



# The Geology of Burma (Myanmar): An Annotated Bibliography of Burma's Geology, Geography and Earth Science.

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September 2008

**UNCLASSIFIED / UNLIMITED**

# Bibliography of Burman Earth Science

REPORT DOCUMENTATION PAGE			
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1. REPORT DATE		2. REPORT TYPE: Bibliography	
4. TITLE AND SUBTITLE: The Geology of Burma (Myanmar): An Annotated Bibliography of Burma's Geology, Geography and Earth Science.			
6. AUTHOR(S) HADDEN, Robert Lee			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Corps of Engineers Topographic Engineering Center ATTN: CEERD-TO-I 7701 Telegraph Road Alexandria, VA 22315-3864			
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)  Geospatial Library      7701 Telegraph Road Alexandria, VA 22315-3864			
12. DISTRIBUTION / AVAILABILITY STATEMENT  Unclassified/Unlimited			
13. SUPPLEMENTARY NOTES:			
14. ABSTRACT A bibliography on Burma prepared by the Topographic Engineering Center (TEC) to assist with humanitarian efforts offered by the US Government after the devastating Cyclone Nargis hit Burma on May 2, 2008. As such, this bibliography covers items of interest to disaster engineers and emergency planners, including citations on topography, transportation, water, medical concerns, and security.			
15. SUBJECT TERMS: Burma. Climate. Earth Sciences. Forests. Geology. Geography. Groundwater. Hydrology. Maps. Meteorology. Mining. Myanmar. Soils. Surface-water. Transportation. Water.			
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT	
Unclassified/Unlimited			
18. NUMBER OF PAGES 312			
a. REPORT	b. ABSTRACT	c. THIS PAGE	
	Unclassified/Unlimited	Unlimited	

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### **Preface**

This bibliography was produced quickly by the Topographic Engineering Center (See: <http://tec.army.mil/Burma/index.html>) in response to the humanitarian crisis caused by the Cyclone Nargis which hit Burma in May 2, 2008. The cyclone packed winds of 215 km/hr (135mph) and with very heavy rains. The cyclone made landfall in Burma as a Category 4 cyclone, with catastrophic results, with estimates of 146,000 fatalities, and thousands more people missing, injured and homeless.

These two images below are provided from NASA, and show the overwhelming amount of damage caused by Cyclone Nargis to Burma. Flood water can be difficult to see in photo-like satellite images, particularly when the water is muddy. This pair of images from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite uses a combination of visible and infrared light to make the floodwaters obvious to the viewer. Water is blue or nearly black, vegetation is bright green, bare ground is tan, and the clouds are white or light blue.

On April 15, 2008 (the top image), rivers and lakes are sharply defined against a backdrop of vegetation and fallow agricultural land. The Irrawaddy River flows south through the left-hand side of the image, splitting into numerous distributaries known as the Mouths of the Irrawaddy. The wetlands near the shore are a deep blue green. Cyclone Nargis came ashore across the Mouths of the Irrawaddy and followed the coastline northeast.

The entire coastal plain of Burma is flooded in the May 5 image (the bottom image). The fallow agricultural areas appear to have been especially hard hit. For example, Yangôn (population over 4 million) is almost completely surrounded by floods. Several large cities (population 100,000–500,000) are in the affected area. Muddy runoff colors the Gulf of Martaban turquoise.

The high-resolution image provided above is at MODIS' maximum spatial resolution (level of detail) of 250 meters per pixel. The MODIS Rapid Response Team provides twice-daily images of the region in additional resolutions and formats, including photo-like natural color.



April 15, 2008



May 5, 2008

Relief efforts were slowed or non-existent as the Burmese military rulers initially refused aid from outside the country. By May 12-20, 2008, the US Department of Defense coordinated \$1.2 million dollars of relief supplies on 36 USAF C-130 flights. The relief supplies would provide needed help to some 113,000 storm victims. Much more aid was needed.

President George Bush also ordered the Essex group, composed of the USS Essex, the USS Juneau, the USS Harpers Ferry, and elements of the Third Marine

Expeditionary Force (III MEF), to stand by offshore with relief supplies, disaster engineering expertise and medical assistance.

The Topographic Engineering Center (TEC) has scanned a number of geological and hydrological maps of Burma to assist the disaster planners on these ships and elsewhere. This data is used to select locations for supply dumps, emergency hospital locations, sanitation and clean water supplies. Other data on transportation and terrain helped with the airlifting of supplies, evacuating of the injured, and the prevention of bottlenecks in air, land and water traffic.

The government of Burma refused permission for the US Navy and Marines to aid the survivors. The Essex group stood off the coast of Burma, waiting for permission to lend its support of supplies, helicopters and manpower, but it was never given.

Although the humanitarian aid was refused, the TEC webpage has also helped civilian relief agencies in their efforts. The data is available around the world, and the US government, the United Nations and a number of non-governmental organizations have made use of this data in their humanitarian relief efforts.

Copyrighted and sensitive materials have been placed behind the PKI site, and are available only to US government civilian and military personnel with CAC access. However, most of the information is from open sources, and thus is available to anyone.

Special thanks are given to all those people outside of the Topographic Engineering Center who helped in this emergency project. They include the Reference Staff of the US Geological Survey Library who replied promptly to our requests and made their services so accessible (<http://library.usgs.gov/>); the public services staff of the Defense Technical Information Center (DTIC) who responded so quickly to our requests, and bent over backwards to make their information available online to the public (<http://www.dtic.mil/dtic/index.html>); the Reference Staff of the Geography and Map Division, The Library of Congress (<http://www.loc.gov/rr/geogmap/>) and to Mr. Willie Sayeed of RefWorks for the use of their services in putting together and updating the bibliography of citations from so many different electronic and manual resources so quickly ([www.RefWorks.com](http://www.RefWorks.com)).

## **Introduction**

The Land:

The country is known by several names: the conventional long form: "Union of Burma"; conventional short form: "Burma"; local long form: "Pyidaungzu Myanma Naingngandaw" (translated by the US Government as "Union of Myanma" and by the Burmese as "Union of Myanmar"); local short form: "Myanma Naingngandaw"; former: "Socialist Republic of the Union of Burma". Note: since 1989 the military authorities in Burma have promoted the name Myanmar as a conventional name for their state; this decision was not approved by any sitting legislature in Burma, and the US Government did not adopt the name, which is a derivative of the Burmese short-form name Myanma Naingngandaw.

The capital city is Rangoon (Yangon), with geographic coordinates: 16 48 N, 96 09 E. Strategically, Burma holds a strategic location near major Indian Ocean shipping lanes.



The time difference: UTC+6.5 (11.5 hours ahead of Washington, DC during Standard Time). Note: Nay Pyi Taw is actually the administrative capital. There are seven administrative divisions (taing-myar, singular - taing) and 7 states (pyi ne-myar, singular - pyi ne). The divisions are: Ayeyarwady, Bago, Magway, Mandalay, Sagaing, Tanintharyi, Yangon. The seven states are: Chin, Kachin, Kayah, Kayin, Mon, Rakhine and Shan.

Burma lies in Southeastern Asia, bordering the Andaman Sea and the Bay of Bengal, between Bangladesh and Thailand. It is slightly smaller in land area than Texas, and has a total area of 678,500 sq km. Of this, land covers 657,740 sq km, and water covers 20,760 sq km. The national boundaries total: 5,876 km, with border countries boundaries of: Bangladesh at 193 km; China at 2,185 km; India at 1,463 km; Laos at 235 km and Thailand with a shared boundary of 1,800 km. There is also 1,930 km of coastline.

### **The Physical Features of Burma<sup>1</sup>**

#### **Geology, Topology and Terrain**

As a country, Burma slopes downward in elevation from the north to the south, and is naturally divided into “Upper Burma” and “Lower Burma”. The terrain is made up of central lowlands ringed by steep, rugged highlands. In the north, the Hengduan Shan mountains form the border with China. Mount Hkakabo Razi, located in the Kachin State, is at an elevation of 5,881 m (19,295 ft), and is the highest point in Burma. The mountain ranges in Burma generally run from north to south as well. Three of these mountain ranges, namely the Rakhine Yoma, the Bago Yoma, and the Shan Plateau, all exist within Burma, and all of these ranges run from north-to-south from the Himalayas.

These mountain chains also divide Burma's three main river systems, which are the Irrawaddy (aka Ayeyarwady), the Salween (aka Thanlwin), and the Sittang rivers. Burma's longest river, the Irrawaddy River, is nearly 2,170 kilometers (1,348 mi) long, and it flows through the country and into the Gulf of Martaban. Fertile plains exist in the valleys between the mountain chains. The majority of Burma's population lives in the Irrawaddy valley, which is situated between the Rakhine Yoma and the Shan Plateau.

As a whole, Burma can be divided into five physiographic regions: the northern mountains; the western ranges; the eastern plateau; the central basin and lowlands, and finally the coastal plains.

The northern mountain region consists of a series of ranges that form a geological complex at Mount Hkakabo. In terms of plate tectonics, this geological complex or “geologic knot” marks the northeastern limit of the encroaching Indian-Australian Plate. The Indian-Australian Plate has been colliding with the southern edge of the Eurasian Plate for roughly the past 50 million years, and has been thrusting up the mountain ranges

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<sup>1</sup> The data in this introductory section are collected from a number of open literature and common knowledge publications and resources, such as various almanacs, AGI's “Glossary of Geology”, geographical dictionaries and gazetteers; encyclopedias such as the World Survey of Climatology, the Encyclopedia Britannica, Encarta, Water Encyclopedia, etc.; open source government publications and websites from the US Department of State, the Library of Congress, the Defense Technical Information Center, the Food and Agriculture Organization of the UN and others; the CIA Factbook, and several different reports, articles and books on Burma from federal government geological and geographical resources.

of Burma and the regions beyond. This northern mountain physiographic region contains the sources of several of Asia's great rivers, including the Irrawaddy, which rises and flows wholly within Burma, and the Salween, which rises to the north in China. The upper courses of these rivers all flow through deep gorges within a short distance of each other, separated by steep, sheer peaks. Jade and other minerals are mined in these northern mountains.

The western range region traverses the entire western side of Burma, from the northern mountains to the southern tip of the Rakhine (Arakan) Peninsula, where they run under the sea and then reappear above the ocean as the Andaman and Nicobar Islands, territories of India. The mountains' average elevation is about 1,800 meters (6,000 feet), although some peaks rise in height to 3,000 meters (10,000 feet) or higher. These mountains consist of old crystalline rocks surrounded by hard, tightly folded sedimentary rocks on either side. From north to south, the Patkai Range, the Naga Hills, and the Chin Hills form the borders between India and Burma. To the south of these are the Rakhine Mountains (Arakan Mountains), which lie entirely within Burma and separate the coastal strip from the central basin.

Occupying the eastern half of the country, the Shan Plateau is deeply dissected, with an average elevation of about 900 meters (3,000 feet). The Shan Plateau to the east rises abruptly from the central basin, often in a single step of some 600 meters (2,000 feet). Because of the geology of this region, rubies and sapphires have been mined in the northern Shan Plateau since pre-colonial times. Burma's rulers depend on sales of these precious stones such as sapphires, pearls and jade to fund their regime. Rubies are the biggest earner; 90% of the world's rubies come from the country, whose red stones are prized for their purity and hue. Thailand buys the majority of the country's gems. Burma's "Valley of Rubies", in the mountainous Mogoke area, about 200 km (125 miles) north of Mandalay, and is noted for its rare pigeon's blood rubies and blue sapphires.

The Shan Plateau was formed during the Mesozoic Era, some 248 to 65 million years ago, and thus is a much older geologic feature than the western mountains. But the Shan Plateau also shows more-recent and intensive folding than the western mountains, with north-south longitudinal ranges rising steeply to elevations of 1,800 to 2,600 meters (6,000 to 8,600 feet) above the plateau surface. Northward, the plateau merges into the northern mountains, and southward it continues into the Dawna Range and to the peninsular Tenasserim Mountains (aka Tanintharyi Mountains), each a series of parallel ranges with narrow valleys.

The central basin and lowlands, lying between the Rakhine Mountains and the Shan Plateau, are structurally connected with the folding of the western ranges. The basin was deeply excavated by the predecessors of the Irrawaddy, Chindwin, and Sittang rivers; the valleys are now occupied by these rivers, which cover the ancient soft sandstones, shales, and clays with their alluvial deposits.

The Basin of the Irrawaddy, with its tributaries the Chindwin, Shweli, and Myitnge rivers, occupies most of Burma. In the delta regions formed by the Irrawaddy and Sittang rivers, the landscape is absolutely flat, and the monotony is relieved only by a few blocks of erosion-resistant rocks that are never more than 18 meters (60 feet) high. The basin is divided into two unequal parts, the larger Irrawaddy valley and the smaller Sittang valley. Between these two valleys are the Bago Mountains. In the centre of the basin and also structurally connected with the Bago Mountains and their northern

extension, is a line of extinct volcanoes with small crater lakes and eroded cones. The largest of these eroded volcanic cones is Popa Hill, at 1,518 meters (4,981 feet).

The coastal areas consist of the narrow Rakhine and Tenasserim plains, which are backed by the higher ranges of the Rakhine and Tenasserim mountains. These coastal regions are fringed with numerous islands of varying sizes.

As to economic geology, Burma is rich in certain minerals, including metal ores, petroleum, and natural gas. Deposits of silver, lead, zinc, and gold are concentrated in the northern Shan Plateau; tin and tungsten in the Tenasserim region, and barite around the town of Maymyo in the central basin. Copper mining at the town of Monywa began in the early 1980s and has been growing, despite intermittent setbacks caused by shortages of fuel and supplies as well as by economic sanctions imposed by foreign governments.

Large-scale exploitation of Burma's mineral deposits began in the mid-1970s. Although production generally has been increasing since the late 20th century, mining accounts for only a tiny fraction of the country's GDP and a comparable portion of the workforce.

The country also has significant deposits of precious and semi-precious stones. Burmese rubies are internationally known for their deep color and quality. The country also produces smaller quantities of spinels<sup>2</sup>, diamonds, and other gemstones.

### **Weather and Climate**

Although Burma is located in the monsoon region of Asia, its climate is greatly modified by its geographic position and its topographical relief. The cold air masses of Central Asia bring snow to the northern mountains for two months of the year, but this mountain wall prevents the cold air masses from moving farther south, so that Burma lies primarily under the influence of the monsoon winds. The north-south alignment of ranges and valleys also creates a pattern of alternate zones of heavy and scanty precipitation during both the northeast and southwest monsoons. Most of the precipitation, however, comes from the southwest monsoon. The west coast is subject to occasional tropical cyclones.

Most of Burma lies between the Tropic of Cancer and the Equator. The Tropic of Cancer divides the country into two regions: the tropical south that covers two-thirds of the country, and the sub-tropical and temperate north, which is the remaining one-third of Burma. This causes two distinct seasons: the dry season from mid-October to Mid-May, and the wet season. There is a cooler spell during the wet season from December to February.

The coastal regions and the western and southeastern ranges receive more than 200 inches (5,000 mm) of precipitation annually, while the delta regions receive about 100 inches (2,500 mm). The central region is not only positioned away from the sea but also on the drier, lee side- in the rain shadow- of the Rakhine Mountains. Precipitation gradually decreases northward until in the region's dry zone it amounts to only 20 to 40

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<sup>2</sup> Probably named from the Latin word "spina", (meaning "thorn"), for its pointed (octahedral) crystals. Spinel is a hard mineral with octahedral crystals found in igneous and carbonate rocks. Spinel occurs typically as a contact metamorphism of impure dolomitic limestone, and less commonly as an accessory mineral of basic igneous rocks. Spinel also occurs in alluvial deposits. It consists essentially of alumina and magnesia ( $MgAl_2O_4$ ), but commonly contains ferrous iron and sometimes also chromium. It is found in a variety of colors including blue, green, brown, black, and the valuable red variety which resembles a ruby, and is frequently used as a gemstone.



inches (500 to 1,000 mm) per year. The Shan Plateau, because of its elevation, usually receives between 75 and 80 inches (1,900 and 2,000 mm) annually.

#### Monsoons

As said above, Burma also lies in the monsoon region of Asia, with its coastal regions receiving over 5,000 mm (200 in) of rain annually. Annual rainfall in the southern delta region is approximately 2,500 mm (100 in), while average annual rainfall in the Dry Zone, which is located in central Burma, is less than 1,000 mm (40 in).

Burma has a monsoon climate with three main seasons: the hot period, the rainy season and the cooler period.

The hottest period is between February and May, with little or no rain. At the end of this season, generally from March to April, the average monthly temperature reaches the upper 30's C (lower 100's F) in many parts of Burma. The average daily temperatures in Yangon (Rangoon) range from 24° to 36°C (75 to 97°F) in April, during the hot season.

The climate of Burma and other countries in South and Southeast Asia follows a typical monsoon pattern. During the half of the year that the sun's rays strike directly above the equator, the land mass of Asia is heated more than is the Indian Ocean. This draws moist hot air from over the ocean onto the land, bringing the rains of the southwest monsoon season. The Monsoon or Rainy season, also called "the hot and wet season", exists usually from May to October.

In Burma during this hot and wet season, rain usually falls nearly every day and sometimes all day long, and almost all of Burma's annual rainfall occurs during this time. Rainfall during the monsoon season totals more than 500 cm (200 in) in upper Burma and over 250 cm (100 in) in lower Burma and Yangon (Rangoon). Central Burma, called the dry zone, and Mandalay, the chief city in this area, each receive about 76 cm (30 in). By July rains have brought the average temperature down to 29°C (84°F) in Mandalay and 27°C (81°F) in Yangon.

Average annual rainfall during this season varies from about 5,000 mm (about 200 in) on the Tenasserim Coast to about 760 mm (about 30 in) at Mandalay. The country receives practically all its rainfall between mid-May and October, the period of the Southwest Monsoon. Annual precipitation in most of Upper Burma averages about 890 mm (about 35 in) and in Lower Burma about 5080 mm (about 200 in). The climate is tropical monsoon, with cloudy, rainy, hot and humid summers during the height of the southwest monsoon season, from June to September.

When the tilt of the earth brings the direct sun rays south of the equator, the heating of the Indian Ocean draws the cooler dry air of the northeast monsoon from the highlands of Asia across the countries of South and Southeast Asia. The dry, cooler weather is from October/November to February. The hot, dry inter-monsoonal season is from mid-February to mid-May. The country is less cloudy, with scant rainfall and mild temperatures and lower humidity during the winter. This is the time of the cool, relatively dry northeast monsoon.

In this cooler season, which runs from late October to mid-February, the temperature for January averages 25°C (77°F) in Yangon in Lower Burma and 20°C (68°F) in Mandalay in Upper Burma. The average daily temperatures in Yangon (Rangoon) range from 18° to 32°C (64-90°F) in January, during this cooler season.

In Burma, the mean annual temperature is 27°C (81°F). Although Burma is a tropical country, temperatures are not uniformly high throughout the year and throughout the country. The daily temperature range in Burma is greater than that temperature range in nearly all other parts of Southeast Asia. But no region in Burma has a continental type of climate (i.e., one characterized by large seasonal differences in average temperature). However, the average daily temperatures in Burma show little variation across the country, ranging from 26 °C to 28 °C (79 °F to 82 °F) between Sittwe in the Rakhine region, Yangon near the coast, and Mandalay in the northern part of the central basin. At Lashio, on the Shan Plateau, the average daily temperature is somewhat cooler, around 22 °C (71 °F).

Elevation and distance from the sea affect temperature as well, and temperatures are generally lower in Burma's mountainous regions. The northern regions of Burma are the coolest in the country, with average temperatures of 21°C (70°F). Thus the climate in upper Burma, especially at altitudes ranging from about 300 to 1,220 meters (1,000–4,000 ft) of elevation, remains the most temperate throughout the year.

Mandalay, in the centre of the dry zone, has some of the greatest daily temperature ranges, which span about 12°C (22°F) annually.

Lower Burma, especially in the river delta and along the coastal regions, is the most humid part of the country. The coastal and delta regions have a mean annual temperature of 32°C (90°F).

### **Surface and Ground Water Resources**

The water resources in Burma from 1999 include 1,045.6 cubic kilometers of total renewable water resources. Freshwater withdrawal for domestic, industrial and agricultural use, totals about 33.23 cu km/yr (1%/1%/98%); per capita water withdrawal in 2000 is about 658 cu m/yr. Environmentally, Burma suffers from deforestation and the industrial pollution of air, soil, and water. Also the inadequate sanitation and water treatment contribute to disease.

Like the mountains, Burma's main rivers run mainly from north to south. About three-fifths of the country's surface is drained by the Irrawaddy River and its tributaries. The Rakhine coastal plains are drained by short, rapid streams, which, after forming broad river deltas, flow into the Bay of Bengal. The Tenasserim plains also are drained by short and rapid rivers, which enter the Gulf of Martaban.

The Bassein River, also known as the Patheingyi River, drains the southern Rakhine Mountains. The Bassein River is about 257 kilometers (160 miles) long, and is chiefly a navigable outlet of the Irrawaddy River in the western part of the delta.

Chindwin River: The great tributary of the Irrawaddy, the Chindwin, is about 1,158 km (750 miles) long, and drains the western region. The Chindwin River (Burmese: *Chindwin Myit*) is the largest tributary of the Irrawaddy River. It flows entirely within Burma and is known as "Ning-thi" to the Manipuris. The Chindwin rises in the Kumon Range in northern Burma, and flows northwest through the Hukawang Valley, then south along the Indian border and then southeast to the Irrawaddy River at Myingyan.

The Chindwin is navigable for some 500 miles (800 km) from its confluence with the Irrawaddy below Mandalay to the confluence with the Uyu River, its chief tributary.

The Chindwin is served by regular river-going vessels up to the town of Homalin. Much of Chindwin's course lies in the within mountain ranges and forests.

Due to the difficulty of access, much of the un-navigable river area remains unspoiled. The government of Burma recently created a very large (2,500 square mile) sanctuary for the endangered tiger within the Hukawng Valley. Teak forests within the drainage area have been a valuable resource since ancient times. The Hukawng Valley is known for its abundance of Burmese amber. Along the river, there are also deposits of jade, but the best jade is found in the region around the headwaters of the Uyu river.

The Irrawaddy River: The country's trade in rice is dependent on water transport, and the Irrawaddy River is the backbone of Burma's transportation system. The Irrawaddy River starts in the North of Kachin State, at the confluence of the Mali Hka and N'Mai Hka rivers north of Myitkyina. The western Mali Hka branch arises from the end of the southern Himalayas, north of Putao, and, like the main river, is called "Nam Kiu" in the Shan language. The river then flows south through Burma to the Bay of Bengal through several mouths near Rangoon. Flowing entirely through Burma, the Irrawaddy is about 2,092 km long (1,300 miles), and it is navigable year round for nearly 1,000 miles (1,600 km) up to the junction with the Bhamo, the main tributary of the Chindwin River.

The Irrawaddy River bisects the country from north to south and empties into the Indian Ocean through a nine-armed Irrawaddy Delta. In colonial times, before railways and automobiles, the river was known as the "Road to Mandalay". Although navigable by large vessels to Myitkyina for a distance over 1,600 km from the ocean, the river is also full of sandbanks and islands, making such navigation difficult. For many years, the only bridge built to cross the Irrawaddy River was the Inwa Bridge.

At the apex of its delta, the Irrawaddy breaks up into a vast network of streams and empties into the Andaman Sea through multiple mouths. The many streams of the Irrawaddy delta are navigable, and there is a regional system of inter-connecting canals.

The Kaladan River is a river located in the west of the country around the Sittwe area. The Burmese government was working on a \$500 million project in cooperation with India to attempt to facilitate river trade between the two nations. The Kaladan River trade will open up not only Mizoram but India's entire North East as a hinterland for the Burma port of Sittwe. Development of the river is also being negotiated with the Shwe Gas Project for economic enhancement.

The Kok River originates in Shan State, Burma. It flows down and across the Burma-Thailand border to Mae Ai district, Chiang Mai Province. Most of its length is in Chiang Rai Province passing the districts Mueang Chiang Rai, Mae Chan, Chiang Saen and Wiang Chai. It becomes a tributary to the Mekong River in Chiang Saen district.

The Mali River (*Mali Hka*) is a river that originates in northern Burma. It flows approximately 320 km, when it meets with the Nmai River and their confluence forms the Irrawaddy River.

The Mekong is one of the world's major rivers. It is the 11th-longest river in the world, and 7th longest in Asia, discharging  $475 \text{ km}^3/114 \text{ cu mi}$  of water annually. Its estimated length is 4,350 km (2,703 mi), and it drains an area of  $795,000 \text{ km}^2$  (307,000 square miles). From high in the Tibetan Plateau, the Mekong runs through China's Yunnan province, then through Burma, Thailand, Laos, Cambodia and Vietnam. All the other countries except China and Burma belong to the Mekong River

Commission. The extreme seasonal variations in flow and the presence of rapids and waterfalls have made navigation extremely difficult along the river.

The Moei River is a tributary of the Salween River. It originates in Phop Phra district, Tak Province. Unlike most rivers in Thailand, the Moei flows north. The river forms the natural border line between Thailand and Burma. The districts along the Moei River bank of Thailand, from South to North are Mae Sot, Mae Ramat, Tha Song Yang and finally it enters the Salween River in Sop Moei district of Mae Hong Son Province. The river is about 327 km long.

The Rangoon River, also known as the Yangon River, is about 40 km long (25 miles), and flows from southern Burma as an outlet of the Irrawaddy River into the Irrawaddy delta. The Rangoon River drains the Bago Mountains; both the Rangoon and the Bassein Rivers enter the Irrawaddy at the delta.

The Ruak River is a river along the Thai-Burma border. It originates within the hills of the Shan State of Burma, and becomes the boundary river between Thailand and Burma at the confluence with the Mae Sai River at the northernmost point of Thailand. It then meanders to the east until it empties into the Mekong River at Ban Sop Ruak, Tambon Wiang, Chiang Saen district, Chiang Rai Province. The boundary section of the river is 26.75 km long.

The Shan Plateau is drained by the Salween River, which enters Burma from southern China and empties into the Gulf of Martaban southeast of the Sittang. The Salween rises in the Plateau of Tibet, and then flows east through Sichuan, then south through the western Yunnan province of southwestern China. The Salween is about 2,415 km long (1500 miles). Many of its tributaries are more than 480 km (300 miles) long and join the Salween in cascades. The river continues south through Burma, and its lower course becomes part of the boundary between Thailand and Burma. The river empties into the Gulf of Martaban at Moulmein. The Salween River, because of its rapids, is navigable for less than 160 km (100 miles) from the sea.

The Salween River is deeply entrenched and crosses the Shan Plateau in a series of deep gorges. It is home to over 7,000 species of plants and 80 rare or endangered animals and fish. UNESCO said this region “may be the most biologically diverse temperate ecosystem in the world” and designated it a World Heritage Site in 2003.

The Salween is the longest undammed river in mainland Southeast Asia. Proposals to build several dams along the river, mainly in Burma, are controversial. Thailand is studying the feasibility of jointly constructing the Hatgyi Dam on the Salween River near the border with Burma; citing environmental, cultural, and social concerns, China is reconsidering construction of 13 dams on the Salween River but energy-starved Burma with backing from Thailand remains intent on building five hydro-electric dams downstream, despite identical regional and international protests.

The Sittang River flows into the Gulf of Martaban of the Andaman Sea. The Sittang flows in east central Burma, and then flows south to the head of the Gulf of Martaban. The river is about 418 km long (260 miles) and, for a comparatively short river, it has a large valley and delta.

Although the Sittang River flows through fairly flat country, the Sittang has a notorious tidal bore at its mouth which has precluded any but very small craft navigating the river. Strong currents make the river even less valuable as a means of transport in eastern Burma. The Sittang, in spite of its silt, is usable by smaller boats, but its basin

does not have the same richness for agriculture as the Irrawaddy because there is no soil flowing from the Himalayas.

The Zawgyi River is a river of eastern Burma. It flows through the foothills of the Shan Mountain range in Shan State.

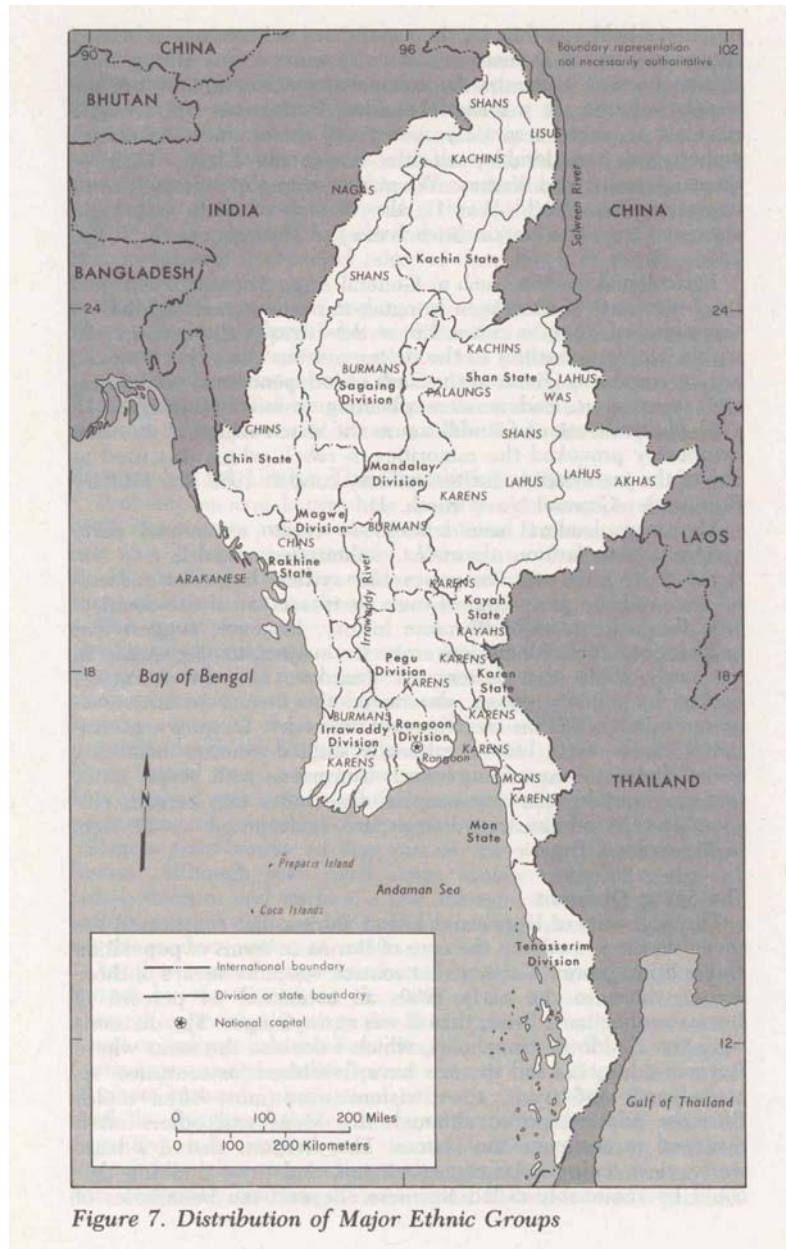
Burma has two major lakes. The Indawgyi Lake, in the northern hills, runs some 24 km (15 miles) from north to south and 13 km (8 miles) from east to west. The Indawgyi is one of the largest natural inland lakes of Southeast Asia.

Somewhat smaller is Inle Lake, stretching about 22 km (14 miles) from north to south and 11 km (7 miles) from east to west, is located on the Shan Plateau. The Inle Lake is fed by dozens of streams.

### **Geography**

The life expectancy in Burma is: Male 58 years; Female 63. Hospitals 1:1,586. The literacy rate is 78%.

The major ethnic groups in Burma are: Burman 68%, Shan 9%, Karen 7%, Rakhine 4%, Chinese 3%, Indian 2%, Mon 2%, other 5%. Complicating national unity, over half of Burma's population consists of diverse ethnic groups who have substantial numbers of kin living in neighboring countries. Thailand must deal with Karen and other ethnic refugees, asylum seekers, and rebels, as well as illegal cross-border activities from Burma. India also seeks cooperation from Burma to keep Indian Nagaland separatists, such as the United Liberation Front of Assam, from hiding in the remote Burmese Uplands.



*Figure 7. Distribution of Major Ethnic Groups*

Image taken from: "Burma: A Country Study." 1984.  
Foreign Area Studies, the American University. 3<sup>rd</sup> edition. US GPO.



The Burmans, who form the largest ethnic group, account for more than half of the population. They are concentrated in the Irrawaddy River valley and in the coastal strips, with an original homeland in the central dry zone.

The Shans (shahns) are about 9% of the population. "Once the masters of the Burmans when they ruled after the collapse of the Pagan-based monarchy, the Shans have no historical inferiority complex. In the centuries after the Pagan period, the Shans developed their own monarchies where Shan mandalas of power oscillated constantly as more powerful Burmese and Thai kings contested each other. Deference to outside royalty was a small price to pay for considerable Shan independence internally. The Shans in 1983 were basically rice farmers, skillful traders, and a valley people. In matters of governance, historically they have allowed an aristocratic elite to rule them."

The Shan of the Shan Plateau have little ethno-linguistic affinity with the Burmans, and, although historically led by hereditary rulers, their society was less elaborately structured than that of the plains peoples. The Shan represent a small but significant portion of the country's population. The ethnographic complexity of the highlands occasionally leads to mis-groupings of some of the smaller communities with their more prominent neighbors. For example, the Wa and the Palaung of the Shan Plateau are often grouped with the larger, but ethnically and linguistically distinct, Shan community.

The Karen ethnic group is about 7% of the Burmese population. "It has been fashionable to call the traditional religion of people like the Karens a form of animism, or 'spirit worship.' The word never does justice to such beliefs, which may be as complex and lofty as those of the major religions of the world. Traditional Karens, like so many other peoples, believe that both matter and spirit are realities, each possibly inhabiting the same entity at a given time or perhaps later separated but still linked. There are Karen gods, rituals, and oral religious traditions so impressive that early missionaries toyed with the belief that the Karens were a lost tribe of Israel. No matter where Karens live, they characteristically have a strong sense of ethnic pride."

The Karen are the only hill people who have settled in significant numbers in the plains. Constituting about one-tenth of the population, they are the second largest ethnic group in Burma. They are found in the deltas among the Burmans, in the Bago Mountains, and along both sides of the lower Salween River. The Kayah, who live on the southern edge of the Shan Plateau, were once known as the Red Karen, or Karenni, apparently for their red robes. Although ethnically and linguistically Karen, they tend to maintain their own identity and hereditary leadership.

The Chin (pronounced "JIN"): In the western hills and the Chindwin River valley are various groups called by the comprehensive name of Chin. "Turbulent, competitive, legalistic, and yet very social, the Chins did not take to Christianity as well as did the Karens. Like the Karens, those who are Christians (possibly one-quarter of the population) have hoped to use their new faith to link with outside powers to protect their people from being engulfed by Burmans. The Chin religion, in which the door to paradise is opened by hinting done in the proper way to honor and contend with the spirits of what is killed, can be seen in contrast to the Buddhism of their neighbors, where taking life is normatively scorned. Animal sacrifice, so common among hill peoples, is likewise condemned by valley Buddhists." The Naga on the Burma side of the frontier with India sometimes are mistakenly placed with the Chin

Numerous small ethnic groups, most of which inhabit the upland regions, together account for roughly one-fifth of Burma's population. The upper Irrawaddy valley and the northern hills are occupied by groups under the comprehensive name of Kachin. These peoples long have had an association with the Burmans. The Muhso (a Lahu people) in northeastern Burma are sometimes grouped with the Kachin.

Chinese, Indians, and other minorities in Burma: "Since only people who can prove long familial links to Burma are accorded full citizenship, ethnic populations such as Muslims, Indians, and Chinese, continued to be denied full citizenship and to be excluded from government positions. People without full citizenship are not free to travel domestically and are barred from certain advanced university programs in medicine and technological fields. Anti-Chinese and anti-Muslim sentiment remained pervasive."

#### Religions

The major religions of the country are: Buddhist 89%, Christian 4% (Baptist 3%, Roman Catholic 1%), Muslim 4%, animist 1%, other 2%.

Theravada Buddhism: "In strict orthodox Theravada Buddhism, Gotama (Siddhārtha Gautama) was merely a human being; he does not exist anywhere to hear people's prayers. His words are left in the sacred books and can be learned from his 'sons,' the living Theravada monks, who exist today as the Buddha once instructed the first monks to live. All Burmans share in this heritage and follow some semblance of the strict orthodox teachings. The Buddhism of the Pali scriptures, however, often differs from actual religious beliefs and practices in modern Burma." (all quotations are from the Library of Congress Country Studies/Area Handbook--Burma [Myanmar])

Hinduism: Burma has a substantial number of Hindu adherents in Rakhine. However, many Burmans remember the use of Indian soldiers to colonize and conquer Burma, and thus are looked upon unfavorably by the majority. Also, many of the Buddhist beliefs claim superiority over Hinduism, and the traditional Hindu gods are relegated to godlings who must be reborn as Buddhist humans.

Islam: "The historically porous border between Burma and Bangladesh and India has been the source of perpetual movement of Muslims back and forth in response to their various political fortunes. Although the potential was always there for Buddhist-Muslim confrontation, in general the two groups have managed to live peaceably side by side but without much interaction." Mosques are found in Arakan, Rangoon, and in all areas where the Muslim community is strong, some of these groups having established themselves in Burma centuries ago. Mosques are primarily found within the Rakhine State. Like the Hindu and Chinese populations, Muslims have to keep a low profile in terms of asserting their ethnic identity in order to avoid the racial antagonism that has often flared up in the past." (Human Rights Report...)

Christian: Many Chins, Kachins, Karens and others are Christian. "Minorities in Burma face a Buddhist majority, and Christianity remains an option for asserting one's distinctness, not only for the Karens or Chins, for example, but also for those who have had a genuine Christian conversion and for others who retain a fierce loyalty to all things British. On a visit to Mandalay, a visitor attempting, however ineptly, to speak Burmese should not be surprised to have an impeccably dressed older man watch for a while with a smile and then speak in exquisite English with a perfect Oxford accent. The same elderly

gentleman will finish his days as an ardent Christian. No revolution will convert him into either a Buddhist or a socialist.”

### Languages

The majority language is Burmese, though minority ethnic groups have their own languages.

Many indigenous languages—as distinct from mere dialects—are spoken in Burma. The official language of the country is Burmese, spoken by the people of the plains and, as a second language, by most people of the hills. During the colonial period, English became the official language, but Burmese continued as the primary language in all other settings. Both English and Burmese were compulsory subjects in schools and colleges. Burmese, Chinese, and Hindi were the languages of commerce. After independence English ceased to be the official language, and after the military coup of 1962 it lost its importance in schools and colleges; an elementary knowledge of English, however, is still required, and its instruction is again being encouraged.

The local languages of Burma belong to three language families. Burmese and most of the other languages belong to the Tibeto-Burman subfamily of Sino-Tibetan languages. The Shan language belongs to the Tai family. Languages spoken by the Mon of southern Burma and by the Wa and Palaung of the Shan Plateau are members of the Mon-Khmer subfamily of Austro-Asiatic languages.

Speakers of Burmese and Mon historically have lived in the plains, while speakers of a unique dialect of Burmese (that perhaps retains some archaic features of pronunciation) have occupied the Rakhine and Tenasserim coastal plains. The hills were inhabited by those speaking Shan, Kachin, Chin, and numerous other languages. In the plains the ancient division between northern and southern Burma (Upper Burma and Lower Burma, respectively) was based not only on geographic differences but also on a linguistic one. The Mon (now a small minority) lived in southern Burma, while the majority Burman population lived in the northern dry zone.

Until colonial times only Burmese, Mon, Shan, and the languages of the ancient Pyu kingdom of northern Burma were written. Writing systems for the languages of the Karen, Kachin, and Chin peoples were developed later.

### Land Use

The area of arable land in Burma during 2005 was 14.92% of the country, with permanent crops: 1.31% and other uses: 83.77%. In 2003, there were 18,700 sq km of irrigated land. The major agricultural products of Burma are rice, pulses, beans, sesame, groundnuts, sugarcane; hardwood; fish and fish products.

According to official estimates, about half of Burma remains covered with forests or jungles of various types (depending on elevation and the amount of precipitation). Even after centuries of rice cultivation involving the clearing of forested areas, large tracts of forest remain, but actual coverage may be less than estimated, however.

Subtropical and temperate forests of oak and pine are found at elevations above 3,000 feet (900 meters). In the northern mountains, above 6,000 feet (1,800 meters), are forests of rhododendrons. Elephants are numerous in Burma, and many are trained for work, especially in the timber industries. Tigers, leopards, and wildcats are still common in the wild. Some bears are found in the hilly regions, and gibbons and monkeys of various kinds inhabit the thicker parts of the forests.

Tropical evergreen rainforests of hardwood trees occur in areas receiving more than 2,000 mm (80 inches) of rain annually. In regions where the rainfall is between 1,000 and 2,000 mm (40 and 80 inches) are found broad-leaved tropical-deciduous monsoon forests, the trees of which shed their leaves during the hot season. They produce valuable woods, notably teak. The jungles of Burma are home to a profusion of birdlife, including grouse, pheasants, parrots, peafowl and other wild fowl. The Asian two-horned rhinoceros (*Dicerorhinus sumatrensis*), the wild water buffalo, the gaur (a species of wild cattle), and various kinds of deer were once plentiful but they are now reduced in number and are protected.

Where rainfall is less than 40 inches, the forests gradually open into scrubland. There are no true grasslands in Burma, but bamboo, bracken (ferns), and coarse grass grow in areas where the forest has been cleared and then abandoned.

Snakes include pythons, cobras, and vipers, and crocodiles are found in the deltas. Turtles live in coastal regions, and edible fish abound in every stream.

The country of Burma can be divided into three distinct agricultural regions: the Irrawaddy river delta, where cultivation of rice in flooded paddies predominates; the largely irrigated dry zone, an area primarily of rice production but where a wide variety of other crops also are raised; and the hill and plateau regions, where forestry and cultivation of rice and other crops through shifting agriculture are most important.

### Delta

The delta's traditional agriculture consisted primarily of rice in normal years, with the substitution of millet in drier years or when there was insufficient moisture for rice. Both millet and rice yielded good returns on the alluvial soils.

Although the dry zone was Burma's most important agricultural region in the past, the rice production of the Irrawaddy River delta now provides much of the country's export earnings and the staple diet of the country's people. In the Irrawaddy and Sittang river deltas are also found tidal forests of mangrove trees that grow as high as 30 meters (100 feet) and these trees supply firewood and bark for tanning.

The lowland regions are covered with alluvial soils- mainly silt and clay. Low in nutrients and organic matter, the planted soils are improved by fertilizers. Burma's richest soils are found in a narrow alluvial strip along the Bay of Bengal, where mountain streams irrigate the land in the wide Irrawaddy and Sittang river valleys. These deep soil deposits form a vast, fertile belt especially suitable for rice cultivation because of the abundant moisture.

#### Dry Zone

The Dry Zone covers approximately 8,718,898 hectares or about 13% of the country's total land area, and is situated in the lower Sagaing, Mandalay and Magway Divisions. Based on mean annual precipitation rates the Dry Zone covers 13 administrative districts and 57 townships. The topography is generally undulating. Most of the local streams are dry for much of the year with water flow is usually limited to the rainy periods.

Crops grown in the dry zone, in addition to rice and millet, include sugarcane, fruits (such as plantains), legumes, peanuts or groundnuts, maize, onions, sesame, rubber, and allspice. To cultivate much of this land successfully, however, irrigation is required.

The earliest known irrigation works were constructed in the 1st century and greatly improved during the 11th century. Although the irrigation system maintenance lapsed somewhat after the fall of the monarchy in the late 19th century, many of the ditches and streams are still in active service. As in the delta, the arrival of the British in the dry zone led to increased commercial and public-works activities. British authorities repaired and extended parts of these ancient systems during the early 20th century. Most of Burma's irrigated land is in the dry zone, and almost all of it is planted in rice. The portions of the dry zone that are not irrigated are utilized for the production of crops that are less sensitive to the seasonality or irregularity of rainfall than rice. In addition to the crops mentioned above, cotton and millet are cultivated, although neither is of considerable significance. Cattle also are raised there.

The Dry Zone townships are characterized by clay, sandy loam and sandy soils that include gravel. The soils clearly vary with topography. According to soil survey data, all soil series in the Dry Zone have low fertility and have declining organic matter levels. Potassium levels are also low for agriculture. Nitrogen is required for all non-legume crops on all soil types. This also suggests the consistent low organic matter level in the soil.

The soil moisture holding capacity of the soils of the Dry Zone are low and with the high level of evapotranspiration, impacts agriculture. This lack of moisture in the ground constitutes a major constraint to crop growth during periods of inadequate rainfall, such as in June and July. Farm management practices that conserve soil moisture or increase the water holding capacity of the soils are being practiced to help take advantage of the full growing season. Hard pan formation is common to all the upland areas.

In the dry belt of the central region are found red-brown soils rich in calcium and magnesium. In the same region, however, when the soil has a low clay content, and it becomes saline under high evaporation that is recognizable by its yellow or brown color.

Soil erosion is a serious problem and in some places in the Dry Zone the soil has been almost completely removed by water and wind erosion. Soil erosion is particularly

severe in the upland areas of Kyaukpadaung and Chaung U, largely as a result of the high intensity of rainfall and rapid surface runoff. Moreover, since most of the soil in these areas is moderately textured with a slope ranging from 5-15%, the erodibility of the soil is also high. In Chaung U, the most severe erosion occurs in the upland areas. In contrast, the incidence of soil erosion in the foot plain is lower. Sheet and rill erosion and vertical dissection are widespread, resulting in an uneven topography.

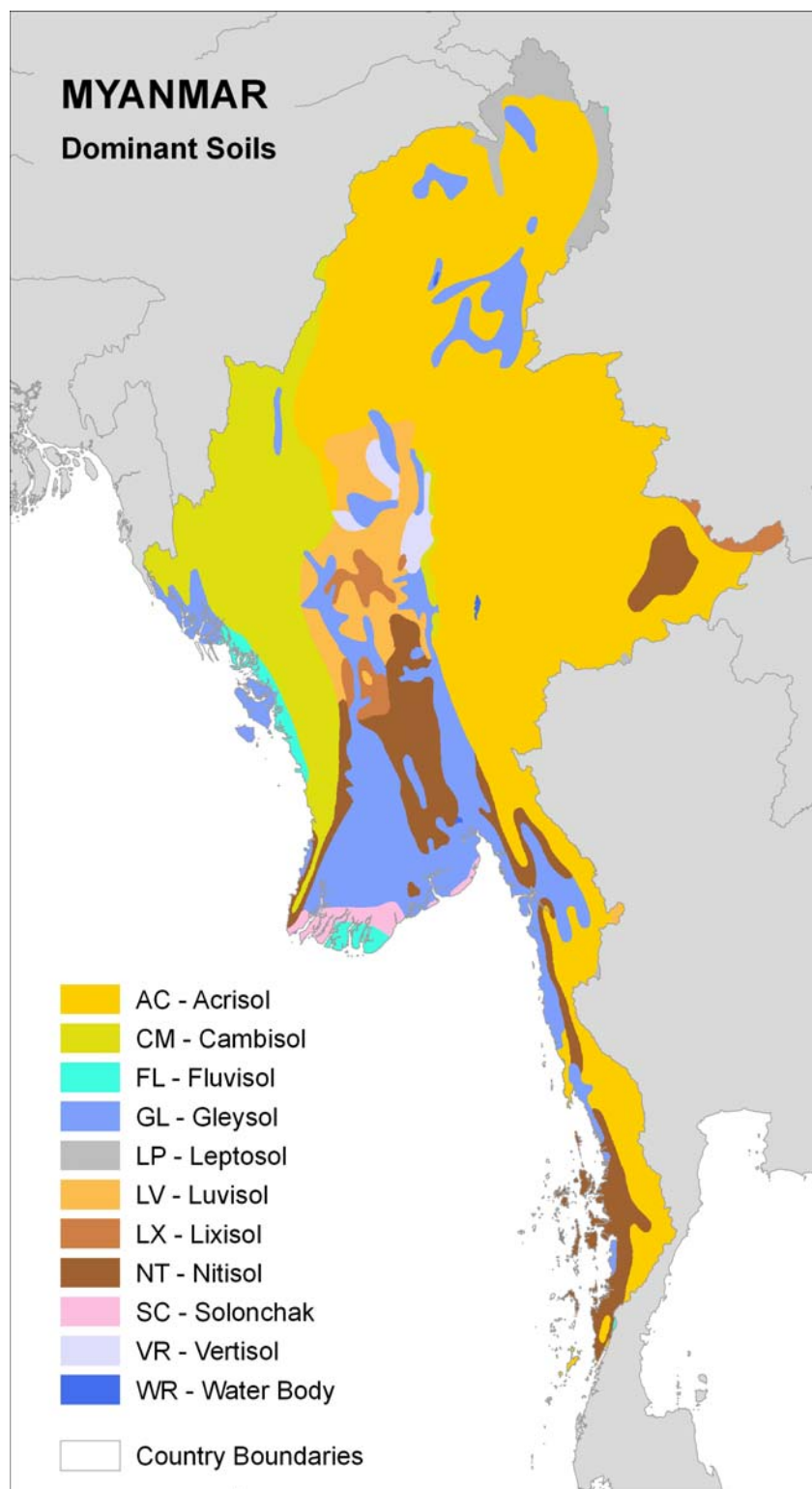
In Magway, because of the sandy topsoil there is also a high level of erosion. The susceptibility of the soil to erosion is compounded by the high level of rainfall occurring over short periods. Wind erosion is a particularly severe problem while sheet and gully erosion are largely confined to wasteland areas. Soil erosion and land degradation are the two components responsible for declining production potential.

#### Hill and Plateau Country

The third agricultural zone, the hill and plateau country, occupies perhaps two-thirds of the area of Burma. This land has less economic significance than the other two zones; it is the home of many of the country's non-Burman ethnic groups, most of whom are engaged in shifting cultivation. More-sedentary modes of agriculture also exist, however, and have been imposed with the advance of agricultural technology, increased population, and central planning.

The highland regions of Burma are covered with highly leached, iron-rich, dark red and reddish brown soils. When protected by forest cover, these soils absorb the region's heavy rain, but they erode quickly once the forest cover has been cleared. Outside the forest areas of these highlands, the principal crops raised are rice, yams, and millet, and large numbers of pigs and poultry are kept. Bullocks and buffalo are used as draft animals, and goats, pigs, and poultry are raised for food in all parts of the country.





**Myanmar Dominant Soils.** *Geographical distribution of 10 dominant soil types in Myanmar. Map created by FAO/NRL from Harmonized World Soil Database (HWSD) – FAO*

### Economy

Burma is one of the poorest nations in southeastern Asia, suffering from decades of stagnation, mismanagement and isolation. Burma's GDP grows at an average rate of 2.9% annually – the lowest rate of economic growth in the Greater Mekong Sub-region.

Agriculture, forestry, and fishing together constitute the largest contributor to Burma's economy. About half of all agricultural land in Burma is devoted to rice, and to increase production the government has promoted multiple cropping (sequential cultivation of two or more crops on a single piece of land in a single year), a system that is easily supported by the country's climate. As a whole, the sector accounts for nearly one-half of the country's gross domestic product and employs about two-thirds of the labor force.

The second most important element in the diet, after rice, is fish, either fresh fish or in the form of *ngapi*, a sort of nutritional paste that is prepared in a variety of ways and eaten as a condiment. Marine fisheries are not well developed, although the industry's reported commercial catch is much greater than that reported from inland waters. Much private, noncommercial fishing is provided, however, in virtually every type of permanent, seasonal, or artificial body of inland water of any size. Non-indigenous fish, including the European carp and the tilapia, originally brought from Thailand, have become the focus of a growing aquaculture industry.

Under British administration and until the early 1960s, Burma was the wealthiest country in Southeast Asia. It was once the world's largest exporter of rice. After Burma was officially annexed to British India in 1886, however, colonial policy called for a more commercially oriented and more extensive cultivation of rice. Since the indigenous labor force was thought to be insufficient to support the colonial export economy, the immigration of Indian and Chinese laborers into Burma was officially encouraged during the early decades of the 20th century. Despite the departure of much of the immigrant labor force and the relatively low growth in rice production after World War II, rice remained both the basic food and, until the 1990s (when it was overtaken by dry beans), the principal agricultural export of Burma.

Also during the British administration, Burma supplied oil through the Burmah Oil Company. Burma also had a wealth of natural and labor resources. It produced 75% of the world's teak and had a highly literate population. The country was believed to be on the fast track to development.

After a parliamentary government was formed in 1948, Prime Minister U Nu attempted to make Burma a welfare state. His administration adopted the Two-Year Economic Development Plan, which was a failure. The 1962 coup d'état was followed by an economic scheme called the "Burmese Way to Socialism", a plan to nationalize all industries, with the exception of agriculture. In 1989, the Burmese government began decentralizing economic control. It has since liberalized certain sectors of the economy, although lucrative industries of gems, oil and forestry remain heavily regulated. These industries have recently been exploited by foreign corporations and governments which have partnered with the local government to gain access to Burma's natural resources.

The major occupations in Burma are in agricultural processing; wood and wood products; copper, tin, tungsten, iron; cement, construction materials; pharmaceuticals; fertilizer; natural gas; garments, jade and gems. The labor force in 2001 was 70% in agriculture; 7% in industry and 23% in services.

### **Transportation**

Airports. There are 86 airports in Burma in 2007. There are 25 airports with paved runways over 3,047 meters long; 8 airports with paved runways from 2,438 to 3,047 meters long; 10 airports with paved runways from 1,524 to 2,437 meters long; 5 airports with paved runways from 914 to 1,523 meters long and one airport that has a runway that is under 914 meters long.

Airports with unpaved runways total 61. Airports with unpaved runways over 3,047 m: 1; airports 1,524 to 2,437 m: 14; airports 914 to 1,523 m: 14; and those airports with unpaved runways under 914 m: 32.

In 2007, there were four heliports listed in Burma. The state-run Burma Airways International runs frequent domestic flights between Yangon and other cities; it also has international service from Yangon to several major Southeast Asian cities. There are also small privately owned airlines that offer domestic and very limited international service. International airports are located only in Yangon and Mandalay.

Railroads in Burma are old and rudimentary, with inadequate and few repairs since their construction in the late nineteenth century. Railways total 3,955 km of narrow gauge track and 3,955 km of 1.000-m gauge in 2006.

The first railway line, running from Yangon to Pyay (Prome) and built in 1877, followed the route of the Irrawaddy River valley. The line was not extended to Mandalay; instead, after 1886 a new railway from Yangon up the Sittang valley was constructed, meeting the Irrawaddy at Mandalay. From Mandalay it crossed the river and, avoiding the Irrawaddy valley, went up the Mu River valley to connect with the Irrawaddy again at Myitkyina. A short branch line railroad now connects Naba to Katha on the Irrawaddy below Bhamo.

The Yangon-Mandalay-Myitkyina railway is the main artery, and from it there are branch lines connecting the northern and central Shan Plateau with the Irrawaddy. Other branches run from Pyinmana across the Bago Mountains to Kyaukpadaung and from Bago to Mawlamyine to Ye. The Pyay-Yangon railway has a branch crossing the apex of the delta to Hinthada and Patheingyi (Bassein).

Roads and highways are normally unpaved, except in the major cities. About 78 percent of the main roads are paved, with about two-thirds of the roads constructed of gravel, and the rest passable most easily only by jeep or ox cart. In 2005, there were a total of 27,000 km of roadways in Burma, of which 3,200 km are paved and 23,800 km are unpaved.

The road system, until independence, was confined to the Irrawaddy and Sittang valleys, and effectively duplicated the railway route. There are extensive road links and several bridge links with Thailand and China. A road goes from Pyay along the Irrawaddy to the oil fields, and many other roads extend into the rural areas.

These rural roads, however, are often impassable during the wet season. In the 1990s the government focused considerable energy on reconstructing roads, often with volunteer or forced labor. There were originally three international roads in use during World War II: the Burma Road from Lashio to Kunming in China; the Stilwell, or Ledo, Road between Myitkyina and Ledo in India; and the road between Kengtung, in the southeastern Shan Plateau, and northern Thailand. The Burma Road, which extended

from northeast of Mandalay into China, played an important role in World War II. These roads subsequently became neglected but more recently have been rebuilt and extended.

There are about 12,800 km (2007) of waterways in Burma. In 2008, the merchant marine in Burma has a total of 27 registered ships (1000 GRT<sup>3</sup> or over) 170,403 GRT and 211,739 DWT<sup>4</sup>; by type: bulk carrier 2, cargo 19, passenger 2, passenger/cargo 3, specialized tanker 1; foreign-owned: 3 (Germany 2, Japan 1).

The long coastline and numerous islands in Burma provide several good harbors. Small steamers and country boats also serve the coasts of the Rakhine and Tenasserim regions. The major ports and terminals are: Moulmein, Yangon and Sittwe. Yangon, as the terminus of road, rail, and river-transport systems, is the country's major port, with up-to-date equipment and facilities. Patheingyi, Mawlamyine, and Sittwe are also important ports.

### **Bibliography and Sources of Citations**

This bibliography on the geology, geography and earth sciences of Burma was gathered from a variety of different abstracting, bibliographical and cartographical resources. They include 592 citations from agriculture, botany, engineering, geology, geography, medical, military science, soils, transportation and other subject resources. These citation resources are provided by a number of scientific societies, such as the American Geographical Society; from government resources, such as the Defense Technical Information Center; non-governmental organizations such as the United Nations Food and Agricultural Organization (FAO); and from commercial databanks such as GeoRef, WorldCat and GeoBase. Many unique citations were collected from the catalogs and resources of major research libraries, such as the Library of Congress and the US Geological Survey Library.

Within this bibliography, the article retrieval information is given as much as possible. These include specific ISSN, ISBN, OCLC and Library of Congress numbers that allow the electronic borrowing or copying of these items through library networks. Alternately, the citations also include information on acquiring these items through document delivery companies and commercial services. Very often, scientific publications in less developed countries are not published in large numbers, and it is very difficult to retrieve reports or maps more than even a few years old. This bibliography is intended to be a resource for those scientific citations on Burma that can still be retrieved.

Also included, when possible, are the addresses and contact information of the journal authors. Many of these experts could be reached as needed during the crisis for additional information and support.

Within these citations are many variations in spelling and place names. Many scientific and cartographic investigations were done in various local languages, and the languages of neighboring countries. Thus, the same name may be spelled differently

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<sup>3</sup> Gross Register Tonnage (GRT) represents the total internal volume of a vessel, with some exemptions for non-productive spaces such as crew quarters; 1 gross register ton is equal to a volume of 100 cubic feet (2.83 m<sup>3</sup>), which volume, if filled with water, would weigh around 2,800 kg or 2.8 tons.

<sup>4</sup> Deadweight (often abbreviated as DWT for deadweight tons) is the displacement at any loaded condition minus the lightship weight. It includes the crew, passengers, cargo, fuel, water, and stores. Like Displacement, it is often expressed either in long tons or in metric tons.

according to the language(s) used. Variations on single and doubled consonants (geminated consonants) and single and doubled vowels (diphthongs) are common.

Rangoon and Yangon are variations on the name of the same city. The river Irrawaddy can be spelled Irrawaddi, Arrawadi, Ayeyarwady etc., according to the language used. So any search for authors, place names and locations in this bibliography should take into account spelling variations.

**Abbreviations and links to resources used:**

(All links and URLs in this bibliography are current as of August 2008)

AGI: American Geological Institute, Alexandria, VA. See: [www.agiweb.org](http://www.agiweb.org). The AGI also has a document delivery service. They say, "When you see a document or map cited in the GeoRef database you can simply order a copy from the GeoRef Document Delivery Service. We provide copies of earth-science documents available in the U.S. Geological Survey Library in Reston, VA, the Library of Congress, the AGI Library, and through an international network of exchange partners including organizations in Germany, China, and the Russian Federation." The document delivery service is found at: <http://www.agiweb.org/georef/dds/index.html>.

AGS: American Geographical Society Library, University of Wisconsin, Milwaukee Campus. See: <http://www.amergeog.org>

AS&T: Applied Science & Technology from H.W. Wilson is a bibliographic database that indexes articles of at least one column in length. English-language periodicals published in the United States and elsewhere are covered; non-English language articles are included if English abstracts are provided. Periodical coverage includes trade and industrial publications, journals issued by professional and technical societies, and specialized subject periodicals, as well as special issues such as buyers' guides, directories, and conference proceedings. See: <http://www.hwwilson.com/Databases/applieds.htm#Abstracts>

ASFA: Aquatic Sciences and Fisheries Abstracts Input to ASFA is provided by a growing international network of information centers monitoring more than 5,000 serial publications, books, reports, conference proceedings, translations, and limited distribution literature. ASFA is a component of the Aquatic Sciences and Fisheries Information System (ASFIS), formed by four United Nations agency sponsors of ASFA and a network of international and national partners. Aquatic Sciences and Fisheries Abstracts are produced by CSA under contract to FAO. See: <http://www.csa.com/>

British Library: The British Library Document Supply Service can supply many of the article citations and reports given in this bibliography, especially those maps and other materials owned by the British Library. See: <http://www.bl.uk/services/document/dsc.html>

CISTI: Canada Institute of Scientific and Technical Information. This is a Canadian document supply service for scientific and technical literature. "Through Global Service, CISTI can obtain any document for you, from anywhere in the world. Most documents are supplied within four weeks. You can specify the level of service you prefer at the time of ordering by choosing the appropriate line from the drop down menu on any of the CISTI order forms." See: <http://cisti-icist.nrc-cnrc.gc.ca/>

CSA Technology Research Database: This comprehensive database provides a single mega-file of all the unique records available through its 3 components: the CSA

Materials Research Database with METADEX, CSA High Technology Research Database with Aerospace, and the CSA Engineering Research Database. The database content represents the most comprehensive and current coverage of the relevant serial and non-serial literature available. Sources covered include over 4,000 periodicals, conference proceedings, technical reports, trade journal/newsletter items, patents, books, and press releases. See: <http://www.csa.com/>

DTIC: Defense Technical Information Center, Alexandria, VA. See: [www.dtic.mil](http://www.dtic.mil)

ESPM: The *CSA Environmental Sciences and Pollution Management* database offers access to the international literature in the environmental sciences. Abstracts and citations are drawn from over 6000 serials including scientific journals, conference proceedings, reports, monographs, books and government publications. See: <http://www.csa.com/>

FAO: Food and Agriculture Organization Library, United Nations, Rome, Italy. See: [www.fao.org](http://www.fao.org)

GeoBase: GEOBASE is a unique multidisciplinary database supplying bibliographic information and abstracts for development studies, the Earth sciences, ecology, geomechanics, human geography, and oceanography. The database provides current coverage of almost 2,000 international journals, including both peer-reviewed titles and trade publications, and provides archival coverage of several thousand additional journal titles and books. GEOBASE is unequalled in its coverage of international literature of the core scientific and technical periodicals. Papers are selected, read, and classified using a unique classification scheme that is versatile and updated annually to adapt coverage to current research trends. The material covered includes refereed scientific papers; trade journal and magazine articles, product reviews, directories and any other relevant material. GEOBASE has a unique coverage of non-English language and less readily available publications including books, conference proceedings and reports, making this the best resource available for multidisciplinary searches of international literature. The content crosses over subject, language, and cultural boundaries, providing a unique research tool to users. All material in *GEOBASE* is also available as print in the following Elsevier/Geo Abstracts journals: *Geographical Abstracts*, *Physical Geography*, *Human Geography*, *Geological Abstracts*, *Ecological Abstracts*, *International Development Abstracts* and *Oceanographic Literature Review*, *Geomechanics Abstracts*. See: [www.elsevier.com](http://www.elsevier.com)

GeoRef: see: American Geological Institute, Alexandria, VA, listed above. The American Geological Institute not only identified materials for the abstracting database, GeoRef, but also locates and supplies materials as a document delivery service. See: [www.agiweb.org](http://www.agiweb.org)

ISBN: International Standard Book Number. This unique number can be used to identify and locate library holdings of a particular book or report title. See: <http://www.isbn.org/standards/home/index.asp>

ISSN: International Standard Serial Number. This unique number can be used to locate libraries which have subscriptions to this journal, magazine or serial. See: <http://www.issn.org/>

Library of Congress Control Number – LCCN: This is a unique number applied by the Library of Congress to identify individual publications. This number can be used



to identify copies of this item in libraries held in the US and abroad. See:

[http://www.loc.gov/marc/lcn\\_structure.html](http://www.loc.gov/marc/lcn_structure.html)

LC or LOC: Library of Congress, Geography and Map Division, Washington, DC. The Geography and Map Division has the largest collection in the world, with 5.4 million maps, 75,000 atlases, 500 globes, 3,000 three-dimensional objects and thousands of digital files. Recently, the Library of Congress has digitally scanned and mounted its 10,000<sup>th</sup> map online. See: <http://www.loc.gov/rr/geogmap/>

Linda Hall Library: "Our Document Delivery Services Department allows students, researchers, and businesses to request copies of journal articles, conference proceedings, historical documents, or many other documents housed at the Linda Hall Library. We are committed to filling every in-scope, properly cited request within 24-48 hours. Requests are processed during the local working hours of 8 am – 5 pm, U. S. Central Time, Monday through Friday. Our fee is a cost recovery fee intended to support a strong collection and dedicated services." See:

[http://www.lhl.lib.mo.us/services/document\\_delivery/index.shtml](http://www.lhl.lib.mo.us/services/document_delivery/index.shtml)

Northwestern University Transportation Library: The Transportation Library was founded in 1958 to support the curricula and research programs of the Transportation Center and the Center for Public Safety of Northwestern University, including the School of Police Staff and Command. Containing over 400,000 items, the Transportation Library of Northwestern University is one of the largest transportation information centers in the world, encompassing information on all transportation modalities, including: air, rail, highway, pipeline, water, urban transport and logistics. Its collection of environmental impact statements is one of the most complete in the world. See:

<http://www.library.northwestern.edu/transportation/>

NTIS: National Technical Information Service, Alexandria, VA. See: [www.ntis.gov](http://www.ntis.gov)

OA: Oceanic Abstracts. For over 32 years, Oceanic Abstracts from Cambridge Scientific Abstracts has been focused exclusively on worldwide technical literature pertaining to the marine and brackish-water environment. The journal has long been recognized as a leading source of information on topics relating to oceans. It focuses on and is totally comprehensive in its coverage of marine biology and physical oceanography, fisheries, aquaculture, non-living resources, meteorology and geology, plus environmental, technological, and legislative topics. See:

<http://www.csa.com/factsheets/oceanic-set-c.php>

OCLC: Founded in 1967, OCLC Online Computer Library Center is a nonprofit, membership, computer library service and research organization dedicated to the public purposes of furthering access to the world's information and reducing information costs. More than 41,555 libraries in 112 countries and territories around the world use OCLC services to locate, acquire, catalog, lend and preserve library materials. Researchers, students, faculty, scholars, professional librarians and other information seekers use OCLC services to obtain bibliographic, abstract and full-text information when and where they need it. See: <http://www.oclc.org/> or their free service at: [www.worldcat.org](http://www.worldcat.org)

SWRA: Selected Water Resources Abstracts (1967-94). *SWRA* provides more than 271,138 abstracts compiled by the Water Resources Scientific Information Center (WRSIC) of the USGS. *SWRA* provides thorough coverage of worldwide technical literature across the life, physical, and social-science aspects of water resources as well as

U.S. Government documents produced by the USGS's many research facilities. Records are drawn from journals, monographs, conference proceedings, reports, court cases, and other federal and state publications. *SWRA*, and now *Water Resources Abstracts*, are your best sources for issues pertaining to groundwater, water quality, water planning, and water law and rights.

TRIS: TRIS is a bibliographic database funded by sponsors of the Transportation Research Board (TRB), primarily the state departments of transportation and selected federal transportation agencies. TRIS Online is hosted by the National Transportation Library under a cooperative agreement between the Bureau of Transportation Statistics and TRB. See: <http://ntlsearch.bts.gov/tris/index.do>

UN: United Nations Library, New York, NY. See: [www.un.org](http://www.un.org)

USGS: US Geological Survey Library, Reston, VA. See: [www.usgs.gov/library](http://www.usgs.gov/library)

University of Texas at Austin. Perry-Castañeda Library Map Collection: "Many of these maps have been scanned and are available for downloading and other uses." See: <http://www.lib.utexas.edu/maps/>

WorldCat: Among other things, this a free database from OCLC showing local library holdings of desired publications. See: <http://www.worldcat.org/>

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earthquake; July 29; 1970; Earthquake Damage. Abstract: The data from the structural response recorder installation during the July 29, 1970, earthquake in the Burma-India border region have been interpreted in terms of structural response results. These results suggest the possibility of dependence of the nature of the response spectrum curves on the azimuth of recording. The strike of the fault plane, determined on the basis of the direction of the maximum recorded amplitudes, coincides with the local structural trend and is in conformity with the fault-plane solutions for some previous earthquakes in the region. Database: Earthquake Engineering Abstracts. ISSN: 0037-1106.

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Aiken, S. Robert, Frost, David B. and Leigh, Colin H. 1980. "Dengue Hemorrhagic Fever and Rainfall in Peninsular Malaysia: Some Suggested Relationships." Social Science & Medicine. Part D: Medical Geography,. 9. Volume 14, Issue 3, Pages 307-316. Abstract: Dengue hemorrhagic fever (DHF) is a viral disease which has spread throughout Southeast Asia over the past 25 years. *Ae. aegypti* is the main vector of the disease. The location of DHF outbreaks, the number of infected individuals, and the diffusion of the disease are related to

several socio-economic, environmental and host factors. A number of writers have discussed the relationships between DHF outbreaks and rainfall in different parts of Southeast Asia. A review of the literature suggests that there are positive correlations between the two variables in Burma, Thailand and the Philippines, all of which have one wet season and prolonged "dry periods", but that the relationships in countries closer to the equator, such as Peninsular Malaysia and Singapore, where there are two wet seasons, are unclear. In two case studies of Selangor and Johore in Peninsular Malaysia for the period 1973–1977, the relationships between DHF cases and moisture surpluses and deficits, the latter derived from Thornthwaite's method for calculating the water balance, are investigated on a monthly basis. It is shown that there is an increase in DHF cases following the March to May wet season and that the size of the increase is positively related to the size of the moisture surplus. The importance of moisture deficits is also underscored. There is, however, an apparent lack of association between DHF cases and rainfall during the second wet season, September–November, of each year. It is suggested that relationships between DHF and rainfall should be sought for a sequence of years, and that investigations must be based on a more sophisticated measure of moisture availability than raw monthly rainfall data. Topics for further research are outlined.

Air Force Combat Climatology Center Scott AFB IL; Taxler, Kathleen M. Donahue, Christopher A. Edwards, Michelle E. Cloys, Kenneth P. and Walters, Kenneth R., Sr. 1997. "Southeast Asia-A Climatological Study." MAY. Descriptors: Climatology; Southeast Asia; Control; Clouds; Weather; Hazards; Wind; Precipitation; Visibility; Climate; Meteorology; Geography; Vietnam; Thailand; Commonality; Seasons; Cambodia; Laos; Malaysia; Trafficability. Abstract: A climatological study of southeast Asia, a region that comprises Cambodia, Laos, Myanmar, Malaysia, Thailand, and Vietnam. After describing the geography and major meteorological features of the entire region, the study discusses in detail the climatic controls of each of southeast Asia 5 six zones of climatic commonality." Each "season" is defined and discussed in considerable detail, to include general weather, clouds, visibility, winds, precipitation, temperature, hazards, and trafficability.

Notes: Distribution Statement: Approved for public release. DTIC Accession Number: ADA383372. ADA286960. ADA286962. URL: <http://handle.dtic.mil/100.2/ADA286960> and <http://handle.dtic.mil/100.2/ADA286962>.

Akaishi, F., Satake, M., Otaki, M. and Tominaga, N. 2006. "Surface Water Quality and Information about the Environment Surrounding Inle Lake in Myanmar." *Limnology*. Apr. Volume 7, Issue 1, Pages 57-62. Descriptors: Article Subject Terms: Alkalinity; Anions; Bacteria; Calcium; Cations; Coliforms; Laboratories; Lakes; Limestone; Limnology; Surface Water; Water Quality; agriculture; culture; plateaus; Article Geographic Terms: Myanmar. Abstract: Inle Lake is the second largest lake in Myanmar and one of the nine key sites for sightseeing there. An analysis of its water quality has not been published before. The objective of this study is to reveal the current situation and find any major problems with the lake. For this purpose, the natural and cultural environments were examined. Some physical and chemical aspects of the surface water were assayed in situ for 2 days in November 2004. The principal ions were analyzed in our laboratory. The main cation and anion species in the lake surface water are  $\text{Ca}^{2+}$  and  $\text{HCO}_3^-$ . Its high calcium content can be attributed to the limestone of Shan Plateau around the lake. The alkalinity of the lake water was 3829-4114 acid-neutralizing capacity (ANC) (pH 7.8-8.0); it can be attenuated by  $\text{Ca}^{2+}$ . The concentrations of  $\text{PO}_4^{3-}\text{-P}$ ,  $\text{NO}_2^-$ -N, and  $\text{NO}_3^-$ -N were relatively high; these could originate from domestic and agriculture uses. The trophic state is eutrophic. The concentrations of coliform bacteria indicated that the lake water was unfit to drink, but some people use it for drinking anyway. The bacteria could enter the lake through the direct latrine system used there. The thermal type of the lake is presumed to be warm polymictic. More extensive studies are needed because the lake is thought to be the most changing site in Myanmar as a result of both the tourism boom and increasing agricultural activity. Database: Environmental Sciences and Pollution Mgmt. ISSN: 1439-8621.



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Alam, M., Chowdhury, M. L. R., Gani, M. R., Alam, M. M. and Curray J.R. Affiliation: M.M. Alam, Department of Geology, University of Dhaka, Dhaka 1000 Country: Bangladesh E-mail: [mmalam@bdcom.com](mailto:mmalam@bdcom.com). 2003. "An Overview of the Sedimentary Geology of the Bengal Basin in Relation to the Regional Tectonic Framework and Basin-Fill History." *Sediment. Geol.* 2005 Elsevier Ltd. All rights reserved.: 01 FEB. Volume 155, Issue 3-4, Pages 179-208 Additional Info: Netherlands. Descriptors: Regional structure and tectonics; paleogeography; continental collision; basin fill; sedimentation; depositional environment; stratigraphy; basin evolution; tectonic evolution. Notes: References: Number: 117; Geographic: India- Bengal Basin Bay of Bengal. Abstract: The Bengal Basin in the northeastern part of Indian subcontinent, between the Indian Shield and Indo-Burman Ranges, comprises three geo-tectonic provinces: (1) The Stable Shelf; (2) The Central Deep Basin (extending from the Sylhet Trough in the northeast towards the Hatia Trough in the south); and (3) The Chittagong-Tripura Fold Belt. Due to location of the basin at the juncture of three interacting plates, viz., the Indian, Burma and Tibetan (Eurasian) Plates, the basin-fill history of these geotectonic provinces varied considerably. Precambrian metasediments and Permian-Carboniferous rocks have been encountered only in drill holes in the stable shelf province. After Precambrian peneplanation of the Indian Shield, sedimentation in the Bengal Basin started in isolated graben-controlled basins on the

basement. With the breakup of Gondwanaland in the Jurassic and Cretaceous, and northward movement of the Indian Plate, the basin started down warping in the Early Cretaceous and sedimentation started on the stable shelf and deep basin; and since then sedimentation has been continuous for most of the basin. Subsidence of the basin can be attributed to differential adjustments of the crust, collision with the various elements of south Asia, and uplift of the eastern Himalayas and the Indo-Burman Ranges. Movements along several well-established faults were initiated following the breakup of Gondwanaland and during down warping in the Cretaceous. By Eocene, because of a major marine transgression, the stable shelf came under a carbonate regime, whereas the deep basinal area was dominated by deep-water sedimentation. A major switch in sedimentation pattern over the Bengal Basin occurred during the Middle Eocene to Early Miocene as a result of collision of India with the Burma and Tibetan Blocks. The influx of clastic sediment into the basin from the Himalayas to the north and the Indo-Burman Ranges to the east rapidly increased at this time; and this was followed by an increase in the rate of subsidence of the basin. At this stage, deep marine sedimentation dominated in the deep basinal part, while deep to shallow marine conditions prevailed in the eastern part of the basin. By Middle Miocene, with continuing collision events between the plates and uplift in the Himalayas and Indo-Burman Ranges, a huge influx of clastic sediments came into the basin from the northeast and east. Throughout the Miocene, the depositional settings continued to vary from deep marine in the basin to shallow and coastal marine in the marginal parts of the basin. From Pliocene onwards, large amounts of sediment were filling the Bengal Basin from the west and northwest; and major delta building processes continued to develop the present-day delta morphology. Since the Cretaceous, architecture of the Bengal Basin has been changing due to the collision pattern and movements of the major plates in the region. However, three notable changes in basin configuration can be recognized that occurred during Early Eocene, Middle Miocene and Plio-Pleistocene times, when both the paleogeographic settings and source areas changed. The present basin configuration with the Ganges-Brahmaputra delta system on the north and the Bengal Deep Sea Fan on the south was established

during the later part of Pliocene and Pleistocene; and delta progradation since then has been strongly affected by orogeny in the eastern Himalayas. Pleistocene glacial activities in the north accompanied sea level changes in the Bay of Bengal. ISSN: 0037-0738.

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Alfaro, M. E., Sellins, S. L., Karns, D. R., Voris, H. K. and Abernathy E. Affiliation: H.K. Voris, Department of Zoology, Field Museum of Natural History, 1400 S. Lake Shore Drive, Chicago, IL 60605 Country: United States E-mail: [hvoris@fieldmuseum.org](mailto:hvoris@fieldmuseum.org). 2004. "Phylogeny of *Cerberus* (Serpentes: Homalopsinae) and Phylogeography of *Cerberus* Rynchops: Diversification of a Coastal Marine Snake in Southeast Asia." *J. Biogeogr.* 2004 Elsevier Ltd. All rights reserved.: Volume 31, Issue 8, Pages 1277-1292 Additional Info: United Kingdom. Descriptors: Evolution and Speciation; plate tectonics; evolution; snake; phylogeography; phylogeny Species Term: *Cerberus rynchops*; *Cerberus australis*; *Cerberus microlepis*; *Homalopsis buccata*; *Bitia hydroides*; *Enhydris enhydris*; *Enhydris plumbea*. Notes: References: Number: 87; Geographic: Viet Nam Singapore [Southeast Asia] Australia Sulawesi Sumatra Thailand India Andamans Philippines Borneo Myanmar Sri Lanka Southeast Asia Australasia South Asia Indian Ocean islands Asia Indian Ocean. Abstract: Aim: The biogeography of Southeast Asia has been greatly affected by plate tectonic events over the last 10 Myr and changing sea levels during the Quaternary. We investigated how these events may have

influenced the evolution of *Cerberus Cuvier*, a marine coastal snake belonging to the Homalopsinae (Oriental-Australian Rear-fanged Water Snakes). This study is an expansion of a previous study on the biogeography and systematics of *Cerberus*. Location: We obtained species from localities across the range of the widely distributed *Cerberus*: India, Sri Lanka, the Andaman islands, Myanmar, the Philippines, Borneo, Suluwesi, Sumatra, Vietnam, Thailand, Singapore and Australia. Methods: We analysed mtDNA sequences (12S, ND3, ATPase, 2338 nucleotide characters) from 21 localities. The sample consisted of 65 *Cerberus rynchops* (Schneider), three *Cerberus australis* (Gray) and four *Cerberus microlepis* Boulenger. One *Homalopsis buccata* (Linnaeus), one *Bitia hydroides* Gray, one *Enhydris enhydris* (Schneider), and two *Enhydris plumbea* (Boie) were used as outgroups. Results: We produced phylogenetic trees based on parsimony, maximum likelihood and Bayesian analysis. We did not find unambiguous support for the monophyly of *Cerberus*. *Cerberus australis*, *H. buccata* and all other *Cerberus* populations formed a three-way basal polytomy under parsimony and *C. australis* formed the sister group to a clade consisting of *H. buccata* and all other *Cerberus* in likelihood and Bayesian analysis. The non-Australian *Cerberus* were monophyletic and consisted of four primary biogeographical clades: Indian and Myanmar, Philippines, Greater Sunda Islands and Suluwesi, and the Thai-Malay peninsula and Gulf of Thailand. The range of genetic divergence between these clades and Australian *Cerberus* was 0.06-0.12. Genetic divergence among clades to the west of Australia was less pronounced (Thai-Malay peninsula and Gulf of Thailand = 0.02-0.05; Sunda Islands and Suluwesi = 0.02-0.05; Philippines = 0.02-0.06; India and Myanmar = 0.04-0.06, Philippines = 0.02-0.5). Main conclusions: Gyi [University of Kansas Publications, Museum of Natural History 20 (1970), 47] recognized three species of *Cerberus*: *C. australis* (from Australia), *C. microlepis* (known only from Lake Buhi in the Philippines), and the widely distributed *C. rynchops* (India to Wallacea). We did not find strong support for the monophyly of the genus. *Cerberus australis* is highly divergent from all other *Cerberus* lineages sampled from this region. The geographically widespread *C. rynchops* is resolved into four biogeographical clades (Indian and Myanmar, Philippines, Greater Sunda Islands and

Suluwesi, and the Thai-Malay Peninsula and Gulf of Thailand). We discuss how the dispersal biology of a salt-water tolerant, coastal marine taxon and the complex geological history of the region (Tertiary plate tectonic movements and Quaternary sea-level changes) could produce the observed patterns of diversification. ISSN: 0305-0270.

Ambraseys, N. N. Mainstone, R. J. Pichard, Pierre and Penzien, Joseph. 1977. [Selected Papers] 19-21 Dec. 1977. Paris. [Selected Papers] 19-21 Dec. 1977. Descriptors: Historic buildings; Congresses; Risk assessment; Seismology; Burma; International Council of Monuments and Sites. International Seismological Committee. Unesco. Abstract: Meeting of Experts on the Protection of Monuments in Seismic Areas (1977: Paris) Final report (CC-77/Conf.616/1).--Working paper: for discussion on the documentation of monuments in seismic regions, by N.N. Ambraseys.--Historic buildings as structures... Draft [by] Rowland J. Mainstone.--Burma: seismic risk for the monuments of Pagan [by] Pierre Pichard [also in French].--Notes for discussion on structural aspects of protection.--A working plan for the ICOMOS Seismological Committee for the protection of monuments and sites against earthquakes, by Joseph Penzien. Database: Earthquake Engineering Abstracts. OCLC Accession Number: O25169509.

Andersen, N. M. and Grimaldi, D. 2001. "A Fossil Water Measurer from the Mid-Cretaceous Burmese Amber (Hemiptera: Gerromorpha: Hydrometridae)." *Insect Syst. Evol.* Volume 32, Issue 4, Pages 381-392. Descriptors: Article Subject Terms: Amber; Animal fossils; Cretaceous; Fossils; Geographical distribution; New genera; New species; Article Taxonomic Terms: *Carinametra burmensis*; Gerromorpha; Hydrometridae; Article Geographic Terms: Burma; Myanmar; Hemiptera; Marsh treaders; Semiaquatic bugs; amber. Notes: TR: CS0221290. Abstract: Semiaquatic bugs (Hemiptera: Gerromorpha) comprise about 1,800 extant species classified in eight families. So far, 38 fossil species belonging to six families have been described or recorded, most of Cenozoic age. Knowledge about the evolutionary history of the major groups of Gerromorpha is seriously hampered by the scarcity of well-preserved Mesozoic fossils, especially

from the Cretaceous. The present paper reports on a well-preserved semiaquatic bug from amber collected in the northern part of Myanmar (Burma). The source of this fossiliferous amber was previously considered to be Eocene in age, but recent evidence indicates that it originated in the Middle Cretaceous (Turonian-Cenomanian), or 100-90 Ma. The fossil species is described as *Carinametra burmensis* gen. et sp. n. The presence of three pairs of cephalic trichobothria, a prolonged head, long slender antennae and legs, reduced wing venation, etc., places the fossil in the gerromorphan family Hydrometridae or water measurers. Other characters suggest a close relationship with the two extant genera of the most basal of the hydrometrid subfamilies, Heterocleptinae. We present and discuss the available evidence used in the dating of Burmese amber. Finally, we discuss the phylogenetic, paleobiological, and biogeographic significance of the new fossil. Database: ASFA: Aquatic Sciences and Fisheries Abstracts. ISSN: 0013-8711.

Anji Reddy, M. and Jhansi Lakshmi, K. V. "Disinfestation of Eleusine Coracana (L.) Gaertn. and Pennisetum Typhoides (Burma. F.) Stapf. and Hubb. Seeds by Hot Water Treatment Cochliobolus Nodulosus." Notes: Source: Geobios. Sept/Nov 1982. v. 9 (5/6): p. 277-278. Additional Info: Jodphur: Dr. David N. Sen. Publishing Agencies: Non-US Imprint, not FAO.

Army Construction Engineering Research Lab Champaign Ill; Schomaker, Norbert B. and Aufmuth, Raymond E. 1971. "Burma Soils. A Study of the Effects of Lime and Cement on Paddy and Laterite Material." Mar. Descriptors: Soils; Burma; Roads; Construction; Stabilization; Cements; Compressive Properties; Soil Mechanics Civil Engineering. Abstract: Laboratory tests were performed on samples of paddy and laterite soils obtained from the proposed right-of-way of the Rangoon-Mandalay Highway, Burma. These tests were conducted to determine the basic engineering properties of the soils and to evaluate the feasibility of stabilizing these soils with lime and cement. The addition of lime to these soils had little beneficial effect on either soil. This was due to the non-reactive nature of the soils and the poor stabilizing quality of the lime available in Burma. Special tests using

American lime indicated a strength increase of about 300% over the natural soil strength, compared to an increase of less than 100% with Burma lime. Addition of cement, on the order of 6% by dry weight of soil, effectively stabilizes both soils. Unconfined compressive strengths of both are increased on the order of 300%. (Author). Notes: Distribution Statement: Approved for public release. OCLC: AD0720993.

Army Engineer Inst For Water Resources Fort Belvoir Va; Priscoli, J. D. Moon, J. Groen, P. van; Bradley, J. and Fujii, C. 1985. "Report of the Inland Waterway Transport (IWT) Mission, 5 February-20 April 1985. Main Report." JUN. Descriptors: Transportation; Inland Waterways; Pakistan; Water; Navigation; Transport; Rivers; Dredging; Harbors; Asia; China; Philippines; Thailand; Indonesia; Burma; Sri Lanka; Malaysia; Geography Hydrology, Limnology And Potamology. Abstract: Report identifies major problems and needs of inland waterways transport across nine Asian countries: Bangladesh, Burma, China, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand. It also recommended and prioritized 70 projects to meet these needs and problems. Originator-supplied keywords: Inland waterway transport, Water resources, Navigation, Asia, Escap, U.N., Ports and harbors, Dredging, Planning, Operation, Rivers. Notes: Distribution Statement: Approved for public release. DTIC Accession Number: ADA159724. Url: <http://handle.dtic.mil/100.2/ADA159724> and <http://handle.dtic.mil/100.2/ADA159725>

Army Engineer Inst For Water Resources Fort Belvoir Va; Priscoli, J. D. Moon, J. Groen, P. van; Bradley, J. and Fujii, C. 1985. "Report of the Inland Waterway Transport (IWT) Mission, 5 February-20 April 1985. Appendices." Jun. Descriptors: Transportation; Inland Waterways; Pakistan; Computations; Reports; Documents; Transport; Background; Resources; Asia; China; Philippines; Thailand; Indonesia; Burma; Sri Lanka; Malaysia; Geography Hydrology, Limnology And Potamology. Abstract: Report identifies major problems and needs of inland waterways transport across nine Asian countries. It also recommended and prioritized 70 projects to meet these needs and problems. Contents of this volume: Terms of Reference and Nature of Services;

People Interviewed; Non-ESCAP Team Members; Background Reports of Countries Visited; Project Documentations; Basis of Personnel and Resources Calculations for IWT Study Centre Alternatives. Notes: Distribution Statement: Approved for public release. OCLC: ADA159725.

Army Natick Labs Ma Earth Sciences Lab; Dalrymple, Paul C. Everett, Kaye R. Wollaston, Sarah; Hastings, Jr, Andrew D. and Robison, William C. 1970. "Environment of the Central Asian Highlands." DEC. Descriptors: Climatology; Geography; Plants(Botany); Wind; Atmospheric Temperature; Mountains; Trees; Asia; Glaciers; Water Supplies; Forestry; Army Operations; Maps; Solar Radiation; Barometric Pressure. Abstract: The report presents a survey of environmental conditions - physiography, vegetation, and climate - which might affect military personnel and equipment above the 2,000-meter elevation in Central Asia. These highlands include some of the world's highest and most inaccessible mountain ranges, such as the Himalaya, Karakoram, Pamir, Hindu Kush, Kun Lun Shan, Anme Machin, Tien Shan, Nan Shan, and Great Snowy Range, as well as the high plateaus of Tibet and the generally lower mountains of Mongolia. The study treats portions of Afghanistan, Bhutan, Burma, China (including all of occupied Tibet), India, Mongolia, Nepal, Pakistan, Sikkim, and the Soviet Union. It is organized in two parts: a general synopsis of environmental characteristics of the area as a whole, and a series of more detailed treatments by sections. For the latter, Central Asia is subdivided into five sections comprising the Sino-Burmese Ranges, Tibetan Plateau and associated ranges, Pamir Knot and associated ranges, Tien Shan and associated ranges, and the Mongolian Highlands. All of these except the Mongolian Highlands are shown in topographic and cultural maps at a scale of approximately 1:3,800,000. The distribution of terrain, vegetation, and climatic elements over the area as a whole is shown in a series of smaller-scale maps at 1:10,000,000. Notes: Distribution Statement: Approved for public release. Database: DTIC. DTIC Accession Number: AD0728460. URL: <http://handle.dtic.mil/100.2/AD728460>.



Arntz, W. and Zetzmann, D. 1986. Multipurpose Cargo Ships Sagaing And Magwe. Abstract: These are single-screw motor vessels with two continuous decks built by the Seebeckwerft for the Burma Five Star Shipping Corporation. There are four cargo holds, all arranged forward of the superstructure. The hatchways have been selected to suit the dimensions of standard containers; base pads for securing containers are welded to the tank tops. Most bulkheads are flat with the stiffeners located outside the cargo holds. Five 25-t electrohydraulic cranes are provided for cargo handling, arranged as a single crane between holds 1 and 2 and as twin cranes between holds 2 and 3 and holds 3 and 4; the latter two pairs can be coupled by spreaders to provide a total lifting capacity of 100 t. Propulsion is by a M.A.N.-B&W 5L60MCE diesel engine developing 6650 kW at 110 rpm driving a 5.4 m diameter propeller; a stern bulb improves the inflow to the propeller. Principal particulars are: Length oa/bp 149.00/140.00 m; Breadth 22.40 m; Depth 10.75 m; Draught, freeboard 8.05 m; Deadweight 13,055 t; Container capacity 215 TEU under deck, 168 TEU on deck; Speed 16.9 knots. A general arrangement drawing is given. Notes: Hansa, 123 (1986), p.553 (No.7, Apr.) [6 pp., 5 fig., 2 tab.]. OCLC: 00689947. URL: Transportation Research Board.

Audy, J. R. and Harrison, J. L. 1951. "A Review of Investigations of Mite Typhus in Burma and Malaya, 1945-1950." Transactions of the Royal Society of Tropical Medicine and Hygiene,. 2. Volume 44, Issue 4, Pages 371-404. Abstract: Summary This paper reviews in general terms the epidemiological work of an Army research unit on the Indo-Burma border in 1945-46 (Scrub Typhus Research Laboratory, Imphal, South-East Asia Command), and a Colonial Office unit, supported by Colonial Development and Welfare funds and attached to the Institute for Medical Research, from 1947 onwards. Only one vector of importance to man is recognized. This exists in two forms, *Trombicula deliensis* (= *walchi*), being the most widespread, and *T. akamushi* (= *fletcheri*), occurring particularly in the east and north. In a wide area of overlap, the parasitic larvae of both forms may transmit infection in neighbouring foci or even in the same focus. The vector is a member of a distinct species-group of which many members have now been found. Larval mites of the family Trombiculidae were the

dominant external parasites of small mammals in all the areas investigated. The life cycle of the vector has been studied by Mr. Cockings by breeding it through several generations in the laboratory, in which conditions the cycle is being completed in 5 ½ to 8 weeks. The cycle of *T. deliensis* in nature appeared to be completed in 8 to 12 weeks during the monsoon in the Imphal area. The vector is distributed on the smallest scale as restricted colonies or "mite-islands" which form an irregular pattern on the ground. The basic infestation pattern is decided largely by the behaviour and numbers of the primary hosts of the parasitic larvae. Though not always the principal hosts in individual foci, the most important and universal hosts of the larvae of the vector are field forms of *Rattus rattus*—in Imphal, *R. r. bullocki*; in Malaya, *R. r. argentiventer*—but others may take their place, e.g., the bandicoot, *Bandicota bengalensis*, in villages and towns in Burma, and forms of *R. exulans* (e.g., *concolor*, *browni*) in Pacific Islands. Some small birds such as quail contribute to the basic pattern. An important group of other hosts with longer ranges are responsible for distributing mites but not appreciably for the basic pattern of infestation. The common giant rats (*R. sabanus*, *R. mülleri*) in the Malayan forest are the proper hosts of members of the vector-species group of mites, and *R. mülleri* is the most prominent host of *T. deliensis* itself in the forest. Heavy infestations by the vector are, however, found outside the forest on forms of *R. rattus*. The number of questing larvae of the vector (and, therefore, the risk of infection) is related to soil moisture and surface humidity, and hence to rainfall (seasonal incidence) and to the lowered humidity which obtains during sunny days and after clearing undergrowth. Even in very dry seasons larvae persist in foci which are kept moist by ground water. Rainfall affects the distribution of the vector in both space and time, and also influences the activity of the rodent hosts to a marked extent. Studies on infection in and infectivity of the vector mite, and of the congenital transmission of infection, are progressing in collaboration with Dr. S. R. Savor. Some evidence has been gained that the congenital transmission of infection may be inefficient.

Auldrige, Larry, Bartlett, Dan C., Houbert, S., Guyonnet, P., Collins, Bart and Hatley, Allen G. 1978. "Southeast Asia Report." *Oil Gas J.*

Volume 76, Issue 9, Pages 2475118. Descriptors: Petroleum Prospecting; Natural Gas Deposits - Asia; Natural Gas, Liquefied - Asia; Oil Well Drilling - Equipment. Abstract: This special report covers oil and gas activities and prospects in Southeast Asia, throughout the vast swath of islands and waters from Burma and Thailand east and southeast of Malaysia, the Philippines, and Indonesia to Australia and New Zealand. It includes special articles on equipment and techniques used to cut costs and solve problems peculiar to this region, on the Philippines' first oil field, on crude-oil handling in Indonesia's second largest oil field, and on eliminating teething troubles at Southeast Asia's first big LNG plant in Brunei.

Aung Kyaw Myat. 1994. Preliminary Study on Earthquake Resistant Capacity of some Famous Pagan Pagodas (Theoretical Approach). [Yangon, Burma]: [Yangon Institute of Technology, Dept. of Civil Engineering]. Pages: 35 leaves. Descriptors: Pagodas; Burma; Pagan; Earthquake effects; Stupas; Temples; Buddhist; Pagan (Burma); Buildings; Structures; etc. Yangon Institute of Technology. Dept. of Civil Engineering. OCLC: O35574075. Database: Earthquake Engineering Abstracts.

Aung Kywe and Australian International Development Assistance Bureau. 1988. Water for the Villagers: The Burma Village Water Supply Project. Canberra: Australian Government Pub. Service. Pages: 33. Descriptors: Water-supply- Burma- International co-operation; Water resources development- Burma; Wells- Burma; Government publication; National government publication. Notes: iv; ill., maps; 25 cm. Responsibility: Aung Kywe ... [et al.]. ISBN: 0644081007; OCLC: 29259696.

Aung Myo, Han, Khin Nwe, D., Tin, Aye and Thein, Hlaing. 1986. "Personal Toilet After Defaecation and the Degree of Hand Contamination According to Different Methods used." J. Trop. Med. Hyg. J. Trop. Med. Hyg. Oct. Volume 89, Issue 5, Pages 237-41 Additional Info: ENGLAND. Descriptors: Defecation; Hygiene; Adolescent; Adult; Child; Child Care; Child, Preschool; Diarrhea-epidemiology; Diarrhea- microbiology; Diarrhea- transmission;

Dysentery- epidemiology; Dysentery- microbiology; Dysentery- transmission; Educational Status; Female; Hand- microbiology; Humans; Infant; Myanmar. Notes: Citation: Status: MEDLINE Owner: NLM; Date of Entry: 19870206; Date Completed: 19870206; Date of Update: 20041117. Abstract: Transmission due to contaminated hands is one of the important routes by which diarrhoea pathogens spread. The hands commonly become contaminated while cleaning the anus after defaecation. This study deals with the commonly used methods of anal cleansing in a low socioeconomic community in Rangoon, Burma and with the degree of hand contamination that results according to the method used. A cross-sectional survey was employed for collection of behavioural and hand contamination data. The incidence of acute diarrhoea and dysentery among under-fives in this community was monitored for 1 month and was correlated with the cleaning method used by their mothers. Water was the principal method used for cleaning the anus in all age groups. No one used toilet paper and only 4 to 9% used paper other than toilet paper. The level of education seemed to be a factor in determining the use of paper or water. The hands of mothers using water were more contaminated than those using paper. However, thorough hand washing with soap and water was found to be effective in decontaminating the hands. Furthermore, there was a relation between the incidence of diarrhoea and dysentery and the method of cleaning. ISSN: 0022-5304 (Print).

AUNG, H. T. A. Y. 1970. "Severe Cyclonic Storm Responsible for Flash Flood in Pakokku and Monywa Districts during the Month of October 1967." In: Forecasting of Heavy Rains and Floods, Proc Joint Seminar of Regional Associations 2 and 5 of World Meteorological Organization, Nov 11-23, 1968, Kuala Lumpur. Malaysia; Published By World Meteorological Organization, Geneva. Volume P 213-220, Pages 5 FIG. Descriptors: Floods; Rainfall-Runoff Relationships; Flash Floods; Antecedent Precipitation; Rainfall Intensity; Storms; Cloudbursts; Tropical Regions; Tropical Cyclones; ECAFE; Burma. Abstract: heavy rains which occurred on october 23-24, 1967 caused a flash flood in the pakokku and monywa districts of central burma. The flash flood and the severe cyclonic storm responsible for the heavy rain are

described. Heavy rainfall started on the evening of October 23 and stopped on the morning of October 24. The flash flood thus started on the night of the 23rd and was over on the morning of October 24. The occurrence of the flash flood during the night and the strong winds due to the land depression was unfavorable for evacuation of the inhabitants of Pakokku and Monywa districts. Most of the flash floods in Burma are associated with heavy rainfall. Forecasting of flash floods depends on forecasting of heavy rainfall, which in turn depends on the movement of the storm. (KNAPP-USGS). Database: Water Resources Abstracts.

Aung, M., Htung, S., Than, A., et al. 2001. "Ecology and Social Organization of a Tropical Deer (*Cervus eldithamin*).<sup>1</sup>" J. Mammal. Volume 82, Issue 3, Pages 836-847. Descriptors: Social organization; Radio-tagging; Seasonal variations; Home range; Reproductive status; *Cervus eldi*; Myanmar; Eld's Deer. Notes: RX: 1 (on May 07, 2008). Abstract: From 1995 to 1999, we conducted an ecological study of thamin (*Cervus eldi thamin*) at Chatthin Wildlife Sanctuary in central Myanmar; we maintained records on deer sightings and radiotracked 11 adult male and 8 adult female deer. Based on 747 sightings, a 0.63:1.0 adult male: female ratio and 0.51:1.0 fawn: adult female ratio were observed. Mean group size was variable (1.0-5.9 deer) and showed seasonal differences, with few groups observed in August-September and groups of less than or equal to 70 individuals observed in March-April. Based on the fixed-kernel method, annual home range was 9.04 km<sup>2</sup> super(2) plus or minus 5.67SD and 7.25 km<sup>2</sup> super(2) plus or minus 3.45 SD for males and females, respectively. Thamin increased their seasonal home range during the hot-dry season, possibly in response to decreased forage and water availability and increased mating activity. The observed synchrony of estrous onset (March-April) and fawning (October-November) in female thamin is unusual for a tropical cervid species, but reproductive seasonality appears timed to balance fawn survival with doe nutrition in a monsoon environment. Database: BioOne Abstracts and Indexes. ISSN: 1545-1542.

Aung, W., Hlaing, K. K., Kyaw, K. P., Win, M. M. and Kyaw, A. 1999. "Stability of Russell's Viper Venom Toxoid (Lyophilized Form) on Storage." *Japanese Journal of Infectious Diseases*, 1999 Dec. 52(6):234-7: JAPAN. Volume 52, Issue 6, Pages 234-237. Descriptors: Animals; Biological Assay; Desiccation; Drug Stability; Drug Storage; Female; Formaldehyde: pharmacology; Freeze Drying; Hydrogen-Ion Concentration; Lethal Dose 50; Male; Mice; Myanmar; Preservatives, Pharmaceutical: pharmacology; Refrigeration; Safety; Temperature; Time Factors; Toxoids: chemistry; Viper Venoms: chemistry; Viper Venoms: toxicity. Notes: RN: 0 (Preservatives, Pharmaceutical); 0 (Toxoids); 0 (Viper Venoms); 0 (viper venom); 50-00-0 (Formaldehyde); LR: 20061115. Abstract: A previously developed Russell's viper venom toxoid in Myanmar is in a liquid form that shows reversion in the form of a reduced number of formaldehyde linkages and toxicity during storage at 37 degrees C and at room temperature. In order to have a safe, potent and stable toxoid, a lyophilized form was prepared in the present study from the liquid toxoid through the use of a freeze dryer. Both the liquid and lyophilized forms were then stored at 4 degrees C and at room temperature, and in addition to safety and immunogenicity tests, biochemical parameters such as the protein content, the activity of venom enzymes (proteinase, phospholipase A, phosphodiesterase, and arginine esterase), and the released free formalin amounts were assessed at 3-month intervals over a period of 1 year. The results indicate that under both conditions, the lyophilized toxoid shows minimum changes in enzyme activity, a reduced tendency toward formaldehyde linkage, no toxicity, and more immunogenicity in comparison with the respective liquid toxoids. It could therefore be hypothesized that Russell's viper venom toxoid in a lyophilized form is more promising in terms of efficacy and stability for prophylactic use in human immunization than the conventional toxoid in a liquid form. Database: TOXLINE. ISSN: 1344-6304.

Avni, Yoav. 1999. "Lithology as the Main Factor Causing Aridization; an Example from Burma (Myanmar); Annual Meeting, 1999; Dead Sea." Annual Meeting - Israel Geological Society. Israel Geological Society, Jerusalem, Israel (ISR): Israel (ISR). Volume 1999, Pages 9.

Descriptors: agriculture; Asia; Burma; clastic rocks; desertification; deserts; developing countries; eolian features; Far East; hydrology; infiltration; Irowaddi Formation; Irrawaddi River; land use; lithofacies; planning; runoff; sandstone; seasonal variations; sedimentary rocks; surface water; water management; water resources; water supply. Database: GeoRef. ISSN/ISBN: 0334-0694.

Aye, T. and Finch, J. 2007. "Legal Aspects of Hydropower Projects in Myanmar." *Int. J. Hydro. Dams*. Volume 14, Issue 1, Pages 62-70. Descriptors: Article Subject Terms: Dam Construction; Dams; Hydroelectric Plants; International cooperation; Investment; Legal Aspects; Article Geographic Terms: Myanmar. Notes: TR: CS0749942. Abstract: Myanmar is rich in hydro potential, and has a major development programme under way, with a number of large and small schemes under construction and planned. As a member of the Greater Mekong Subregion and also an ASEAN member, the country offers possibilities for international cooperation in the region. This paper discusses the legal framework relating to investment in hydro schemes. Database: ASFA: Aquatic Sciences and Fisheries Abstracts. ISSN: 1352-2523.

Aye, T. T. and Siriarayapon, P. Affiliation: Department of Health, Ministry of Health, Myanmar. 2004. "Typhoid Fever Outbreak in Madaya Township, Mandalay Division, Myanmar, September 2000." *J. Med. Assoc. Thai. J. Med. Assoc. Thai. Apr.* Volume 87, Issue 4, Pages 395-9 Additional Info: Thailand. Descriptors: Disease Outbreaks; Adolescent; Adult; Female; Humans; Male; Middle Aged; Thailand-epidemiology; Typhoid Fever- epidemiology. Abstract: In September 2000, an outbreak of typhoid fever was reported in a rural village of Central Myanmar. The authors investigated the outbreak in the affected village. A suspected case was a person suffering from fever with either constipation, abdominal pain, diarrhoea/bloody diarrhoea. A probable case was a suspected case who had positive result on the diazo urine test or widal test. Based on probable cases, the authors conducted a case-control study comparing history of contact with the cases, water source, and personal hygiene. Control was a person living in the village was not ill and having a negative result for diazo urine

test. Among 49 suspected cases, 33 were probable. Attack rate was 1.2%. Three cases had a positive culture for *Salmonella typhi* and were not drug resistant. The following risk factors were identified: drinking unboiled river water (adjusted OR 12.5, 95%CI 2.8-75.3), history of contact with other patients before the illness (adjusted OR 22, 95%CI 3.5-76.2), no hand washing with soap after defecation (adjusted OR 0.15, 95% CI 0.03-0.81). Environmental investigation result showed that most of the households had unsanitary latrine and some latrines were constructed near the edge of a river. The outbreak subsided quickly after intervention. ISSN: 0125-2208.

## **B**

Baird, I. G. and Beasley I.L. Affiliation: I.G. Baird, Department of Geography, University of British Columbia, Vancouver, BC Country: Canada E-mail: [ianbaird@shaw.ca](mailto:ianbaird@shaw.ca). 2005. "Irrawaddy Dolphin *Orcaella brevirostris* in the Cambodian Mekong River: An Initial Survey." *Oryx*. Volume 39, Issue 3, Pages 301-310 Additional Info: United Kingdom. Descriptors: Marine mammals- dolphin; coastal water; river system; habitat; river basin; survival Species Term: *Orcaella brevirostris*; Cetacea; *Orcaella*; Animalia. Notes: References: 18; Geographic: Bay of Bengal Mekong River Cambodia Ayeyarwady Mahakam Delta Australia Indian Ocean Asia Southeast Asia Myanmar Kalimantan Australasia Eurasia Indonesia. Abstract: Irrawaddy dolphins *Orcaella brevirostris* are found in coastal waters from the Bay of Bengal east to Palawan, Philippines and south to northern Australia. They also occur in three large tropical river systems in South-east Asia: the Mekong, Mahakam and Ayeyarwady. In March and May 1997 approximately 350 km of riverine habitat in parts of north-east Cambodia were surveyed, discussions took place with local people, and reported dry season dolphin habitat was mapped. Our objectives were to investigate the status, habitat and distribution of dolphins in north-east Cambodia and identify threats to the continued survival of dolphins in the Mekong River Basin. Nine groups of dolphins were observed in the Mekong River. A 'best' estimate of 40 animals were seen. Irrawaddy dolphins were generally confined to sections of the river with water levels >8-10 m during the dry season. It appears that the Mekong River dolphin



population is rapidly declining. In 1997 there were probably no more than 100-150 dolphins left in north-east Cambodia (including southern Laos) and no more than 200 within the entire Mekong River Basin, although these numbers remain tentative. Anthropogenic mortality is high, albeit largely unintentional, and there is considerable risk that the dolphin population will become locally extinct in the Mekong River in the near future. The establishment of community-managed deep water Fish Conservation Zones with government support may represent the best opportunity for reducing dry season dolphin mortality from large-meshed gillnet entanglement. Efforts to establish protected areas for dolphins are currently underway. ISSN: 0030-6053.

Bajracharya, D. Affiliation: Chief Water and Environmental Sanitation Section, UNICEF, Yangon, Myanmar. [dbajracharya@unicef.org](mailto:dbajracharya@unicef.org). 2003. "Myanmar Experiences in Sanitation and Hygiene Promotion: Lessons Learned and Future Directions." Int. J. Environ. Health Res. Int. J. Environ. Health Res. Jun. Volume 13 Suppl 1: S141-52 Additional Info, Pages England. Descriptors: Communicable Disease Control; Health Promotion; Hygiene; Sanitation; Communication; Community-Institutional Relations; Diarrhea- etiology; Diarrhea- mortality; Diarrhea- prevention & control; Handwashing; Humans; Myanmar; Public Health; Rural Population; Toilet Facilities. Notes: Citation: Status: MEDLINE Owner: NLM. Abstract: Recent activities in connection with the National Sanitation Week (NSW) and Social Mobilisation for Sanitation and Hygiene have contributed to a significant increase in access to sanitary means of excreta disposal, from 45% in 1997 to 67% in 2001. Handwashing with soap and water after defecation has also increased from 18% in 1996 to 43% in 2001. Success is attributable to high level political commitment, state or division level action and community mobilisation by village level authorities. Multi-level efforts such as mass media, planning workshops, training sessions and house-to-house visits by village authorities and health officials have raised greater awareness of sanitation and hygiene issues and led to construction of latrines on a self-help basis. The challenge ahead is to give greater attention to the 'hard to reach' who live in less accessible areas and are more resistant

to change. The 2002 NSW has accordingly given special emphasis to activities in 73 of 324 townships where 50% or more of the households have no access to a sanitary latrine. The communication and social mobilisation package has been improved to upgrading unsanitary latrines and integrating handwashing more systematically with promotion of sanitary latrines. Programmatic follow-up to the NSW is being provided in selected townships through more intensive social mobilisation for 'hard to reach' households and activity-based school sanitation and hygiene education. This approach will contribute further towards improved hygienic practices and reduce diarrhoeal morbidity and mortality. ISSN: 0960-3123 (Print); 1369-1619 (Electronic).

Banerjee, P. K., Bagchi, A., Vaz, G. G. and Sengupta B.J. Affiliation: P.K. Banerjee, 315 B Upen Banerjee Rd, Calcutta 700 060  
Country: India. 2001. "A Qualitative Assessment of Seismic Risk Along the Peninsular Coast of India, South of 19°N." *Journal of Geodynamics*. Volume 31, Issue 5, Pages 481-498 Additional Info: United Kingdom.  
Descriptors: Earthquakes; Earthquake mechanisms and effects; natural hazard; earthquake; seismicity; seismic hazard; risk assessment. Notes: References: Number: 66; Geographic: India.  
Abstract: Many earthquakes have been recorded from the coastal margin of the Indian peninsular shield during the last 200 years. Largely made up of Precambrian assemblages with variable cover of Jurassic to Quaternary sedimentary rocks and Cretaceous-Eocene volcanics, the peninsular shield was long held to be aseismic. Recent measurements, however, show that this continental fragment is being pushed northeastward by the Carlsberg and Central Indian ridges; and the Indo-Myanmar subduction zone is exerting vigorous slab pull towards the east. Repeated cycles of sea level change during the Quaternary have also induced continuing hydro-isostatic adjustment due to variable melt water loading in the Bay of Bengal and the Arabian sea. All these forces produce space-time fluctuations of strain around many small to large faults, which occur in the upper crust of the shield. Some of the faults have been intermittently active (during the past 100 kyr); others were active earlier. Although the Shillong plateau and the associated hill ranges of northeastern India and

Myanmar are subject to the maximum seismic hazard, the peninsular coast is also vulnerable to intermittent seismicity. We present illustrative evidence of some active faults, which are recognisable (a) on coastal land by displaced Pleistocene weathered cover, hot springs, leakages of native mercury and allochthonous geochemical anomalies of base metals and (b) offshore below the inner shelf by horst-shaped uplifted segments and intra-formational slump folds on and below the top shallow seismic (3.5 khz) reflector. On the other hand, there are long stretches of the east coast at Vishakhapatnam and Manappad Point, which do not show active faults. Step-like marine terraces, which occur up to + 6 m above the low tide level (LTL) preserve records of relative sea level fluctuations during the Holocene and the Last Interglacial. In such sectors, absence of tectonic disturbance during the last 100 ka is also corroborated by lateral continuity of shallow seismic reflectors below the inner shelf over many kilometers. Since authentic historical (200-1000 years B.P.) records of seismicity along the Peninsular coast are virtually unavailable, the likely recurrence interval between earthquakes in each sector cannot be gauged. We, therefore, propose a scale of seismic risk, based on geometry of the mappable faults and available seismic records of the last two centuries. These could be used in combination to rank the densely populated coastal tracts sector-wise. ISSN: 0264-3707.

Bannert, D. 1993. "Facies Developments in Hydrocarbon Basins from Landsat Images." Environmental Research Institute of Michigan, Ann Arbor. Pages: 159-168. Descriptors: GEOGRAPHICAL ABSTRACTS: PHYSICAL GEOGRAPHY- 71; hydrocarbon basin; Landsat imagery; sedimentation. Abstract: A set of isopach maps was constructed showing the depositional features of the shelf area of Tertiary Burma. Oligocene sediments, which were believed to be absent in the northern part (Chindwin Basin) could be proven in an area defined during the course of the work. Indications for the rise of the Arakan Yoma during Post-Oligocene times could be deduced. A second example where Landsat MSS image interpretation yielded valuable information on the sedimentary process lies at the eastern Makran coast in Pakistan. There, the fast uplift of the accretionary prism of flysch sediments put deep water sediments into near shore position documented by a

change from clay to coarse sandstone. -from Author. Notes: References: Number: 27; Notes: Special Features: 1 map, 3 photos, 27 references. OCLC: 1013892.

Bay, E. C. and Self, L. S. 1972. "Observations of the Guppy, *Poecilia Reticulata* Peters, in *Culex Pipiens Fatigans* Breeding Sites in Bangkok, Rangoon, and Taipei." P 407-416: VOL 46, NO 3. Descriptors: Asia; Human Diseases; Public Health; Mosquitoes; Organic Wastes; Water Pollution; Cities; Bangkok; *Culex-Pipiens-Fatigans*; Guppy; Mosquito Control; *Poecilia-Reticulata*; Rangoon; Taipei; *Wuchereria-Bancrofti*. Abstract: the successful establishment of the guppy in a number of shallow, highly polluted ground pools beneath low income housing in bangkok, thailand was previously reported. Whether bangkok guppies evolved a higher tolerance to organic pollution than *p. Reticulata* that had never been exposed to these conditions was questioned; the possibilities of using these fish elsewhere to control *c. Pipiens fatigans* (especially in rangoon, burma, and taipei, taiwan) where this mosquito is the vector of *wuchereria bancrofti* which affects humans are discussed. Database: Environmental Sciences and Pollution Mgmt.

Beech, Hannah. 2007. "A Bend in the River." TMAS. Sep 10. Volume 170, Issue 10, Pages 26. Descriptors: Dams; Hydroelectric plants; Environmental protection; Water flow; Shipping industry; Industrial parks; Farmers; Environmental economics; Entrepreneurs; Economic expansion; Construction. Notes: Geographic: China Mekong River. Abstract: In 2001, Chinese crews, brought in by Southeast Asian governments eager to increase traffic and trade, began blasting and dredging a stretch of the river running from Burma and Laos to Thailand, clearing away islands, reefs and rapids that once blocked the passage of ships. ISSN: 1064-0304.

Benammi, Mouloud, Soe, Aung Naing, Tun, Than, et al. 1989. "First Magnetostratigraphic Study of the Pondaung Formation: Implications for the Age of the Middle Eocene Anthropoids of Myanmar; Diamonds from Myanmar and Thailand: Characteristics and Possible Origins; Myanmar's Upstream Sector Hobbled by Pipeline Controversy, Poor E&D Results; Myanmar's Mann Field Awaits Search, Investment; A

New Primate from the Middle Eocene of Myanmar and the Asian Early Origin of Anthropoids; Myanmar Faces Energy Crisis Despite Potential; Polyphase Deformation in a Fore-arc/back-Arc Basin, Salin Subbasin, Myanmar (Burma); Exiting Myanmar; an Integrated Oil Industry Runs in Chindwin Basin, Myanmar; Myanmar's Indaw/Chindwin Area has Tertiary, Cretaceous Targets; Working Elephants; on the Road to Burma; Indochina Becoming Prime Target for Foreign Investment in E&D; Burma to Buy 30 Soko Attack Jets, Will Likely Avoid Embargo on Engine; Seismicity and Tectonic Stress Field of a Part of the Burma-Andaman-Nicobar Arc." J. Geol. November; January/February; June 26; March 20; October 15; August 30; October; December 15; October 20; October 20; January; October; May 18; August 13; August. Volume 110; 96; 98; 98; 286; 97; 82; 95; 95; 95; 274; 196; 90; 133; 79, Issue 6; 1; 26; 12; 5439; 35; 10, Pages 748; 159; 24; 80; 528; 42+; 1837; 25; 63+; 76; 82; 13; 19; 29; 989-756; 170; 29; 81; 530; 1856; 7+; 87; 14; 22+; 1005. Descriptors: Paleontology-Myanmar; Paleontology-Eocene; Magnetite-Analysis; Diamond mines and mining/Myanmar; Diamond mines and mining-Thailand; Geology/Southeast Asia; Oil and gas leases-Myanmar; Natural gas pipe lines/Myanmar; Civil rights; Fossil primates; Petroleum supply/Myanmar; Electric power/Consumption; Fuel supply/Myanmar; Foreign investments/Myanmar; Petroleum geology/Myanmar; Plate tectonics-Myanmar; Rocks-Deformation; American corporations-Myanmar; Petroleum industry-Political aspects; Atlantic Richfield Co. Atlantic Richfield Co./Foreign business; Petroleum industry/Myanmar; Natural gas geology/Myanmar; Elephants; Lumber industry/Myanmar; Lumbering; Mining law/Myanmar; Oil and gas leases/Indochina; Oil and gas leases-Thailand; Military airplanes-Myanmar; Earthquakes-Myanmar; Submarine canyons. Notes: Physical Description: Bibliography; Graph; Map; Physical Description: Bibliography; Illustration; Map; Physical Description: Diagram; Map; Physical Description: Bibliography; Illustration; Physical Description: Bibliography; Illustration; Map; Physical Description: Illustration; Map; Physical Description: Diagram; Illustration; Map; Physical Description: Illustration; Physical Description: Illustration; Map; Physical Description: Bibliography; Map; Diagram. Abstract: We report the results of a magnetostratigraphic investigation to improve the

stratigraphical and chronological resolution of the Pondaung Formation of central Myanmar. A total of 98 samples were collected from 45 sites through a 319-m-thick section at the fossiliferous locality of Yashe Kyitchaung or the Primate Resort (yielding primate species *Bahinia pondaungensis*, *Amphipithecus mogaungensis*, and *Myanmarpithecus yarshensis*) near the Bahin village. Thermal and alternating field demagnetization allowed separation of two remanence components. The high-temperature component is interpreted as the characteristic magnetization. Rock magnetic experiments show that the remanence magnetization is mainly carried by magnetite. This investigation documents normal polarity remanent magnetization, with a mean direction  $D = 336.7^\circ$ ,  $I = 45.5^\circ$  ( $N = 74$ ,  $\alpha_{95} = 7.1$ ,  $k = 12$ ). A local anticlockwise tectonic rotation of about  $32^\circ$  [plus or minus]  $0.94^\circ$  about a vertical axis is suggested, therefore. The magnetostratigraphic data indicate that the Bahin section can be correlated with chron C17n.1n, and an age of between 37 and 37.4 Ma can thus be assigned to the anthropoid locality. A study of the characteristics and possible origins of diamonds from Myanmar and Thailand is presented. The alluvial diamond deposits under investigation do not contain typical diamond indicator minerals. Evidence including isotopic data, the dominantly peridotitic nature of the syngenetic inclusions, indications of long surface transport, and association with glacial-marine sediments suggest that these diamonds originated in northwestern Australia or within the Sibumasu terrane itself before the Early Permian separation of the Sibumasu terrane from the Gondwanaland margin. Although a number of large offshore gas discoveries in the early 1990s boosted Myanmar's oil and gas industry, the sector is faltering once again. Several factors are causing problems for the sector, including tensions between state oil company Myanma Oil & Gas Enterprise and the ruling military government that are hampering development and disappointing results from onshore oil exploration. Both of these factors are leading operators to reduce investment in the sector. Furthermore, the domestic and international pressures facing America's Unocal Corp. and Britain's Premier Oil plc over allegations of serious human rights abuses in pipeline projects in which they are involved are putting a further strain on the sector. Meanwhile, the Clinton administration in May 2000 renewed unilateral sanctions

against Myanmar. A big onshore oil field in Myanmar has responded to initial production improvement work and is in line for a big waterflood scheme later in 2000. Mann field also appears to be ready for subthrust, flank, and deeper pool exploration, according to the field's new operator. Myanmar Petroleum Resources Ltd. (MPRL), Yangon, Myanmar, with 100 percent working interest, has bought a workstation and is interpreting reprocessed data from a 31,000-acre 3D seismic survey carried out in 1997. MPRL is operating the field under a production compensation contract with state Myanma Oil & Gas Enterprise. A new genus and species of anthropoid primate, *Bahinia pondaungensis* gen. et sp. nov., is described from the Yashe Kyitchaung locality in the Late Middle Eocene Pondaung Formation (Myanmar). It is related to *Eosimias*, but it is represented by more complete remains, including upper dentition with associated lower jaw fragment. It is interpreted as a new representative of the family Eosimiidae, which corresponds to the sister group of the Amphipithecidae and of all other anthropoids. Eosimiidae are now recorded from three distinct Middle Eocene localities in Asia, giving support to the hypothesis of an Asian origin of anthropoids. Although Myanmar possesses huge energy resources in terms of potential petroleum reserves and hydroelectric power potential, it is facing an increasing shortfall in energy supply. A report presented by Energy Minister Lun Thi highlighted the fact that an anticipated significant rise in demand and a deficiency in energy infrastructure required to support the anticipated demand growth are making the issue of energy availability increasingly serious. Significant domestic and foreign capital is required to initiate large-scale energy infrastructure projects. However, obtaining such funding is extremely difficult due to the fact that Myanmar's poverty and serious political problems have prompted most overseas investors to look beyond the country for project development. The deformation history of the Salin subbasin, Myanmar, Burma, was studied. In the study, field-based geological observations and interpretations of geophysical data were integrated with regional tectonics. Exploration of the mechanisms of creation and deformation can be carried out in this region due to the configuration of the basin being preserved as a result of intense structural shortening due to continental collision. An insight into the structural and tectonic

processes at work is provided. In mid-November 1997, ARCO announced its intention to reduce its operations in Myanmar by selling an interest in gas-prone blocks in Gulf of Martaban--a withdrawal that appears to have been forced by protest groups in the U.S. that have been targeting companies with interests in Myanmar. The reactions of other petroleum companies that have been targeted by these protest groups are discussed. Part of a special section on oil and gas exploration in Myanmar (Burma) discusses the integrated oil industry in the Chindwin basin, covering exploration methods, drilling practices, production, transportation, refining, and marketing and distribution. Oil occurrence testifies to the potential oil source rocks of the Eocene in the Chindwin basin, and it seems likely that the oil potential of the Eocene at Indaw makes the structure a good candidate for a giant discovery. Part of a special section on oil and gas exploration in Myanmar (Burma). On July 21, 1997, Pacrim Energy NL of Brisbane, Australia, signed production sharing contracts with Myanmar to explore two blocks known as C-1 (Indaw) and RSF-9 (Pyalo). RSF-9 covers 600,229 acres in the old Central Burma oil belt. It is situated east of the Ayeyerwady (Irrawaddy) River north of Prome Oil field, approximately 180 miles northwest of Yangon (Rangoon). It has one depleted and/or not fully developed gas field, at Pyalo, and the block is very lightly explored. Block C-1, modified and enlarged relative to the earlier Block C-1 held by Yukong Ltd. of Korea in 1989-94, now comprises almost 4.8 million acres. The block is located in Northwest Myanmar, with its center about 150 miles northwest of Mandalay in the remote Chindwin basin. This block, which was extended to the east to include the Mettaung thrust belt and to the north to include the Yen-an anticline west of the Chindwin River, is discussed in detail. In Myanmar, formerly Burma, the use of elephants for logging provides benefits for both the country's forests and an endangered species. Myanmar has some of the largest tracts of unspoilt forest on the earth, thanks to a century-old policy of harvesting selected trees and transporting the logs by teams of men and elephants. The traditional practice keeps vast sections of forest robust and highly productive. The environmental benefits of using elephants over machines for logging; the importance of the numbers of logging elephants to the overall population of Asian elephants; and attempts to inseminate



female elephants as part of a breeding program are discussed. Recent alterations to the mining laws in Myanmar, which was previously known as Burma, have generated renewed interest in this area of Southeast Asia. The law now provides for 3 types of permits. These are 3-year-life for prospecting/exploration in virgin areas, 1-year-life for exploration/feasibility-study in areas with extensive data extant, and 15-year-life for mine development/production. Indochina is emerging as a prime candidate for foreign investment in oil and gas exploration and development (E&D) and should retain that status for the rest of the decade as the trend toward privatization accelerates there. With the exception of Thailand and its market-oriented economy, the region's countries have been experiencing years of international isolation caused by war or civil unrest, and some are looking for foreign private investment in oil and gas for the first time in more than 10 years. According to A. D. Melzer, managing director at Premier Consolidated Oilfields, oil firms generally take a cautious but favorable stance toward E&D in Indochina. However, progress could be impeded by the confusing array of boundary claims among Southeast Asian countries and by the vast number of unexploded bombs and ordnance left by decades of war in the region. E&D efforts in Thailand, Myanmar, Cambodia, Laos, and Vietnam are discussed. ISSN/ISBN: 0022-1376; 0361-0128; 0030-1388; 0030-1388; 0036-8075; 0030-1388; 0149-1423; 0030-1388; 0030-1388; 0030-1388; 0036-8733; 0095-8948; 0030-1388; 0005-2175; 0037-1106.

Bender, F. Bannert, D. Brinckmann, J. Gramann, F. and Helmcke, D. 1983. *Geology of Burma*. Federal Republic of Germany: Gebrueder Borntraeger Verlagsbuchhandlung, Berlin-Stuttgart, Federal Republic of Germany. *Beitraege Zur Regionalen Geologie Der Erde*. Volume: 16, Language: English. Descriptors: areal geology; Asia; Burma; Far East; hydrogeology; monographs; regional; soils. Notes: CD: BRGEA4; FE: References: 940; illus. incl. 92 plates, table, geol. sketch map, sect., strat. col. Map Scale: 1:2,000,000. type: Geologic map. ISSN: 0522-7038.

Bernardi, Michele. 2008. "Nargis Rain Rate Animation." Rain rate during the Cyclone Nargis, 30 April - 2 May, 2008. Naval Research

Laboratory, Marine Meteorology Division, Monterey CA, USA. GIF animation was created by FAO/NR. See:  
[http://www.fao.org/nr/myanmar/Nargis\\_30Apr\\_02May\\_08-animate.gif](http://www.fao.org/nr/myanmar/Nargis_30Apr_02May_08-animate.gif)

Bert, W. 1990. "Chinese Policy Toward Democratization Movements: Burma and the Philippines." *Asian Survey*. Volume 30, Issue 11, Pages 1066-1083. Descriptors: WATER; reform movement; democratisation; Chinese foreign policy. Notes: Geographic: Burma Philippines China. Abstract: This article is an inquiry into China's attitude and policy toward situations where a reform movement was trying to replace or reform a rigid and inefficient government in a geographical area of strategic and economic importance to China. As the crises deepened in Burma and the Philippines, was China's policy toward democratization aimed at continuing good relations with the friendly but now threatened 'old regime' and maintaining the status quo or at establishing rapport with and supporting the movement or party attempting to take power; and were China's reasons for giving or withholding support based on its advocacy of reform per se, or protection of its security and economic interests through diplomatic and foreign policy means? ISSN: 0004-4687.

Bird, M. I., Robinson, R. A. J., Win Oo, N., et al. "A Preliminary Estimate of Organic Carbon Transport by the Ayeyarwady (Irrawaddy) and Thanlwin (Salween) Rivers of Myanmar." *Quaternary International*,. Volume In Press, Corrected Proof,

Blaber, S. J. M., Brewer, D. T., Milton, D. A., et al. 1999. "The Life History of the Protandrous Tropical Shad *Tenualosa Macrura* (Alosinae: Clupeidae): Fishery Implications." *Estuarine, Coastal and Shelf Science*. 11. Volume 49, Issue 5, Pages 689-701. Descriptors: tropical; coastal waters; *Tenualosa*; protandry; overfishing; distribution. Abstract: *Tenualosa macrura* is a tropical shad that was previously found throughout the estuaries and coastal waters of Sumatra and Borneo where it formed the basis of flourishing fisheries. The only viable fishery today has contracted to the Riau Province of Sumatra, Indonesia. To provide information for conservation and fisheries management, a two-year study of the biology, ecology and life history characteristics of *T. macrura* was conducted. The evidence from sizes

of sexes, sex ratios and histology is that *T. macrura* is a protandrous hermaphrodite. It changes from male to female mainly between 14 and 20 cm SL (standard length) (six months to one year in age), after the male has spawned. Almost all fish in their second year are females; the species does not appear to live beyond two years. There is a regular movement of spawning males and females between the Strait of Malacca (salinity 28–30) and the spawning grounds in the sheltered straits (salinity 20–28) of Riau Province on each new and full moon. Their occurrence in the inshore straits leads to heavy fishing during these moon phases. The main nursery areas are the shallow coastal waters of the Strait of Malacca. The decline in catches of *T. macrura* has probably been as a result of fishers intensively targeting aggregations of spawning females. Furthermore, most are caught before spawning. It is postulated that the protandrous habit of this species, and its likewise endangered congener of Sarawak, *T. toli*, renders them more vulnerable to overfishing than is the gonochoristic and more widespread *T. ilisha* that is heavily fished from Burma through the Indian sub-continent to Kuwait.

Blaber, SJM; Milton, DA; Fry, G. and Chenery, SR. 2003. New Insights into the Life History of *Tenualosa ilisha* and Fishery Implications. American Fisheries Society. Am. Fish. Soc. Symp. Volume: 35, Pages: 223-240. Descriptors: Article Subject Terms: Age groups; Anadromous species; Bays; Biodiversity; Brackishwater environment; Catch statistics; Coastal fisheries; Coastal waters; Commercial species; Correlation; Depleted stocks; Distribution records; Estuaries; Estuarine fisheries; Fecundity; Fishery management; Geochemistry; Growth rate; Migrations; Monsoons; Otolith reading; Population dynamics; Population structure; Recruitment; Rivers; Salinity gradients; Sex ratio; Sexual maturity; Spawning grounds; Stock assessment; Temperature effects; Water temperature; Article Taxonomic Terms: *Tenualosa ilisha*; Article Geographic Terms: Australia; Bangladesh; ISW, Indian Ocean, Bengal Bay; Kuwait; Myanmar; PSE, East Indian Ocean; Pakistan; Hilsa; Sex ratio bias; Shads; Brackish. Abstract: *Tenualosa ilisha* (known as hilsa) is the most widespread of the five species of tropical shads *Tenualosa* spp. It is found from North Sumatra in the east to Kuwait in the west. It is the basis of important

fisheries in Bangladesh, India, Burma, Pakistan, and Kuwait and is probably the basis of the largest estuarine fishery in the world. In Bangladesh, *T. ilisha* comprises 25% of total fish production (total = about 200,000 metric tons per year). To date, there has been no attempt to relate the marine, estuarine, and freshwater components of the populations and describe the full life history of the species. To address this, studies were conducted in Bangladesh by the Commonwealth Scientific and Industrial Research Organization, Australia, and the Fisheries Research Institute of Bangladesh between 1996 and 2000. Results show that male and female *T. ilisha* reach sexual maturity at 200 mm when they are 1 year old and that both are able to spawn at this size. Unlike other *Tenualosa* species, there is no histological or macroscopic evidence for sex change in *T. ilisha*, but there is a bias in the sex ratio. The majority of individuals over 300 mm and almost all over 400 mm are females. Males predominate between 100 and 250 mm, but the sex ratio below 100 mm is more even. The biases in the sex ratio suggest that males may not live as long as females. Spawning occurs throughout the year from upstream at the Indian border to the coast at Chittagong and even in the sea off Cox's Bazar. Contrary to the previous belief that *T. ilisha* is strictly anadromous, the data show clearly that *T. ilisha* spawn in rivers, in estuaries, and on the coast. Otolith core microchemistry indicates that some fish (e.g., from Cox's Bazar) are born in middle to high salinities, which suggests that salinity per se may not be relevant to the location of spawning areas. The previously documented large-scale movements of *T. ilisha* show a marked correlation with water temperature. Upstream movements during the monsoon (July-September) take place when water temperatures are highest inland. Conversely, the movement toward the sea corresponds with a marked drop in upstream water temperature from about October, when sea temperatures are 3-4 degree C higher than riverine temperatures. Otolith Sr:Ca ratios and reproductive surveys indicate that the movement patterns of *T. ilisha* are complex and variable. Individuals attain 20 cm standard length by the end of their first year and grow at similar rates to other tropical clupeids. The population is now dominated by 1-year-old fish, whereas in the 1960s it was composed mainly of 3-year-old fish. Hence, the probability of recruitment failure

has greatly increased because 1-year-old fish now contribute most to egg production and have a relatively low fecundity. This, together with a decline in female fecundity, has implications for the future of the fishery which recorded large declines in catches in 2000 and 2001. Notes: SO: Biodiversity, Status, and Conservation of the World's Shads. pp. 223-240. American Fisheries Society Symposium [Am. Fish. Soc. Symp.]. Vol. 35. TR: CS0509113. ISBN: 1888569514. Database: ASFA: Aquatic Sciences and Fisheries Abstracts. OCLC: 5707398.

Bodden, Ralf. 1987. "Kinda Dam Hydroelectric Power Plant Makes an Important Contribution to Burma's Power Supply." *Energy & Automation*. Volume 9, Issue 6, Pages 52-53. Descriptors: HYDROELECTRIC POWER PLANTS- Burma; DAMS- Burma; ELECTRIC POWER PLANTS- Burma. Abstract: The Kinda Dam hydroelectric power plant was commissioned at the end of 1985 after a construction period of just under five years. It is part of a multi-purpose project built for the Electric Power Corporation and financed by the World Bank and the Kreditanstalt fuer Wiederaufbau. In January 1986 the plant, which is Germany's major development aid project for Burma, was visited by Dr. Richard von Weizsaecker, President of the Federal Republic of Germany. The Kinda Dam storage reservoir was built to afford protection against flooding in the rainy season and for irrigation of wide areas of land for more intensive rice cultivation, since the severe seasonal water shortage is a problem in the dry zone of central Burma.

Bodet, F. and Schaerer, U. 2001. "Pb Isotope Systematics and Time-Integrated Th/U of SE-Asian Continental Crust Recorded by Single K-Feldspar Grains in Large Rivers." *Chem. Geol.* 30 Jul. Volume 177, Issue 3-4, Pages 265-285. Descriptors: Article Subject Terms: Erosion; Feldspars; Fluvial Sediments; Fluvial deposits; Geochemistry; Geologic History; Geomorphology; Isotope Studies; Lead; Lead Radioisotopes; Radioactive Dating; Radiometric dating; Sediment chemistry; Sediment sources; Thorium; Uranium; Uranium Radioisotopes; Article Geographic Terms: Asia, Mekong R. Asia, Red R. Asia, Salween R. Burma, Irrawaddy R. Asia, Mekong R. Notes: TR: CS0208582. Abstract: To elucidate time-integrated Th/U and Pb isotope characteristics of the SE-Asian continent, 159 individual K-

feldspar grains from the rivers Mekong, Salween, Irrawaddy and Red River were analyzed. Earlier U-Pb dating and Hf isotope results of zircon and baddeleyite from the same river sands have established its crustal growth and recycling history, also showing that these heavy minerals are sufficiently representative for the evolution of large continental regions. We therefore consider K-feldspar populations in these sands to be the best possible way to investigate Pb isotope systematics on the continental scale, and analyzing individual grains overcomes the averaging effect of multi-grain measurements. To test the basic condition that U/Pb-ratios are very low in K-feldspar, Pb concentration were measured in all grains, and U in about 10% of them, corroborating Pb concentrations between 4 and 292 ppm with a mean value of 80 plus or minus 40 ppm, and U and Th well below 0.1 and 0.4 ppm, respectively. In situ decay of U can therefore be neglected in all grains and measured Pb isotope ratios are those acquired by the magmatic or metamorphic host material at the time of K-feldspar crystallization. Relative to the model evolution of  $^{206}\text{Pb}/^{204}\text{Pb}$  in upper continental crust, model ages range between 0.5 and 0.2 Ga, whereas many  $^{207}\text{Pb}/^{204}\text{Pb}$  are significantly more radiogenic than any type of Phanerozoic crust. This confirms important recycling of Precambrian crust into the K-feldspar source material such as already observed by Hf signatures for the heavy mineral source lithologies. An important observation is that none of the K-feldspars has preserved Precambrian Pb isotope signature and in consequence, detrital sediments covering the SE-Asian continent must essentially originate from Phanerozoic orogenic belts, where K-feldspars have been re-equilibrated by metamorphic reactions or crystallization in newly formed melts. To dominate delivery of detrital material to such a large extent on the continental scale, these Phanerozoic orogenies must have generated important high mountains ranges, to be subsequently flattened by erosion; today topographic highs are exclusively due to uplift in relation to the India-Asia collision. Database: Water Resources Abstracts. ISSN: 0009-2541.

Bolin, T. D., Genge, J. R., Duncombe, V. M., Soe-Aung and Myo-Khin  
Affiliation: Gastrointestinal Unit, Prince of Wales Hospital, Randwick,

New South Wales,,Australia. 1996. "Patterns of Methane Production in a Burmese (Myanmar) Population." *J. Gastroenterol. Hepatol. J. Gastroenterol. Hepatol. Jan.* Volume 11, Issue 1, Pages 71-6  
Additional Info: AUSTRALIA. Descriptors: Adolescent; Adult; Age Factors; Aged; Aged, 80 and over; Breath Tests; Child; Child, Preschool; Cross-Sectional Studies; Diet; Female; Humans; Infant; Infant, Newborn; Male; Methane- metabolism; Middle Aged; Myanmar; Sex Factors; Smoking- epidemiology; Socioeconomic Factors. Notes: Chemical Subst: Methane [74-82-8]; Citation: Status: MEDLINE Owner: NLM. Abstract: While up to 50% of Western populations produce methane, this is less than that of rural black Africans and there is no information on methane production in populations from Asian developing countries. Females consistently produce methane more commonly than males, and methane production in children under the age of five years, except in Nigeria, is unusual. Breath methane was sampled in 1426 subjects from Myanmar ranging in age from 1 month to 88 years, with a mean age of 26.2 years. Half (49.8%) of the Myanmar population produced methane, this figure comprising 53% of females and 46% of males sampled. Methane production increases with age and reaches adult levels after 10 years of age. A high prevalence of methane production was found in children under 3 years of age (15.8%). Methane production was absent in 13 solely breast-fed children and increased as other food was introduced into the diet. There was an association of methane production within families and with smoking. The prevalence of methane production increased in male and female smokers, with 75% of smokers producing methane. Methane production was not associated with occupation, education, income, water source, latrine type, previous diarrhoea, antibiotic usage or socio-economic status. ISSN: 0815-9319 (Print); 1440-1746 (Electronic).

Bondre, N. 2007. "Earthquakes: Burma's Fault." *Nature; Nature.* Sep 6. Volume 449, Issue 7158, Pages 33 Additional Info: England. Descriptors: Models, Theoretical; Natural Disasters; Myanmar; Oceans and Seas; Water Movements; Earthquakes; Tidal waves; Geology. Notes: Notes: Comment On: *Nature.* 2007 Sep 6; 449 (7158): 75-8 PMID: 17805292; Citation: Status: MEDLINE Owner: NLM. Abstract:

The Sumatra-Andaman earthquake and Indian Ocean tsunami of 2004 came as a surprise to most of the Earth science community. While it is now widely recognized that the risk of another giant earthquake is high off central Sumatra, just east of the 2004 earthquake, there seems to be relatively little concern about the subduction zone to the north, in the northern Bay of Bengal along the coast of Myanmar (formerly Burma). Phil Cummins suggests, however, that giant earthquake activity is possible in this region, and that a large and vulnerable population may be facing a significant earthquake and tsunami hazard. ISSN/ISBN: 0028-0836 (Print); 1476-4687 (Electronic).

Boonpiraks, S. 1992. "Thai-Myanmar Joint Hydro Schemes." *International Water Power and Dam Construction IWPCDM*, Vol.44, no.10, p 40-41. October 1992. 1 fig. Descriptors: Hydroelectric projects; Myanmar; Thailand; Water resources development; Water resources management; Cost analysis; Dams; Developing countries; International agreements; Regional planning. Abstract: Both Thailand and the Union of Myanmar have, for a long time, been interested in the development of the water resources of their bordering rivers. The two countries agreed in 1989 to cooperate on eight hydro projects along their common border: Nam Mae Sai, Klong Kra, Upper Salawin, Lower Salawin, Nam Moei 1, Nam Moei 2, Nam Moei 3, and Mak Kok. Preliminary studies of the projects have since been carried out and choices for dam type and electric power generation equipment have been made. The total capacity of the eight stations will be 6397.5 MW, requiring a total investment of some US \$5.12 billion. Database: Environmental Sciences and Pollution Mgmt. ISSN: 0306-400X.

Boucher, Francois. 2007. Southeast Asia. A Rail Network from China to Singapore. *LA VIE DU RAIL*. no. 3, Pages: pp 28-35. Descriptors: Burma; China; Network analysis (Planning); Networks; Railroad transportation; Railroads; Regional development; Regional planning; Regional transportation; Singapore; Southeast Asia; Vietnam. Abstract: By 2015, a 5,500-km unified Pan-Asian railway network should be completed, replacing the existing metric gauge mosaic of railway lines in Southeast Asia. Since 1995, this project has mobilized



the key railway players and stakeholders in this part of the globe. Between China and Singapore, and between Vietnam and Burma, 8 countries are involved. However, not all these countries have the same level of development nor the same priorities as do the aforementioned nations. This article discusses the logistics, barriers, and possible solutions involved in constructing the proposed Pan-Asian railway network throughout Southeast Asia. OCLC Accession Number: 01082418.

Boucot, A. J., Cocks, L. R. M. and Racheboeuf P.R. Affiliation: A.J. Boucot, Department of Zoology, Oregon State University, Corvallis, OR, 97331. 1999. "Early Devonian Brachiopods from Satun Province, Southern Thailand." *J. Paleontol.* 2005 Elsevier Ltd. All rights reserved.: Volume 73, Issue 5, Pages 850-859 Additional Info: United States. Descriptors: Invertebrates; Devonian; paleobiogeography Species Term: *Quasiprosserella samedensis*; *Plectodonta forteyi*; *Caplinoplia thailandensis*; *Clorinda wongwanichi*; Brachiopoda; Entovalva; Plectodonta; Quasiprosserella. Notes: References: Number: 52; Geographic: Thailand- Satun Province. Abstract: Twelve brachiopod taxa are described from the Early Devonian (probable early Emsian) Pa Samed Formation of southern Thailand, including the new genus and species *Quasiprosserella samedensis* (Ambocoeliidae?) and the new species *Plectodonta forteyi*, *Caplinoplia thailandensis*, and *Clorinda wongwanichi*. They are the first undoubted Devonian brachiopods from Thailand. They represent the deeper-water Benthic Assemblages BA4-5, and, although clearly indicative of the Old World Realm, cannot be assigned to a particular biogeographical region. A new undescribed fauna from the contemporary Zebingyi Formation of Burma (Myanmar) is also noted. ISSN/ISBN: 0022-3360.

Bray, J. 1993. "Burma Politics and Petroleum." *Geopolitics of Energy.* 2005 Elsevier Ltd. All rights reserved.: Volume 15, Issue 5, Pages 6-8. Descriptors: WATER; gas; petroleum; political factors; offshore exploration. Notes: Geographic: Burma. Abstract: Interest in Burma is provoked mainly by offshore prospects and the possibility that such gas discoveries may be related to others in the Gulf of Thailand, thus making the region a gas province of importance to continental

Southeast Asia and possibly a source of additional LNG trade. The geological opportunities for offshore exploration are considered attractive, but the bleak political outlook sours the prospects for economic expansion. ISSN: 0273-1371.

Brichieri-Columbi, J. S. A. 1983. "Hydrological Studies of the Irrawaddy Delta." *Hydrology of Humid Tropical Regions* IAHS Publication no.140, 1983. Proceedings of a Symposium Held at the 18th General Assembly of the International Union of Geodesy and Geophysics. Hamburg, West Germany. Volume August 15-27, Pages 3 ref. Descriptors: Hydrology; Irrawaddy Delta; Mathematical models; Surveys; Drainage basins; Deltas; Hydrologic regime; Short-term planning; Available water; Mali River; N'Mai River; Burma; China. Abstract: The Irrawaddy is formed by the confluence of the Mali and N'Mai rivers which rise among 6,000 m peaks on the Burma-China border, and drains a 415,000 sq km drainage basin. As it is navigable for much of its 2,000 km length, and provides a constant supply of fresh water to the dry central zone, it has played a dominant role in the history and economic life of Burma. The delta starts at Kyangin, 380 km from the Gulf of Martaban, at an altitude of 15 m, and extends over an area of 31,000 sq km between the confining hills of the 1,300 m Arakan Yomas in the west and the 900 Pegu Yomas in the east. The river fans out from its braided channel above Kyangin in a complex of tidal creeks which drain into the gulf by 12 major mouths extending over 260 km of coast. In the period November 1977-March 1981, a hydrological survey was carried out by various British government and private organizations under a project funded by the IDA and ODA (UK). The study objectives were (a) to establish hydrological design parameters for paddy projects; (b) to determine the availability of fresh water in the lower delta channels; (c) to assess the effect of short-term projects for development of 400,000 ha of paddyland, and long-term development with widespread embanking, on the hydraulic regime of the delta. To satisfy the second and third objectives, a one-dimensional mathematical model of the delta was set up to study the fluvio-tidal interaction under low flow and flood conditions. The modelling work was carried out in parallel with a major survey effort in order to concentrate the survey efficiently, and to identify errors in the

survey or modelling while the teams were still available. (See also W87-00086). Database: Environmental Sciences and Pollution Mgmt.

Brinckmann, J. and Hinze, C. 1981. "On the Geology of the Bawdwin Lead-Zinc Mine, Northern Shan State, Burma." *Geologisches Jahrbuch, Reihe D*. 2005 Elsevier Ltd. All rights reserved.: Volume 43, Pages 7-45. Descriptors: MINERALOGY. Notes: Special Feature: 2 figs, 11 coloured photos, 2 coloured geological maps (1:10 000 & 1:4800), 5 coloured plans. Abstract: Detailed geological re-mapping shows a close association between the Pb(Ag)-Zn ore of the Bawdwin mine and the rhyolitic country rocks. These 2000 m-thick volcanoclastic sediments and shallow rhyolite intrusive are intercalated in Lower Palaeozoic shallow-water deposits. The late phase of this volcanism was characterized by pneumatolytic and/or hydrothermal solutions which gave three sulphide orebodies (the Shan, Chinaman and Meingtha lodes) and surrounding low-grade ore in volcanoclastics sediments. The position of the high-grade orebodies was controlled by the Bawdwin fault zone. Several features of the Bawdwin ore and its felsitic host rocks are similar to the Japanese Kuroko ore deposit. The Bawdwin lodes are of the 'fissure-filling vein type' and/or 'stockwork ore' of the Kuroko-type deposits.

Browder, Greg John. 1998. *Negotiating an International Regime for Water Allocation in the Mekong River Basin (Cambodia, Laos, Thailand, Vietnam)*. Stanford University. DAI. Volume: 59, 06A, Pages: 359-2178. Descriptors: Political Science, International Law And Relations; Political Science, General; Environmental Sciences; Urban And Regional Planning. Abstract: This study analyzes negotiations for the 1995 Mekong Agreement and examines the early implementation of the Agreement. The Mekong regime is defined as a governance system for water management in the Mekong Basin. The regime-member states are Cambodia, Laos, Thailand, and Vietnam; the two upper basin states, China and Myanmar, are not members. Although the regime has existed since 1957, the Agreement signaled the start of a new era in which water allocation is a key issue. The research question is: How, and to what extent, has the Mekong regime made progress on water allocation issues? The dissertation reviews the history of the

Mekong regime, surveys current water resource development in the Mekong Basin, and describes the geopolitical context for the Agreement. Negotiations for the Agreement and its early implementation are then examined. The study constructs an analytic framework based on the work of three negotiation researchers: Howard Raiffa, James Sebenius, and Lawrence Susskind. Information for the analysis comes from interviews with the negotiators, negotiation documents, press reports, and the author's personal experiences. Three levels of hierarchical rules exist in the Mekong regime: constitutional, legislative, and administrative. The Agreement represents a new constitution because it specifies principles, procedures and organizational arrangements. The Agreement was possible because: (i) the Mekong states wanted to maintain amicable relations in the post-Cold War era, (ii) governments from Europe and Japan subsidize the Mekong regime, and (iii) planned Chinese reservoirs will augment the dry season water supply. Mediation by the United Nations Development Programme was necessary in formulating the Agreement. The Agreement created the Mekong River Commission (MRC), and requires the MRC to formulate legislative rules on: (i) minimum flows in the Mekong River, (ii) procedures for reviewing proposed water uses, and (iii) a non-binding basin development plan. The MRC has encountered difficulties drafting these legislative rules because of the absence of mediation, the MRC's low status on the region's foreign policy agenda, and the contentious nature of water allocation issues. The restructuring of the Mekong regime will not be complete until the MRC has a set of administrative rules on specific water uses. Notes: Degree: PH.D. OCLC: AAG9837180.

Brown, L. R. Renner, M. and Halweil, B. 1999. *Vital Signs 1999. The Environmental Trends that are Shaping Our Future*. Norton (W.W.) and Company, Incorporated. Pages: 197 p. Descriptors: Burma; Cellular phones; Economic conditions; Environmental quality; Laos; Newspapers; Scientists; Weather and climate. Abstract: This eighth volume in the series from the Worldwatch Institute shows the key trends that often escape the attention of the news media and world leaders- and that are often ignored by economic experts as they plan for the future. This book provides key indicators that show social,

economic, and environmental progress, or the lack of it. The data have been extracted from thousands of documents obtained from government, industry, scientists, and international organizations into "vital signs" of our times. Among the findings are the following: 1998 was the hottest year since record keeping began in 1866; Yak caravans in the mountains of Laos and Burma now use cell phones to find the best route to market during the rainy season. ISBN: 0393318931. OCLC Accession Number: 00765528.

Brown, P., Kenney, A. J., Htwe, N. M., et al. 2008. "Farmers' Knowledge, Attitudes, and Practices for Rodent Management in Myanmar." *Int. J. Pest Manage.* Volume 54, Issue 1, Pages 69-76  
Additional Info: United Kingdom. Descriptors: Pests; crop damage; crop yield; farmers attitude; farmers knowledge; farming system; perception; pest control; pest species; rice; rodent Species Term: Hexapoda; Rattus; Rodentia. Notes: References: Number: 29; Geographic: Asia Eurasia Myanmar Southeast Asia. Abstract: A survey of 350 farmers was conducted in the lowland rainfed agricultural system of central Myanmar (Burma) to examine the importance of rodents, farmers' perception of the causes of yield loss, and their beliefs as to why they undertake rodent management. Farmers grew monsoon rice, summer rice and mungbeans with the major constraints upon production identified as pests (29.4% of respondents), followed by insufficient water (19.4%). The main pests were insects (48.6%), followed by rats (40.9%); however, farmers thought that rats caused most damage to their crops (47.7% of respondents; insects 30.3%), and were the most important pest to control. Farmers estimated that rodents caused 13% yield loss. Most farmers believed they could increase yields if they were to work together to control rats, but 61.1% applied rodent control individually. Most farmers (81%) thought that rodenticides were not safe despite 33% using them. Rodents were clearly identified as a significant problem by farmers. With an understanding of the main rodent pest species, ecology and crop damage, ecologically based management strategies for the lowland rainfed rice system in Myanmar can be developed. ISSN: 0967-0874; Electronic- 1366-5863.

Bruneau, M. 1991. "Modeles Spatiaux Des Etats De l'Asie Du Sud-Est Continentale Translated Title: State Spatial Models of Continental Southeast Asia." *Cahiers De Geographie Du Quebec*. Volume 35, Issue 94, Pages 89-116. Descriptors: Spatial Analysis, Location Theory; WATER; developing country; spatial model; regional variation; simulation model; colonisation process; national territory; core-periphery relations; capitalist economy; regional development; state control; uneven development; territorial administration. Notes: Geographic: Asia- (Southeast) Burma Thailand Laos Cambodia. Abstract: Within four states of continental Southeast Asia (Burma, Thailand, Laos, Cambodia) we observe the persistency of a concentric circle spatial model of uneven development and decreasing control of the central power. This model originates from the *muang* or principality of the precolonial period whose autonomy was challenged only by the rise of strong kingdoms. The colonisation and the penetration of the capitalist economy did not succeed in truly integrating the national space in spite of the development of communication networks and of the rationalisation of territorial administration. Thailand, not directly colonised, has gone the farthest in the way of a unified national territory because of the continuity of its monarchy and the integration of her Chinese bourgeoisie. The two buffer-states of Laos and Cambodia, and Burma are still economically underdeveloped and have a very loosely integrated external ring. The present trend for them is to become peripheries to Thailand and especially its center Bangkok where population, activity and capital accumulate. ISSN: 0007-9766.

Bruneau, M. And Bernot, L. 1974. "A Lake Population: The Intha of Lake Inle. (Southern Shan States, Burma), (in French)." *J Agric Trop Bot Appl*. 19(10/11); P 401-441. 1972(1974). Descriptors: Asia; Lakes; Rice; Human Population; Forests; Geography; Water Hyacinth; Nuisance Algae; Bibliographies; Burma; *Ceratophyllum*; *Dipterocarpus-Tuberculatus*; *Eichornia-Crassipes*; *Ephydatia-Fluviatilis*; *Hydrilla*; *Imperata*; Inle; Intha; Shan; *Utricularia*. Abstract: cultural data on the people and a bibliography of geographic, ethnographic and biological works on this area are provided. The *yaungshwe* basin contains 2 distinct types of forest: one characterized by *dipterocarpus*

tuberculatus and associated plants; the other by imperata. The lacustral zone occupies a portion of the basin and is composed of 3 sections: the central section, characterized by ceratophyllum; the area around the lake, composed of floating islands of living and dead plants, especially the water hyacinth eichornia crassipes, a rapidly growing south american plant which is considered a nuisance; and the intermediate paludal zone, the bottom of which is covered with hydrilla, ceratophyllum and utricularia. This last zone is also rich in the sponge, ephydatia fluviatilis. The principal industry in the area is rice growing. Database: Environmental Sciences and Pollution Mgmt.

Bryant, R. L. 1994. "Fighting Over the Forests: Political Reform, Peasant Resistance and the Transformation of Forest Management in Late Colonial Burma." *Journal of Commonwealth & Comparative Politics*. 2005 Elsevier Ltd. All rights reserved.: Volume 32, Issue 2, Pages 244-260. Descriptors: WATER; political reform; colonial period; peasant resistance; forest management. Notes: Geographic: Burma. Abstract: Although contemporary forest politics in South-East Asia differs from the past in that it features new actors (that is NGOs) and a pronounced international dimension, there are important continuities with the past. Political reforms and peasant resistance combined to transform forest management in colonial Burma between 1923 and 1942. The essay addresses two issues of central importance during this period: peasant access to the plains reserves, and the Burmanisation of the forest sector. The former was an issue which largely pitted the peasantry against the forest department but which also implicated nationalist leaders who sought peasant political support. In contrast, the latter was primarily an affair of the urban middle class - not surprisingly, since it was this class which would benefit most from the employment opportunities in government and business that would occur with reform in this area. Together, these two issues dominated forest politics in the late colonial period, and contributed to the transformation of forest management.

Bryant, R. L. 1994. "Shifting the Cultivator: The Politics of Teak Regeneration in Colonial Burma." *Modern Asian Studies*. 2005 Elsevier Ltd. All rights reserved.: Volume 28, Issue 2, Pages 225-250.

Descriptors: HISTORICAL GEOGRAPHY; WATER; cultural conflict; political process; colonial period; economic control; plantation forestry; forest policy; shifting cultivators; teak production; taungya forestry; state control; teak plantation. Notes: Geographic: Burma. Abstract: One of the most innovative aspects of forest policy in colonial Burma was the employment of shifting cultivators in order to create teak plantations. As developed in the 19th and early 20th centuries, this system of plantation forestry (taungya forestry) represented a far-sighted attempt to establish teak production on a long-term basis. In considering the politics of taungya forestry in colonial Burma, this paper challenges the view, popularized by such colonial forest officials as Nisbet and Stebbing, that the system developed without conflict, and was somehow above politics. Rather, the author starts from the premise that taungya forestry was a highly political process, and examines the different considerations that shaped its contested introduction. Whereas colonial officials hoped to derive important political and economic advantage from taungya forestry, the hill Karen whose labour was primarily in contention feared (accurately as it turned out) the erosion of their traditional shifting lifestyle. Not surprisingly, these differing interests and perceptions made conflict inevitable. ISSN: 0026-749X.

Bryant, R. L. 1994. "The Rise and Fall of Taungya Forestry: Social Forestry in Defence of the Empire." *Ecologist*. 2005 Elsevier Ltd. All rights reserved.: Volume 24, Issue 1, Pages 21-26. Descriptors: Forest Resources; WATER; social system; sustainable development; forestry production; developing country; taungya system; agroforestry; taungya forestry; colonialism; sustainable forestry; indigenous people; social forestry. Notes: Geographic: Burma. Abstract: The taungya system of agroforestry developed by the British in the teak forests of Burma has been extolled by some foresters as a model for a modern sustainable forestry system which is compatible with shifting agriculture. However, taungya forestry was not the result of premeditated "scientific" design, but the outcome of an antagonistic relationship between an acquisitive colonial power and a threatened indigenous people whose reactions varied from covert resistance to defensive compliance. Applications of taungya forestry within present-



day social contexts are likely to manifest the same tensions. ISSN: 0261-3131.

Buffetaut, E. 1978. "A Dyrosaurid (Crocodylia, Mesosuchia) from the Upper Eocene of Burma." *Neues Jahrbuch fuer Geologie Und Palaeontologie. Monatshefte*. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Federal Republic of Germany: Federal Republic of Germany. May. Issue 5, Pages 273-281. Descriptors: Archosauria; Asia; biogeography; biostratigraphy; bones; Burma; Cenozoic; Chordata; Crocodylia; Diapsida; Dyrosauridae; environment; Eocene; Far East; fresh-water environment; morphology; paleoecology; Paleogene; paleontology; Pondaung Formation; Reptilia; teeth; Tertiary; Tetrapoda; upper Eocene; Vertebrata. References: 19; plates; ISSN: 0028-3630.

Bunce GE Affiliation: Department of Biochemistry, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061, USA., [gebunce@vt.edu](mailto:gebunce@vt.edu). 2005. "Nutrition Surveys in Burma and Northeast Brazil." *J. Nutr.* May. Volume 135, Issue 5, Pages 1281-2 Additional Info: United States. Descriptors: Nutrition Surveys; Brazil; Crops, Agricultural; Developing Countries; Humans; Inter-professional Relations; Myanmar. Notes: Citation: Status: MEDLINE Owner: NLM. Abstract: Participation of the author in the Interdepartmental Committee on Nutrition for National Defense sponsored nutrition surveys of Burma and northeast Brazil is described. These surveys not only collected important data on nutritional status but also guided the subsequent research interests of the author. The Brazil survey results contributed to the creation of legislation that mandated the addition of water-dispersible vitamin A to skimmed-milk powder products. This additive has greatly diminished the likelihood of vitamin A deficiency syndrome occurring in children after famine relief efforts. ISSN: 0022-3166 (Print); 1541-6100 (Electronic).

Bureau of Intelligence and Research (State) Washington, DC. 1970. "International Boundary Study. Series A. Limits in the Seas. Number 14, Straight Baselines: Burma." 14 MAR. Descriptors: Boundaries;

Geographic Areas; Burma; Coastal Regions; International; Geography Sociology and Law. Abstract: The following declaration by the Chairman of the Revolutionary Council of the Union of Burma is published for general information: WHEREAS International Law has always recognised that the sovereignty of a State extends to a belt of sea adjacent to its coast, AND WHEREAS international practice is not uniform as regards the extent of this sea belt commonly known as the territorial sea of the State, and consequently it is necessary to make a declaration as to the extent of the territorial sea of the Union of Burma, the Chairman of the Revolutionary Council of the Union of Burma hereby declares-- That notwithstanding any rule of law or practice to the contrary which may have been observed in the past relating to the Union of Burma or any part thereof, the territorial sea of the Union of Burma shall extend into the sea to a distance of twelve nautical miles measured from the appropriate base line. Except as provided for in paragraph 3, the low-water line along the coast, as marked on large-scale charts officially recognised by the Government of the Union of Burma, shall be the base line for measuring the breadth of the territorial sea of the Union of Burma. That where it is necessary by reason of the geographical conditions prevailing on the Union of Burma coasts, and for the purpose of safeguarding the vital economic interest of the inhabitants of the coastal regions, to establish the system of straight base lines drawn between fixed points on the mainland, on islands or rocks, the breadth of the territorial sea shall be measured from such base lines. The fixed points between which such straight base lines shall be drawn are indicated in detail in the schedule annexed to this declaration. Notes: Distribution Statement: Approved for public release. DTIC Accession Number: ADA090816.

Burma. 1973. Development Credit Agreement (Inland Water Transport Project) between the Union of Burma and International Development Association. Uniform Title: Treaties, etc. International Development Association, 1973 July 2. Washington, D.C: International Development Association. Descriptors: Loans, Foreign- Burma; Debts, External- Burma; Inland water transportation- Burma- Finance; Economic assistance- Burma; International Development Association- Finance; Government publication; International government publication. Notes:

19 p. 27 cm. Notes: "Conformed copy."; Other Titles: Inland water transport project. OCLC: 45278606.

Burma. 1968. The Inland Steam-Vessels Manual: Containing the Notifications in Force Issued Under the Inland Steam-Vessels Act, 1917 (as Modified Up to 6th October 1956): Corrected Up to 8th may 1964. Rangoon: Central Press. Descriptors: Steamboats- Law and legislation- Burma; Inland water transportation- Law and legislation- Burma; Government publication; National government publication. Notes: ill. (some col.), forms; 25 cm. Notes: Includes index. OCLC: 63539791.

Burma Issues (Organization). 2003. Khu'an Salawin: Soknattakam Song Phændin, Phændin, Sainam læ Lomhaichai Khong Klum Chatphan Thi Cha Chom Tai Nam. Krung Thep: Burma Issues. Pages: 152. Descriptors: Water resources development- Burma; Refugees- Burma; Salawin river (Burma)- History; Burma- Politics and government; Thailand- Foreign relations- Burma. Notes: ill. (some col.); 21 cm. Responsibility: [ruam chattham doi Burma Issues ... et al.]; Khru'akhai Mænam `Esia Tawan`ok Chiang Tai læ Sunkhao Salawin, bannathikan]. ISBN: 974912300X; 9789749123003 LCCN: 2003-532674. OCLC: 53263149.

Burma. Inland Water Transport Board. 1952. Handbook of Sailings and General Information. Rangoon: Printed at the Royal Stationery Supply House. Descriptors: Inland water transportation- Burma. Notes: 87 p. illus., maps. 19 cm. Notes: Cover title. Advertising matter interspersed. OCLC: 43713858.

Burma. Lay` ya Cuik` pyui" re" nhan`' Chaññ` mron`" Van` kri" Thana. 2003. Water Resources Management in Myanmar. Yangon, Myanmar: Ministry of Agriculture and Irrigation. Pages: 20. Descriptors: Water resources development- Burma; Irrigation projects- Burma; Natural resources- Burma; Environmental management- Burma. Notes: ill. 23 cm. Notes: Cover title. "March, 2003." Responsibility: Ministry of Agriculture and Irrigation, the Union of Myanmar. OCLC: 76911339.

Burma and Ministry of Electric Power. 2003. Contract between Myanma Electric Power Enterprise and Sichuan Machinery & Equipment Import & Export Co., Ltd. for Supply and Technical Service of 230 kV Twin Bundle Double Circuit Transmission Line Material and Substation Equipment for Shweli Hydropower Project. Rangoon: Govt. of the Union of Myanmar, Ministry of Electric Power. Descriptors: Water resources development- Burma; Government publication; National government publication. Notes: 27, [38] leaves; 31 cm. Notes: Cover title. At head of title: The Government of the Union of Myanmar, Ministry of Electric Power. "Contract No. 29/EL/MEPE (PL)/2003-2004." OCLC: 85765526.

Burma; Ministry of Transport and Communications and Waterways Dept. 1984. Terms of Reference for Feasibility Study on Improvement of Waterways of the Irrawaddy and Lower Chindwin Rivers. Rangoon: The Dept. Descriptors: Inland navigation- Government policy- Burma; Inland water transportation- Government policy- Burma. Notes: 14 leaves; 30 cm. Notes: "November 1984."; Responsibility: Socialist Republic of the Union of Burma, Ministry of Transport and Communications, Waterways Department. OCLC Accession Number: 34354969.

Burma Needs Aid. 1986. Simmons-Boardman Publishing Corporation. Int. Railway J. Volume: 26, no. 12, Pages: p. 36-38. Descriptors: Burma; Burma railways corporation; Myanmar; Railroads. Abstract: No abstract provided. ISSN: 0744-5326. OCLC: 00431885. URL: Transportation Research Board.

Burma Road Is Test Bed For New Technology. 1983. International Road Federation; Route One Publishing Limited. World Highways / Routes Du Monde. Volume: 34, no. 7, Pages: p. 1-2. Descriptors: Bituminous materials; Bituminous surfacing; Developing countries; Flexible pavements; Granular materials; Highway construction; Road construction; Seal coats; Surface texture; Surface treating; Texture. Abstract: A 700 kilometer road, connecting the seaport of Bassein, in the Irrawaddy River delta, with the provincial town of Monywa, on the Chindwin River west of Mandalay, is under construction in Burma. The

road will provide a through link on the west side of the Irrawaddy River, and is part of the Burmese government's program to develop this relatively isolated area. It will also provide a north-south connection between a number of existing and proposed east-west roads running from the Irrawaddy valley across the Arakan mountains to the Arakan coast on the Bay of Bengal. In 1977 the Burmese government requested assistance from the Australian government in constructing and surfacing the Bassein-Monywa road. The Australian Development Assistance Bureau appointed the Snowy Mountains Engineering Corporation (SMEC) to implement the project, with the following specific objectives: to introduce appropriate low-cost pavement construction and surfacing technology; to assist in upgrading the output of the construction unit by improved plant utilization and overall job planning; to introduce modern road location, survey and design techniques for use on the Bassein-Monywa road; to upgrade mechanical support facilities and methods and fuel handling to increase equipment serviceability; and to introduce appropriate road maintenance methods and management. Following a study it was agreed that a granular flexible pavement using readily available river gravels surfaced with bituminous surface treatment, would be more appropriate than the previously proposed concrete pavement. The final design comprises subbase and base courses of natural gravels which are crushed and mixed on the road. The gravels are taken from rivers and streams encountered at regular intervals of between 15 and 30 kilometers along the road line. Bituminous surface sealing technology has been introduced on the project to provide a low-cost all-weather seal coat. After tests were made of various combinations of prime coat, primer seal, and single and double surface treatment, a standard design was chosen comprising a primer seal with various size cover aggregates, and a single surface treatment. Local technicians learned the surface treatment techniques so quickly that the operations were handed over to them within one year. The work force has continued to produce excellent results. The pavement has proved to be an excellent performer except in areas of poor drainage, where it has become necessary to modify the gravel aggregate. Results to date indicate that over 95 percent of the finished pavement will have a useful life of 20

years or more. ISSN: 0964-4598. OCLC Accession Number: 00380469. URL: Transportation Research Board.

Burma's Forgotten Fleet. 2007. Volume: 1 videodisc (DVD) (ca. 50 min.), Descriptors: Inland water transportation- Burma- History; Irrawaddy River (Burma); Videorecording. Abstract: Summary: "Looks at the world's largest ever river fleet, the Irrawaddy Flotilla Company. These boats played a major role in the making of British Burma, and helped turn the country into one of the richest colonies in South East Asia."--Container. Notes: Named Corp: Irrawaddy Flotilla Company. System Info: DVD R, compatible in most generic DVD players. Notes: Off-air recording: broadcast by ABC TV on 20 May 2007. OCLC: 225480564.

"Burma to Buy 30 Soko Attack Jets, Will Likely Avoid Embargo on Engine." 1990. Aviation Week & Space Technology. August 13. Volume 133, Pages 29. Descriptors: Military airplanes/Myanmar. ISSN: 0005-2175.

Butts, Kent H.; Jasparro, Christopher; Turner, Curtis W. 2003. "Environmental Security Cooperation" USARPAC's: Defense Environmental and International Cooperation (DEIC) Conference (Center of Strategic Leadership Issue Paper, Volume 07-03, September 2003). Corporate Author: Army War College, Carlisle Barracks, PA. Center for Strategic Leadership. Report Date: Sep 2003. Report Classification: Unclassified. Abstract: (U) The U.S Counter-terrorism (CT) program for Southeast Asia received important support in June when attendees at the United States Defense Environmental and International Cooperation (DEIC) Conference developed a military-based model for identifying and preventing the causes of environmental terrorism, preventing attacks on critical infrastructure, and providing consequence management and mitigation of man-made and natural disasters. Distribution Statement: approved for public release. DTIC Accession Number: ADA430704. Url: <http://handle.dtic.mil/100.2/ADA430704>

Byron, P. 1991. DWE Supplies Second Hopper Dredger for Myanmar. Descriptors: Areindamar; Hopper dredgers. Abstract: The Deggendorfer Werft und Eisenbau GmbH (DWE) handed over a second HYDROTRAIL-dredger to the Myanma Port Authority (previously known

as the Burma Port Authority) at the beginning of May 1991. The HYDROTRAIL 1000 AREINDAMAR is the DWE's 237th longitudinally split vessel built on the firm's "HYDROKLAPP" principle. General arrangement drawings are given. Notes: Schiff & Hafen Seewirtschaft, v 43 n 6, June 1991, p 28 [5 p, 6 fig]. OCLC: 00700905. URL: Transportation Research Board.

## C

Cadet, D. L. and Greco, S. 1987. "Water Vapor Transport Over the Indian Ocean during the 1979 Summer Monsoon: Part II. Water Vapor Budgets." Monthly Weather Review MRWEAB Vol.115. No. 10, p 2358-2366. October. Pages 16 ref. NOAA Grant NA83AA-D-00053. Descriptors: Hydrologic budget; Water vapor; Monsoons; Indian Ocean; Climatology; Meteorology; Weather patterns; Arabian Sea; Bay of Bengal; Evaporation; Rainfall; Southern Hemisphere; India; Burma; Malaysia. Abstract: Over the Arabian Sea the different terms of the moisture balance equation, except evaporation, strongly fluctuate depending on the activity of the monsoon. The relative contribution to the monsoon moisture supply by water vapor transport across the equator and Arabian Sea evaporation varies as the monsoon intensity changes from active through break and back to revival stages; however, it is shown that water vapor from the Southern Hemisphere is the major source of moisture for Indian rainfall. Total evaporation during the active period following the onset of the monsoon was 30-40% of the total eastward flux across the west coast of India. This ratio increases to 40-45% during break conditions, but falls below 20% during a revival phase. Moisture budgets over the Bay of Bengal depend strongly on the monsoon intensity and the amount of moisture advected across the western coast of India and into the Bay of Bengal by the monsoon circulation. Moisture supply from the Southern Hemisphere via cross-equatorial flux at the longitude of the Bay of Bengal is very weak. Compared to weak monsoon periods a much larger percentage of the water vapor supplied by evaporation and boundary fluxes is transported towards Burma and Malaysia during active monsoon periods, fueling the heavy rainfall there. (Author 's

abstract). Database: Environmental Sciences and Pollution Mgmt.  
ISSN/ISBN: 0027-0644.

Cadet, D. L. and Greco, S. 1987. "Water Vapor Transport Over the Indian Ocean during the 1979 Summer Monsoon. Part I: Water Vapour Fluxes." *Mon. Weather Rev.* 2005, Volume 115, Issue 3, Pages 653-663. Descriptors: HYDROLOGY; METEOROLOGY AND CLIMATOLOGY. Abstract: The analysis is based on wind fields from the European Centre for Medium Range Weather Forecasts and humidity fields derived from a 3-layer precipitable water dataset. After the onset of the monsoon the cross-equatorial water vapor flux W of 50oE does not vary much; it undergoes significant fluctuations E of that longitude. The bulk of water vapor crossing the W coast of India comes from the Southern Hemisphere. The latitude band between 10o and 20oS appears as a major source of moisture during the N summer. The major moisture supply for the W coast of Burma and Thailand is advected over the Bay from the Arabian Sea branch of the monsoon. The early retreat of the 1979 monsoon is associated with a decreasing trend in moisture transport over the Arabian Sea. In the Bay of Bengal, the cross-equatorial flux is not affected by the break/active cycle of the monsoon.-from Authors. ISSN: 0027-0644.

Catling, H. D., De Datta, S. K., Vergara, B. S., Hillerislammers, D. And Jackson, B. R. "Deep-Water Tour of Thailand, Burma, And India [Genetic Evaluation of Rice]." Descriptors: Thailand; Burma; India; Subj Category: Plant Genetics and Breeding. Notes: Source: Int Rice Res Newsl Int Rice Res Inst (DEC 1977): 10-11.

Chai, J. Y., Han, E. T., Shin, E. H., et al. 2003. "An Outbreak of Gnathostomiasis among Korean Emigrants in Myanmar." *Am. J. Trop. Med. Hyg.* Am. J. Trop. Med. Hyg. Jul. Volume 69, Issue 1, Pages 67-73 Additional Info: United States. Descriptors: Disease Outbreaks; Emigration and Immigration; Adult; Animals; Child; Child, Preschool; Eosinophilia- complications; Female; Fishes- parasitology; Food Parasitology; Gnathostoma- isolation & purification; Humans; Infant; Korea- ethnology; Male; Middle Aged; Myanmar- epidemiology; Recurrence; Spirurida Infections- complications; Spirurida Infections-



drug therapy; Spirurida Infections- epidemiology; Spirurida Infections-pathology. Notes: Citation: Status: MEDLINE Owner: NLM. Abstract: Thirty-eight (designated as cases) of 60 Korean emigrants who consumed raw fresh water fish in Yangon, Myanmar developed migratory swellings and creeping eruptions on the back, abdomen, flank, and other cutaneous areas 1-10 weeks later. The symptoms included itching, nodule formation, fatigue, urticaria, fever, pain on the skin, and erythematous plaques. Skin biopsies of two cases revealed no parasites. However, the mean  $\pm$  SD peripheral blood eosinophilia among the cases was  $6.3 \pm 6.5\%$  ( $n = 29$ ) and  $9.0 \pm 9.8\%$  ( $n = 26$ ) in two examinations. An enzyme-linked immunosorbent assay of their serum samples, using *Gnathostoma doloresi* adult worms as the antigen, showed mean  $\pm$  SD optical densities of  $0.47 \pm 0.29$  ( $n = 28$ ) and  $0.32 \pm 0.20$  ( $n = 30$ ) in two examinations and  $0.12 \pm 0.09$  ( $n = 50$ ) in healthy controls. Two advanced third-stage larvae of *G. spinigerum* were found in two of six catfish purchased at a local market in Yangon. The outbreak of the human infection is suggested to have been due to *G. spinigerum*, which is known to live out its life cycle in the Yangon area of Myanmar. ISSN: 0002-9637 (Print); 1476-1645 (Electronic).

Chalise, Suresh Raj. 2001. "An Introduction to Climate, Hydrology, and Landslide Hazards in the Hindu Kush-Himalayan Region." Nepal (NPL): International Centre for Integrated Mountain Development, Kathmandu, Nepal (NPL). Descriptors: Afghanistan; Asia; Burma; China; climate; debris flows; Far East; fluvial sedimentation; geologic hazards; Himalayas; Hindu Kush; human activity; hydrology; Indian Peninsula; land management; land use; landslides; Mahabharat Range; mass movements; mitigation; monsoons; Nepal; sedimentation; Siwalik Range; slope stability; Tibetan Plateau; topography. References: 22; illus. incl. 2 tables, sect., sketch map; ISBN: 9291153281. Database: GeoRef.

Chandrasekaran, A. R. and Das, Josodhir. 1989. Analysis of Strong Motion Accelerograms of N.E. India Earthquake of 18 May, 1987. University of Roorkee, Roorkee, India: Dept. of Earthquake Engineering. Pages: 1 v. (various pagings). Descriptors: Earthquakes;

India; Accelerograms; Burma; University of Roorkee. Dept. of Earthquake Engineering. OCLC: O21371683.

Chaplin, George. 2005. "Physical Geography of the Gaoligong Shan Area of Southwest China in Relation to Biodiversity." *Proceedings of the California Academy of Sciences* (1907). California Academy of Sciences, San Francisco, CA, United States: United States. 30 Dec. Volume 56, Issue 27-37, Pages 527-556. Descriptors: Asia; biodiversity; Burma; China; ecology; Eurasian Plate; Far East; fluvial features; Gaoligong Shan; geographic information systems; geography; Hengduan Mountains; hydrology; information systems; Kachin Burma; landforms; mountains; plate tectonics; soils; South China Block; valleys; World Heritage Sites; Yunnan China. References: 37; illus. incl. 2 tables, geol. sketch maps. Abstract: The Gaoligong Shan mountains (Gaoligong Shan) comprise the western-most part of the Hengduan Mountain Range. They include all of the contiguous ridges west of the Nujiang River and east of the Irrawadi-Nmai Rivers and lie at the junction of the Indo-Malaya and Palearctic zoogeographic realms. The Gaoligong Shan are one of the world's most significant biodiversity hotspots outside of the tropics. The Hengduan Mountains, of which the Gaoligong Shan are a part, are a result of the collision of the South China Block and Eurasian Plate during the late Mesozoic. During the Cenozoic, the Gaoligong Shan have also been affected by the continuing movements of the Indo-Australasian Plate and Eurasian Plates to the west of the Hengduan Mountains. The Gaoligong Shan are characterized by a number of unusual features. Their high, contiguous ridges extend further south than do most of those of the other Hengduan Mountains. Also, their river valleys are unusually narrow and deep because they are incised into hard rock that maintains steep slope profiles. Continuing uplift, steep gradients, and swiftly flowing rivers have eroded deep gorges. The north-south orientation of the river valleys causes the Gaoligong Shan to have an unusual face aspect relative to the sun; nearly all slopes face either east or west. The deep valleys and north-south orientation of the ridges result in the region having a more moderate climate than surrounding non-mountainous areas situated at the same latitude. Because of their antiquity, the Gaoligong Shan have accumulated a

high level of biodiversity. At the same time, their high elevations and deep gorges have acted as barriers to migration for most terrestrial organisms. Moreover, because of their unusual climate and many protected environments, the Gaoligong Shan provide a refugium from global climate perturbations. It is significant that the difficult terrain has, until recently, deterred extensive human habitation, thus preserving the region's biodiversity. ISSN: 0068-547X.

Chen, W. -P and Molnar, P. 1990. "Source Parameters of Earthquakes and Intraplate Deformation Beneath the Shillong Plateau and the Northern Indoburman Ranges." *Journal of Geophysical Research*. American Geophysical Union. 10 Aug. Volume 95, Issue B8, Pages 12527-12552. Descriptors: Seismicity; India; Burma; earthquakes; source mechanisms; Seismology. Abstract: The fault plane solutions and focal depths were determined for 17 earthquakes beneath the Shillong Plateau in India and the northern Indo-Burman ranges by combining results from the inversion of long-period P and SH waveforms and amplitudes, from polarities of first motions, and from the identification of pP and sP phases on short-period seismograms. Findings are discussed. Database: Earthquake Engineering Abstracts. ISSN: 0148-0227.

Chenoweth, J. L., Malano, H. M. and Bird J.F. Affiliation: J.L. Chenoweth, Dept. of Civil/Envrn. Engineering, Victoria 3010 Country: ,Australia. 2001. "Integrated River Basin Management in the Multi-Jurisdictional River Basins: The Case of the Mekong River Basin." *Int. J. Water Resour. Dev.* 2005 Elsevier Ltd. All rights reserved.: Volume 17, Issue 3, Pages 365-377 Additional Info: United Kingdom. Descriptors: Runoff, stream flow and basins; integrated approach; basin management; international cooperation. Notes: References: Number: 38; Geographic: Cambodia- Mekong Basin Thailand- Mekong Basin Laos- Mekong Basin Viet Nam- Mekong Basin Myanmar- Mekong Basin. Abstract: Achieving integrated river basin management in large multi-jurisdictional river basins is a difficult task. In the Mekong River basin some of the countries have begun to implement a cooperative framework, which indicates a desire to achieve a form of integrated management. Significant progress has been made but results still fall

short of the ideal. The primary reasons for this includes the lack of institutional capacity of the multi-jurisdictional cooperative authority and its counterpart organizational in each of the participating countries, together with a lack of political drive to develop integrated management as a priority. ISSN: 0790-0627.

Chia, Aik Song; Liew, Soo Chin; Heng, Alice W. C. and Kwoh, Leong Keong. 2005. Satellite Observations of Coastline Changes in the Andaman Islands After the 2004 Sumatra Earthquake. Seoul, South Korea: Institute of Electrical and Electronics Engineers Inc., Piscataway, NJ 08855-1331, United States. Volume: 3, Pages: 1838-1840. 2005 IEEE International Geoscience and Remote Sensing Symposium, IGARSS 2005. Conference: Jul 25-29 2005. Descriptors: Coastal engineering; Satellites; Earthquakes; Imaging systems; Subsidence; Parameter estimation. Abstract: Following the M9.0 Sumatra earthquake on December 26, 2004, elevation and subsidence on separate parts of the coastline of the Andaman Islands have been reported. In this study, we use satellite imagery to map the coastline changes due to land elevation or subsidence after the earthquake in the Andaman Islands. The NIR band of SPOT-5 images before and after the earthquake was used to delineate coastlines. Images with similar tide levels were chosen for comparison. Elevation or subsidence is indicated by the emergence or submersion of corals and mud flats in the pre- and post-earthquake images. Our results indicate a general tilt of the main Andaman Islands in a direction in agreement with seismological estimates of the thrust-faulting between the Burma and Indian plates. Changes in coastal bathymetry were estimated using a shallow water reflectance model. The vertical displacement is estimated to be about 1 m for the uplifted areas on the northwestern coast. T3: International geoscience and remote sensing symposium (IGARSS). URL: <http://dx.doi.org/10.1109/IGARSS.2005.1526364>.

Chin, Victor A. 2007. The Prospect of China's Access to Naval Facilities in Burma and the Ramifications for Regional Stability. Corporate Author: Naval Postgraduate School Monterey, CA. June 2007. Abstract: This thesis examines the prospect of the People's Liberation Army Navy to gain access to naval facilities in Burma and the implications for the Asia-Pacific region. With much of China's energy

resources sailing through the Strait of Malacca, Burma is in a strategic position to affect China's energy security design. If China were given access to port facilities in Burma to service the expanding Chinese naval fleet, it would give PLAN the ability to control maritime trade routes as well as the ability to command strategic chokepoints along those routes jeopardizing the security interests of the maritime powers that depend on these waters. The increase in PLAN's capabilities could generate an uncertain climate and prompt a build up of rival naval powers in the region. This thesis will argue that although the PLA Navy will be able to ply China's extended sea lines of communication with the help of Burmese naval facilities, the Chinese naval vessels have not attained sufficient modernization to pose a major threat to the United States or the regional powers. It is also unlikely China would challenge the U.S., the current guarantor of freedom of navigation, for dominance of the sea. The danger will come from the regional instability caused by the naval arms race to counter the expanded capabilities of the PLA Navy. Distribution Statement: Approved for public release; distribution is unlimited. Accession Number: ADA469978. Url: <http://handle.dtic.mil/100.2/ADA469978>.

Cho-Nwe-Oo, Khin-Mg-Naing, Tin-Tin-Oo, Thein-Than and Mg-Mg-Thwin. 1984. "Endemic Goitre in Lowland Burma." Southeast Asian J. Trop. Med. Public Health; Southeast Asian J. Trop. Med. Public Health. Jun. Volume 15, Issue 2, Pages 217-23 Additional Info: THAILAND. Descriptors: Adolescent; Adult; Age Factors; Child; Child, Preschool; Diet; Female; Goiter, Endemic- epidemiology; Goiter, Endemic-metabolism; Humans; Infant; Infant, Newborn; Iodine- analysis; Iodine- urine; Male; Myanmar; Sex Factors; Thyrotropin- blood; Thyroxine- blood; Triiodothyronine- blood; Water- analysis. Notes: Chemical Subst: Triiodothyronine [6893-02-3] Thyroxine [7488-70-2] Iodine [7553-56-2] Water [7732-18-5] Thyrotropin [9002-71-5]. Abstract: The problem of endemic goitre in Burma was thought to be confined to hilly regions and therefore goitre control programme has been focussed on these areas only. However, sporadic evidences accrued that there might also be pockets of endemic goitre in low-lying areas of the country. Goitre surveys and indepth study were carried out to determine the magnitude and nature of endemic goitre in lowland Burma. The overall goitre rate was 67% and the male:female ratio was 1:1.2. The findings of the study indicate that the problem of endemic goitre is also of public health significance in the lowland areas

of the country. It is recommended that effective and appropriate intervention programmes be extended to these areas. ISSN: 0125-1562.

Chubb, H. J. Duckworth, Christian Leslie Dyce and Joint Author. 1973. Irrawaddy Flotilla Company Limited, 1865-1950. London: National Maritime Museum. Pages: 177. Descriptors: Inland water transportation- Burma- History; Irrawaddy Flotilla Company- History. Notes: ill. 30 cm. Responsibility: by H.J. Chubb and C.L.D. Duckworth. LCCN: 77-355705. OCLC Accession Number: 2985073.

Cities Service Company, Exploration Staff, Tulsa, Okla., United States. 1980. "Hydrocarbon Plays in Tertiary S.E. Asia Basins." Oil Gas J. PennWell, Tulsa, OK, United States: United States. 21 Jul. Volume 78, Issue 29, Pages 90-96. Descriptors: Asia; Barito Basin; Cenozoic; Central Burma Basin; detection; East Java Sea Basin; economic geology; hydrocarbons; Indonesian Seas; Java Sea; Kutei Basin; middle Tertiary; Northwest Palawan Basin; oil and gas fields; organic compounds; organic materials; Pacific Ocean; petroleum; petroleum exploration; production; reserves; reservoir rocks; Sabah-Sarawak Basin; South Sumatra Basin; Southeast Asia; subsurface reservoirs; Talang Akar Formation; Tertiary; West Java Sea Basin; West Pacific. Notes: illus. incl. sketch maps. Database: GeoRef. ISSN: 0030-1388.

Cities Service Company, Exploration staff and Beddoes, Leslie R. 1981. "Hydrocarbon Plays in Tertiary Basins of Southeast Asia." Energy. 11. Volume 6, Issue 11, Pages 1141-1163. Abstract: Oil and gas fields in Tertiary basins of Southeast Asia are catalogued into a pattern of hydrocarbon occurrence related to regional cycles of sedimentation. Eight basin areas, peripheral to the Sunda Shield—from Burma through Indonesia and East Malaysia to northwest Palawan—are cited as exhibiting a general continuity of sedimentary cycles during Tertiary time. However, each of these basins has its unique structural, stratigraphic and temperature gradient character, reflecting its individual plate tectonic setting. Magnitudes of oil and gas reserves, in both clastic and carbonate facies, show a pattern of distribution within these sedimentary cycles of deposition. Empirically, this relationship

forms a basis for improved exploration predictability in other Tertiary basin areas of Southeast Asia. Detailed examples of Tertiary depositional cycles and hydrocarbon occurrences are cited from exploration areas in the East Java Sea (Indonesia) and northwest Palawan (Philippines).

Cocks, L. R. M., Fortey, R. A. and Lee C.P. Affiliation: L.R.M. Cocks, Department of Palaeontology, The Natural History Museum, Cromwell Road, London SW7 5BD Country: United Kingdom E-mail: [r.cocks@nhm.ac.uk](mailto:r.cocks@nhm.ac.uk). 2005. "A Review of Lower and Middle Palaeozoic Biostratigraphy in West Peninsular Malaysia and Southern Thailand in its Context within the Sibumasu Terrane." *Journal of Asian Earth Sciences*. Volume 24, Issue 6, SPEC. ISS., Pages 703-717 Additional Info: United Kingdom. Descriptors: Palaeozoic; biostratigraphy; Paleozoic. Notes: References: Number: 93; Geographic: West Malaysia Thailand Malaysia Southeast Asia Asia Eurasia Eastern Hemisphere World. Abstract: Fossils from the Cambrian to Devonian rocks of southern Thailand, the Langkawi Islands, mainland Kedah, Perlis, north Perak and central West Peninsular Malaysia are listed and reviewed, and their stratigraphy and correlation reassessed. The hitherto anomalous record of the trilobite *Dalmanitina* from Malaysia is reviewed and found to be of latest Ordovician (Hirnantian) age, rather than Lower Silurian age as previously reported, and is considered a probable synonym of the widespread *Mucronaspis mucronata*. A new stratigraphical nomenclature is erected for part of the Langkawi, mainland Kedah and Perlis area successions, in which the term Setul Limestone (which stretched from the Ordovician to the Devonian) is abandoned and replaced by the Middle Ordovician Kaki Bukit Limestone, the late Ordovician and early Silurian Tanjong Dendang Formation, the Silurian Mempelam Limestone, and the early Devonian Timah Tasoh Formation, all underlying the paraconformity with the late Devonian Langgun Red Beds. There was a single depositional basin in the generally shallow-water and cratonic areas of southern Thailand, Langkawi, and mainland Kedah and Perlis, in contrast to the deeper-water basin of north Perak. Only Silurian rocks are dated with certainty within another basin in central West Malaysia, near Kuala Lumpur,

which were also cratonic and shallow-water, although to the east in west Pahang there are basal Devonian deeper-water sediments with graptolites. The area is reviewed in its position within the Sibumasu Terrane, which, in the Palaeozoic, also included central and northern Thailand, Burma (Myanmar) and southwest China (part of Yunnan Province). ISSN: 1367-9120.

Colin, Christophe, Bertaux, Jacques, Turpin, Laurent and Kissel, Catherine. 2001. "Dynamique De l'Erosion Dans Le Bassin Versant De l'Irrawaddy Au Cours Des Deux Derniers Cycles Climatiques (280-0 Ka). Dynamics of the Erosion in the Irrawaddy River Basin during the Last Two Climate Cycles, 280 Ka to Present." *Comptes Rendus De l'Academie Des Sciences, Serie II. Sciences De La Terre Et Des Planetes*. Volume 332, Issue 8, Pages 483-489. Descriptors: Andaman Sea; Asia; atmospheric precipitation; Burma; Cenozoic; chemical weathering; chlorite; chlorite group; clastic rocks; clastic sediments; clay; clay minerals; cores; dynamics; erosion; Far East; feldspar group; fluvial sedimentation; framework silicates; hydrolysis; illite; Indian Ocean; intensity; Irrawaddy River basin; isotope ratios; isotopes; kaolinite; marine sedimentation; marine sediments; metals; mineral assemblages; monsoons; Nd-144/Nd-143; neodymium; O-18/O-16; oxygen; paleoclimatology; pedogenesis; physical weathering; quartz; Quaternary; rare earths; sedimentary rocks; sedimentation; sediments; sheet silicates; silica minerals; silicates; smectite; soil erosion; soils; stable isotopes; terrigenous materials; upper Quaternary; weathering. Abstract: Core MD77-169, located in the Andaman Sea, is characterized by epsilon (sub Nd) (0) ranging between -9.5 and -11, implying that the Irrawaddy River is the main contributor of detrital material. The pedogenic clays (smectite and kaolinite) to primary mineral (feldspar, quartz, illite and chlorite) ratios show strong precessional cycles, suggesting that they are controlled by past changes in the monsoon intensity. Wet periods of summer monsoon reinforcement are characterized by the increase of chemical weathering and/or physical erosion of the Irrawaddy plain soils. Database: GeoRef. ISSN: 1251-8050.



Cook, P. 1993. "Myanmar: Experience with Aid and Management Development during Transition." *Public Administration & Development*. Volume 13, Issue 4, Pages 423-434. Descriptors: GEOGRAPHICAL ABSTRACTS: HUMAN GEOGRAPHY; WATER; market transition; economic policy; developing country; reform process; management development; technical assistance; UNDP; management development programme; economic reform; bureaucracy; administration; market reform; socialist economy. Notes: Geographic: Malaysia- Burma Burma. Abstract: This article examines the role of the UNDP's management development programme in Myanmar between 1988 and 1992. It describes the economic and political background against which technical assistance was provided to assist the transition from a centrally planned to a market-oriented economy. It is argued that present reforms can be interpreted as part of a survival strategy. The article analyses the principal findings of the various components of assistance between these years, and reports on implementation. In particular, attention is given to problems that occur in reforming both central bureaucratic institutions and patterns of decision-making, and to changes in these key areas. The concluding part summarizes the lessons that arise from implementation and indicates that forms of state-led planning are likely to continue alongside attempts to embody market principles. -Author.

Cummins, P. R. Affiliation: Geoscience Australia, GPO Box 378, Canberra ACT 2601, Australia., [phil.cummins@ga.gov.au](mailto:phil.cummins@ga.gov.au). 2007. "The Potential for Giant Tsunamigenic Earthquakes in the Northern Bay of Bengal." *Nature*. Sep 6. Volume 449, Issue 7158, Pages 75-8 Additional Info: England. Descriptors: Models, Theoretical; Natural Disasters- history; Water Movements; History, 18th Century; Myanmar; Oceans and Seas; Time Factors. Notes: Comment In: *Nature*. 2007 Sep 6; 449 (7158): 33 PMID: 17805283. Abstract: The great Sumatra-Andaman earthquake and Indian Ocean tsunami of 2004 came as a surprise to most of the earth science community. Although it is now widely recognized that the risk of another giant earthquake is high off central Sumatra, just east of the 2004 earthquake, there seems to be relatively little concern about the subduction zone to the north, in the northern Bay of Bengal along the

coast of Myanmar. Here I show that similar indicators suggest a high potential for giant earthquakes along the coast of Myanmar. These indicators include the tectonic environment, which is similar to other subduction zones that experience giant megathrust earthquakes, stress and crustal strain observations, which indicate that the seismogenic zone is locked, and historical earthquake activity, which indicates that giant tsunamigenic earthquakes have occurred there in the past. These are all consistent with active subduction in the Myanmar subduction zone and I suggest that the seismogenic zone extends beneath the Bengal Fan. I conclude therefore that giant earthquakes probably occur off the coast of Myanmar, and that a large and vulnerable population is thereby exposed to a significant earthquake and tsunami hazard. ISSN: 0028-0836 (Print); 1476-4687 (Electronic).

Curiale, Joseph A. and Gibling, Martin R. 1992. "Organic Geochemistry of Mae Sot Basin Oil Shales, Thailand; Implications for Depositional Setting and Basin Reconstruction; 1992 AAPG International Conference and Exhibition; Abstracts." AAPG Bull. American Association of Petroleum Geologists, Tulsa, OK, United States: United States. Jul. Volume 76, Issue 7, Pages 1095. Descriptors: Asia; basins; brackish-water environment; Burma; C-13/C-12; carbon; Cenozoic; deposition; economic geology; Far East; fresh-water environment; geochemistry; hydrocarbons; isotopes; kerogen; lacustrine environment; Mae Sot Basin; oil shale; organic carbon; organic compounds; organic materials; organic residues; reconstruction; sedimentary rocks; stable isotopes; steranes; Thailand; western Thailand. Database: GeoRef. ISSN: 0149-1423.

Curiale, Joseph A., Kyi, Pe, Collins, Ian D., et al. 1994. "The Central Myanmar (Burma) Oil Family; Composition and Implications for Source." Org. Geochem. Pergamon, Oxford-New York, International (III): International (III). Nov. Volume 22, Issue 2, Pages 237-255. Descriptors: aliphatic hydrocarbons; alkanes; aromatic hydrocarbons; Asia; bicadinanes; biodegradation; Burma; C-13/C-12; cadalene; carbon; Cenozoic; central Burma; chemical composition; clastic rocks; coal; Eocene; Far East; gas chromatograms; geochemistry;

hydrocarbons; isoprenoids; isotope ratios; isotopes; kerogen; mass spectra; Miocene; Neogene; oil seeps; oleanane; organic compounds; organic materials; organic residues; Paleogene; petroleum; phytane; pristane; reservoir rocks; resins; sedimentary rocks; shale; source rocks; spectra; stable isotopes; steranes; sulfur; Tertiary; thermal maturity; traps; variations. Notes: References: 54; illus. incl. chart, 4 tables, sketch map. Database: GeoRef. ISSN: 0146-6380.

Curiale, Joseph A., Kyi, Pe, Collins, Ian D., et al. 1994. "The Central Myanmar (Burma) Oil Family; Composition and Implications for Source; AAPG Annual Convention." Annual Meeting Abstracts - American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists. American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, Tulsa, OK, United States: United States. Volume 1994, Pages 130. Descriptors: aliphatic hydrocarbons; aromatic hydrocarbons; Asia; biodegradation; Burma; C-13/C-12; carbon; Cenozoic; central Burma; clastic rocks; coal; Eocene; Far East; geochemistry; hydrocarbons; isotope ratios; isotopes; maturity; Michigan; oil seeps; organic compounds; organic materials; organic residues; Paleogene; petroleum; reservoir rocks; resins; saturated hydrocarbons; sedimentary rocks; shale; source rocks; stable isotopes; steranes; sulfur; Tertiary; thermal maturity; United States; variations. ISSN: 0094-0038.

## **D**

Das, I. 1996. "First Record of Heosemys Spinosa from the Philippines, with Biogeographic Notes." Chelonian Conserv. Biol. Feb. Volume 2, Issue 1, Pages 80-82. Descriptors: Article Subject Terms: Aquatic reptiles; Biogeography; Ecological distribution; Geographical distribution; Inland water environment; New records; Rivers; Article Geographic Terms: Borneo; Indo-China; Myanmar; Philippines; Freshwater. Notes: TR: CS0516169. Abstract: Heosemys spinosa, the spiny turtle, is a widespread southeast Asian batagurid, distributed from Tenasserim in southern Myanmar, south to the tip of the Malay Peninsula, and also on the islands of Sumatra, Borneo, and Natuna

(Smith, 1931; Pritchard, 1979; Iverson, 1992). It is apparently absent from Indo-China, and not previously known from the Philippines. Database: ASFA: Aquatic Sciences and Fisheries Abstracts. ISSN: 1071-8443.

Dasgupta, P. K., Mukherjee, R. and Biswas, A. 2005. "Evolution of the Assam-Arakan Orogen; Basinal Configuration and Sedimentation; Himalaya (Geological Aspects)." Current Trends in Geology. Satish Serial Publishing House, Delhi, India. Volume 15, Part 1, Pages 465-493. Descriptors: Asia; Assam India; Assam-Arakan Basin; Barail Group; Barail-Sylhet Sub-basin; basins; Bengal; Burma; Cenozoic; Chhotanagpur Gneiss; clastic rocks; crust; deep-water environment; depositional environment; Far East; foreland basins; geodynamics; gneisses; Himalayan Orogeny; India; Indian Peninsula; Indian Plate; Indus-Yarlung Zangbo suture zone; island arcs; Jaintia Group; lithofacies; lithostratigraphy; metamorphic rocks; Miocene; Naga Hills; Naga Schuppen Zone; Neogene; Northeastern India; ocean floors; oceanic crust; Oligocene; orogenic belts; orogeny; paleo-currents; paleoenvironment; Paleogene; paleogeography; plate collision; plate tectonics; sea-level changes; sedimentary basins; sedimentary rocks; sedimentary structures; sedimentation; Surma Basin; Surma Group; syntectonic processes; tectonic units; tectonics; Tertiary; Tethys; Tipam Formation; trenches; turbidite. References: 52; illus. incl. 1 table, geol. sketch maps. Abstract: The problems of "Tethyan Paradox", Palaeo-Tethys, Neo-Tethys interlinked in time, Cimmerian- and Himalayan Orogenies are addressed to understand the geodynamic background in which the large remnant ocean basin from Neo-Tethys termed as Assam-Arakan Basin (AAB) originated in the eastern part of India that extended from Myanmar to Chhotanagpur Gneiss and bounded in the north by Indus-Tsangpo suture. Oceanic crust in the northeast was subjected to an oblique collision (Andean Type) involving three plates: Asian, Myanmar and Indian. A back arc configuration was postulated from Eocene to Miocene to the east of Indo-Myanmar Range. The sedimentation in the entire AAB through the Tertiary was under an overall control of Arc-trench system. Western part of the basin is named as Bengal Basin and in the north of AAB existed foreland basinal set-ups with petroliferous sub-crops. The

remnant AAB got modified through the Tertiary and gave rise to several sub-basins such as the Indo-Myanmar-, Oligocene Barail-Sylhet- and Mio-Pliocene Surma. On the basis of facies analysis and basinal evolution of AAB, it has been envisaged that the Barail- and Surma turbidite sub basins were opened up successively owing to the action of listric faulting in phases during the Tertiary near the active margin of Indo-Myanmar plate convergence. Thrust sheets from the fore arc side in the east were gradually piled up in the west to form rising accretionary prism complexes and adjacent to Naga Schuppen Zone to the west with the northern continental blocks was the main provenance. Sedimentation styles appear to have continued from Palaeogene to Neogene with an angular unconformity in between. The sub-basins were gradually filled up by Palaeogene-Neogene synorogenic turbidite- and associated deep-water facies complexes, punctuated by shallow marine facies associations. Subsequently periodic shallowing of the basin during the closing phases of Bhuvan, Bokabil and Tipam caused sedimentation to continue in narrow shelf, tidal- and fluvial set-ups. Moreover, basal Tipam witnessed a pulse of terrestrial acid- to intermediate volcanism. Such sedimentation patterns as suggested from the spatio-vertical juxtaposition of different synorogenic turbidite-, shallow marine- and fluvial facies indicate an overall basinward progradation of time transgressive wedges punctuated by minor transgressive pulses during the Oligocene, Miocene and Pliocene. Salient aspects of post-depositional tectonics such as folding, repetitive under-thrusting and over-thrusting, crustal shortening and duplex formation similar to Rocky Mountain type are documented in the Oligo-Mio-Pliocene deformed rock strata. Database: GeoRef. ISSN: 0971-1481.

Daly, Charles. 2007. Humanitarian Assistance and Disaster Relief Communications for the 21st Century. Corporate Author: Naval War College, Newport, RI. Joint Military Operations Dept. 10 May 2007. Abstract: Communication requirements for humanitarian assistance or disaster relief operations (HADR) differ from conventional combat operations -- the military commander requires an unclassified, information-sharing architecture to effectively collaborate and coordinate with the civilian agencies and organizations involved in such an operation. The military response is often at the operational level

but this response can have strategic effects on U.S. prestige and credibility in a given region. All combatant commands must be ready to respond to a humanitarian crisis or natural disaster, and to do so effectively they must share information with civilian entities in the operating environment. This paper will do the following: analyze Operation Unified Assistance, the United States Pacific Command's response to the 2004 tsunami natural disaster; draw conclusion about the communications architecture used in this operation; and discuss the lessons learned for operational commanders who are involved in HADR communications and collaboration. Distribution Statement: Approved for public release; distribution is unlimited. Accession Number: ADA470757. Url: <http://handle.dtic.mil/100.2/ADA470757>.

Denyer, J. E. 1945. "Burma; Miscellaneous Notes on Water Supply." India, Geol. Surv., Strategic Branch, Tech. Note. Strategic Branch, Tech. Note. Volume 58, Pages 28. Descriptors: Asia; Burma; Far East; water supply; water, ground and surface. Notes: illus. Abstract: An account of the general characteristics of water-bearing strata in Burma and descriptions of a number of specific localities with data on present and potential water supplies. Database: GeoRef.

Dickinson, Rob. 1997. Myanma Railways 1996. Continental Railway Circle. Continental Railway Station. Descriptors: Burma; Myanmar; Railroads. Abstract: No abstract provided. Notes: Continental Railway Journal, NO. 110 (Summer 1997), P. 607-614: ILL., MAP. ISSN: 0306-6177. OCLC Accession Number: 00878331. URL: Transportation Research Board.

Dillon, C.P. and Andrews, Mark J. 1996. 1996 Annual Tropical Cyclone Report. Corporate Author: Naval Pacific Meteorology and Oceanography Center Pearl Harbor, Hawaii. Joint Typhoon Warning Center. Report Date: Jan 1996. Report Classification: Unclassified. Abstract: (U) Annual publication summarizing tropical cyclone activity in the Western North Pacific, Bay of Bengal, Arabian Sea, Western South Pacific and South Indian Oceans. A best track is provided for each significant tropical cyclone. A brief narrative is given for all tropical cyclones in the Western North Pacific and North Indian Oceans. All fix data used to construct the best tracks are provided upon request on diskettes. Forecast verification data and statistics for the Joint Typhoon Warning Center (JTWC) are submitted. Distribution

Limitation(s): Approved For Public Release. DTIC Accession Number: ADA399576. Url: <http://handle.dtic.mil/100.2/ADA399576>

Doherty, C. B. Gauvin, C. A. Marcolini, R. A. and O'Brien, J. L. 1980. Open Ocean Pollution Response - the Coast Guard System (Ixtoc).” Pages: 245-253. Descriptors: Ecological Abstracts. Abstract: Describes the US Coast Guard's integrated system approach, operational test results, and actual performance during the IXTOC I blowout and Burmah Agate response.-from Selected Water Resources Abstracts. Special Features: 7 figs. OCLC Accession Number: 0401048.

Douville, H. and Royer J.-F. Affiliation: H. Douville, Meteo-France/CNRM, 42 Avenue Coriolis, Toulouse Cedex 31057, France. 1996. “Sensitivity of the Asian Summer Monsoon to an Anomalous Eurasian Snow Cover within the Meteo-France GCM.” *Clim. Dyn.* 2005 Volume 12, Issue 7, Pages 449-466. Descriptors: Synoptic meteorology; Asian monsoon; ARPEGE model; monsoon; snow cover; GCM. Notes: Geographic: Asia. Abstract: An updated version of the ARPEGE climate model of Meteo-France, including a simple but physically-based snow parameterization, is used to test the impact of an increased snow mass prescribed at the beginning of March on the simulated summer monsoon circulation and rainfall. The large-scale features of the Asian monsoon are reproduced in a realistic way in the control integration, which is a necessary premise of such a sensitivity test. In the heavy snow cover experiment, the anomalous persistence of the winter snow pack delays the springtime continental heating. This weakens the thermal low over northern India and Persia as well as the southwesterly winds over the monsoon area. There is also a significant decrease in the rainfall over western India and Bengal-Burma, which usually represent the centers of maximum precipitation. Radiative, turbulence transfer and hydrological processes seem to be involved in the snow-monsoon relationship. The changes in the monsoon precipitation are strongly related to changes in the atmospheric circulation and are not reinforced by a local evaporation/convection feedback in the experiment. ISSN: 0930-7575.

Dumont, Henri J. and Green, Jim. 2005. “Eodiaptomus Indawgyi n. Sp., a Pelagic Calanoid Copepod Presumed Endemic to Ancient Lake

Indawgyi, Myanmar." *Hydrobiologia*. Jan. Volume 533, Issue 1, Pages 41-44. Descriptors: Article Subject Terms: Copepods; Crustaceans; Ecology; Endemic species; Freshwater crustaceans; Lakes; New species; Taxonomy; Zooplankton; Article Taxonomic Terms: Copepoda; Eodiaptomus; Article Geographic Terms: Myanmar; Freshwater. TR: CS0524775. Abstract: The little-known pre-pleistocene Lake Indawgyi (Myanmar) is shown to harbor an endemic pelagic Eodiaptomus species, described herein. The area around the lake is inhabited by another species in the same genus. Related species occur throughout South-East Asia, and a presumed close relative is endemic to a chain of pre-pleistocene lakes in Celebes. Database: Aqualine. ISSN: 1573-5117.

Durkee, E. F. and Gerrard, M. J. 1997. "An Integrated Oil Industry Runs in Chindwin Basin, Myanmar." *Oil & Gas Journal*. October 20. Volume 95, Pages 63+. Descriptors: Petroleum industry-Myanmar. Notes: Physical Description: Illustration; Map. Abstract: Part of a special section on oil and gas exploration in Myanmar (Burma) discusses the integrated oil industry in the Chindwin basin, covering exploration methods, drilling practices, production, transportation, refining, and marketing and distribution. Oil occurrence testifies to the potential oil source rocks of the Eocene in the Chindwin basin, and it seems likely that the oil potential of the Eocene at Indaw makes the structure a good candidate for a giant discovery. ISSN: 0030-1388.

Durkee, Ed F. 1997. "Myanmar's Indaw/Chindwin Area has Tertiary, Cretaceous Targets." *Oil & Gas Journal*. October 20. Volume 95, Pages 76-7+. Descriptors: Petroleum geology/Myanmar; Natural gas geology/Myanmar. Notes: Physical Description: Diagram; Illustration; Map. Abstract: Part of a special section on oil and gas exploration in Myanmar (Burma). On July 21, 1997, Pacrim Energy NL of Brisbane, Australia, signed production sharing contracts with Myanmar to explore two blocks known as C-1 (Indaw) and RSF-9 (Pyalo). RSF-9 covers 600,229 acres in the old Central Burma oil belt. It is situated east of the Ayeyerwady (Irrawaddy) River north of Prome Oil field, approximately 180 miles northwest of Yangon (Rangoon). It has one depleted and/or not fully developed gas field, at Pyalo, and the block is



very lightly explored. Block C-1, modified and enlarged relative to the earlier Block C-1 held by Yukong Ltd. of Korea in 1989-94, now comprises almost 4.8 million acres. The block is located in Northwest Myanmar, with its center about 150 miles northwest of Mandalay in the remote Chindwin basin. This block, which was extended to the east to include the Mettaung thrust belt and to the north to include the Yen-an anticline west of the Chindwin River, is discussed in detail. ISSN: 0030-1388.

Dutta, Dhiren N. 1995. Fifty Years of Planning for Water Power in South Asia. San Francisco, CA, USA: ASCE, New York, NY, USA. Volume: 1, Pages: 212-221. Part 1 of 3. Conference: Jul 25-28 1995. Descriptors: Water power; Hydro-electric power; Environmental impact; Project management; Strategic planning. Abstract: Water power is an important part of planning for energy in the Indian subcontinent and Burma. Hydropower projects in the four countries of South Asia: Pakistan, India, Bangladesh and Burma are reviewed, focusing on the challenges of foundation problems, construction in seismic areas, storage in Karstic areas and long-term planning for large and complex water power and multipurpose projects. Proceedings of the international conference on hydropower - waterpower. ISSN: 1057-1841.

## E

Earthquakes, Tsunamis, and Volcanoes in the Northeastern Indian Ocean. 1968. Corporate Author: Naval Oceanographic Office Nstl Station, MS. Report Date: Aug 1968. Abstract: (U) The report gives information on earthquakes, tsunamis and volcanoes in the Northeastern Indian Ocean and adjacent land areas. Most of the seismic activity in this region has occurred along the Burma-Sunda arcs, the 89th meridian between 5 degrees N. and 5 degrees S., and southwest of Ceylon. Tsunamis and other large waves have been reported from most coastal sectors in the area. Damage by tsunamis has been restricted to the coasts of Sumatra and adjacent islands. Active volcanoes in the area are located on Sumatra and Barren Island. A submarine eruption was reported on the flank of the Ninety East Ridge in 1883. Mud volcanoes have been reported from the coast of Burma and off the southwest coast of India. Report Classification: Unclassified. Distribution Statement: Approved for public release;

distribution is unlimited. Accession Number: AD0840477. Url:  
<http://handle.dtic.mil/100.2/AD840477>

Earth Sciences Div Army Natick Labs, Mass and Ohman, Howard L. 1965. "Climatic Atlas of Southeast Asia (Temperature, Rainfall, Temperature-Humidity Index)." DEC. Descriptors: (\*Climate; Southeast Asia); Thailand; Vietnam; Laos; Cambodia; Burma; Malaya; Singapore; Meteorological Phenomena; Geography; Maps; Meteorology. Abstract: Eighty-seven maps present the distribution in Southeast Asia (Thailand, Vietnam, Laos, Cambodia, Burma south of 25 degrees N. Latitude, and the peninsular portion of Malaysia) of various climatic statistics of temperature, rainfall, and the temperature-humidity index. Maps for each month of the year have been prepared for: mean monthly temperature, mean daily maximum temperature, mean daily minimum temperature, absolute maximum temperature, mean monthly rainfall, mean number of rainy days per month, and mean daily temperature-humidity index for the warmest hour of the day. Single maps of mean annual rainfall, the physiography of the region, and of the names and location of climatic stations are also included. The maps are drawn in considerable detail having been based not only on the available climatic data but also on the distribution of mountain ranges, major water bodies, and other geographic features. A brief text discusses the preparation of the maps and describes a few of the important distributional aspects of climate shown by the maps. Notes: Distribution Statement: Approved for public release. DTIC Accession Number: AD0632878.

Ecker, A. 1983. "Surface and Subsurface Water-Flow Directions in a Tectonically Young Area of Burma." Current Research - Geological Survey of Israel. Geological Survey of Israel, Jerusalem, Israel. Volume 1982, Pages 51-53. Descriptors: aquifers; Asia; Burma; central Burma; drainage patterns; Far East; fluvial features; geomorphology; ground water; hydrogeology; hydrology; neotectonics; surface water; surveys; tectonics; water quality. References: 5; illus. ISSN: 0333-6425.

Economic Bulletin for Asia and the Pacific, v. 32, no. 1, June 1981. 1981. New York: UN. Pages: 123. Descriptors: Economic

Development; Asia And The Pacific; Water Management; India; Sri Lanka; Rural Water Supply; Bangladesh; Myanmar; Indonesia; Nepal; Pakistan; Thailand. Notes: v; charts, graphs, tables. Notes: UN sales publications. Stock no: 81.II.F.18. OCLC: 78504651.

Engel, M. S. 2002. "The Smallest Snakefly (Raphidioptera: Mesoraphidiidae): A New Species in Cretaceous Amber from Myanmar, with a Catalog of Fossil Snakeflies." *Am. Mus. Novit.* American Museum of Natural History: Mar. Volume 363, Issue 1, Pages 1-22. Descriptors: New species; New genera; Fossils; Systematics; Amber; Cretaceous; raphidioptera; Mesoraphidiidae; Burma. Abstract: The world's smallest snakefly (Raphidioptera) is described and figured from a fossil preserved in Cretaceous amber from Myanmar (formerly Burma). *Nanoraphidia electroburmica*, new genus and species, is distinguished from other mesoraphidiids by characters of the wing venation and head morphology. Brief comments are made on the diminutive size of the specimen (forewing length just over 4 mm) and the geological history of the order is reviewed. Additionally, a larval snakefly is described from the same deposits, but is not considered to be congeneric with *Nanoraphidia*. A taxonomic catalog of all described, fossil snakeflies is appended. The following taxonomic changes are proposed: *Priscaenigmatidae*, new family, including *Priscaenigma* Whalley and *Hondelagia* Bode; *Huaxiaraphidiidae*, *Sinoraphidiidae*, and *Jilinoraphidiidae*, new synonyms of *Mesoraphidiidae*; *Cratoraphidia* and *Rudiraphidia*, new synonyms of *Baissoptera*; *Caloraphidia*, *Mioraphidia*, *Phiradia*, *Xynoraphidia*, and *Yanoraphidia*, new synonyms of *Mesoraphidia*; *Miofibla*, new synonym of *Fibla* (Reisserella); *Cretoaphidiopsis*, new name for *Cretoaphidia* Willmann (non *Cretoaphidia* Ponomarenko); *Baissoptera pulchra* (Martins-Neto and Nel), new combination; *B. liaoningensis* Ren, resurrected combination; *Cretoaphidiopsis bontsaganensis* (Ponomarenko), new combination; *Fibla* (Reisserella) *cerdanica* (Nel), new combination; *Pararaphidia vitimica* (Martynova), new combination; *Mesoraphidia furcivenata* Ren and *M. pterostigmalis* Martynova, resurrected combinations; and *M. gaoi* (Ren), *M. glossophylla* (Ren), *M. longistigmata* (Ren), *M. myrioneura* (Ren), *M. obliquivenata* (Ren), *M. polyphlebia* (Ren), and

*M. shangyuanensis* (Ren), all new combinations in Mesoraphidia.

Database: BioOne Abstracts and Indexes. ISSN: 0003-0082.

Engel, M. S. and Grimaldi, D. A. 2002. "The First Mesozoic Zoraptera (Insecta)." *Am. Mus. Novit.* American Museum of Natural History: Mar. Volume 362, Issue 1, Pages 1-20. Descriptors: New species; New genera; Phylogeny; Amber; Reclassification; Evolution; Cretaceous; Zoraptera; Zorotypus; Xenozorotypusburmiticus; Burma; Zorapterans. Abstract: The earliest representatives of the polyneopteran insect order Zoraptera are described and figured. Four species, representing both alate and apterous morphs, are preserved in Cretaceous amber from Myanmar (Burma) and are the first fossil records of the order from the Old World and the Mesozoic. *Zorotypus cretatus*, new species, is represented by an apterous individual of indeterminate sex whereas *Z. nascimbenei*, new species, is represented by analate female and *Z. acanthothorax*, new species, is known from analate male. *Xenozorotypus burmiticus*, new genus and species, is represented by an alate male and possesses distinct plesiomorphies suggesting that it may be sister to all other zorapterans (Recent and extinct). Based on some peculiar apomorphies of the metafemoral and terminalic structure as well as wing venation it is placed in a separate genus. These species, particularly *Z. cretatus*, *Z. acanthothorax*, and *Z. nascimbenei*, are remarkably similar to living zorapterans, which indicates antiquity of the genus *Zorotypus* and the order, the latter perhaps Lowermost Mesozoic in origin. Phylogeny and classification of Polyneoptera is briefly reviewed, and a list of zorapterans and their distributions is updated along with general comments on the evolution of the order. Database: BioOne Abstracts and Indexes. ISSN: 0003-0082.

Engineering Consultants, Inc and Electric Power Corporation. 1973. Thaukyegat Hydroelectric Project: Interim Report. Denver, Co: Engineering Consultants, Inc. Descriptors: Hydroelectric power plants- Burma; Water-power- Burma; Burma- Economic conditions. Notes: 1 v. (various pagings): ill., maps; 28 cm. Notes: "September 1973." Responsibility: Engineering Consultants, Inc. Electric Power Corporation. OCLC: 42740764.

Eveans, Sarah and Lavin, Elizabeth. 2007. "Growing Together." D. June. Volume 34, Issue 6, Pages 64-69. Descriptors: Refugees-Photographs; Gardeners-Photographs. Notes: Details: il. Abstract: Over the past two decades, the East Dallas Community Garden, more commonly known as the Asian Garden, has been a place where refugees from Cambodia, Vietnam, Burma, and Somalia have grown foods from their homelands to sustain their families and communities. The farmers pay \$30 per year to rent a 10-by-30 plot on which they cultivate Chinese broccoli, water spinach, edible loofah, Thai round eggplant, Kafir lime, and lemongrass. The facility is one of six in Dallas backed by the nonprofit Gardeners in Community Development. Photographs of some of the farmers who use the East Dallas Community Garden are presented. ISSN: 0164-8292.

Facilitation of Travel in the Asian Region. 2000. United Nations. Pages: 40 pages. Descriptors: Asia; Bangladesh; Burma; East Asia; Economic and social factors; Facilitation; India; Pacific Area; Sri Lanka; Strategic planning; Thailand; Tourism; Tourists; Travel; Travel behavior; Travelers. Abstract: This issue of the Economic and Social Commission for Asia and the Pacific (ESCAP) Tourism Review offers analysis and insight into the experiences of selected member countries in addressing values of facilitation as part of the national tourism development strategies. Viewpoints of selected international organizations are also presented in order to better understand some of the many complex issues related to the facilitation of travel and tourism. This paper concentrates and makes recommendations for the countries of Bangladesh, India, Myanmar, Sri Lanka and Thailand. ISBN: 9211199794. OCLC: 01042579. URL: Transportation Research Board.

Falshaw, Ruth, Furneaux, Richard H., Wong, Herbert, Liao, Ming-Long, Basic, Antony and Chandkrachang, Suwalee. 1996. "Structural Analysis of Carrageenans from Burmese and Thai Samples of *Catenella Nipae* Zanardini." Carbohydrate Research. 5/14. Volume 285, Pages 81-98. Descriptors: Carrageenan,  $\alpha$ -,  $\beta$ -,  $\iota$ -, and  $\kappa$ -; Galactans, sulfated; Structure determination; Reductive hydrolysis; Reductive partial-hydrolysis; Polysaccharides. Abstract: The carrageenans

extracted from samples of the red seaweed *Catenella nipae* Zanardini from Burma and Thailand have been characterised by recently developed chemical derivatization procedures (utilizing reductive hydrolysis and reductive partial-hydrolysis techniques) combined with GLC-MS analysis and by IR and NMR spectroscopy. Both polysaccharides are linear polymers composed primarily of 4-linked 3,6-anhydro- $\alpha$ -galactopyranosyl-2-sulfate residues alternating with 3-linked  $\beta$ -galactopyranosyl residues that are either un-substituted ( $\alpha$ -carrageenan) or 4-sulfated (I-carrageenan). The Burmese sample has a somewhat higher proportion of  $\alpha$ -carrageenan residues. The Thai *C. nipae* carrageenan was shown to have minor proportions of  $\beta$ - and  $\kappa$ -carrageenan residues.  $^1\text{H}$ - $^1\text{H}$  COSY,  $^{13}\text{C}$ - $^1\text{H}$  COSY and TOCSY NMR spectroscopic examinations of polymer segments produced from this polysaccharide as well as I-carrageenan itself, have permitted the  $^1\text{H}$  and  $^{13}\text{C}$  NMR assignments for I-carrageenan to be independently verified and for characteristic  $^1\text{H}$  and  $^{13}\text{C}$  chemical shifts for  $\alpha$ -carrageenan to be identified and assigned for the first time.

## F

Feldhake, C. J. 1954. "Well Drilling and Latrine Construction in Rural Burma." Public Health Rep. Public Health Rep. Apr. Volume 69, Issue 4, Pages 391-7. Descriptors: Sanitation; Toilet Facilities; Water Supply. ISSN: 0094-6214 (Print).

Fernando, C. H. 1984. "Reservoirs and Lakes of Southeast Asia; Oriental Region." Netherlands. Volume: 23, Descriptors: Asia; Bangladesh; Burma; Cambodia; Celebes; ecosystems; engineering geology; Far East; geomorphology; Grand Lac; hydrology; India; Indian Peninsula; Indonesia; lacustrine features; Lake Lanao; Lake Parakrama; lakes; Laos; limnology; Malaysia; Nepal; Oriental Region; Philippine Islands; ponds; reservoirs; Singapore; Southeast Asia; Sri Lanka; surveys; Tasek Bera; Thailand; Tonle Sap; Vietnam. Notes: FE: References: 176; illus. incl. 6 tables, sketch maps. GeoRef Accession Number: 1985-024462.

Fohs, D. G. 1991. Federal Highway Administration Moves Toward Metric Units. Transportation Research Board. TR News. no. 155, 3 pages. Descriptors: Benefits; Costs; Department of transportation; Federal highway administration; Implementation; International system of units; Metric system; National cooperative highway research; National Cooperative Highway Research Program; Policy; Problem identification; Transportation departments; U.S. Federal Highway Administration; United States. Abstract: The International System of Units (SI), a modern version of the metric system of measurement, is being adopted throughout the world. Three nations have yet to convert to SI: Burma, Liberia, and the United States. On May 8, 1990, the U.S. Department of Transportation issued Order 1020.1C, which established its policy and administrative procedures for orderly transition to the metric system. This article discusses the activities being undertaken by the U.S. Department of Transportation toward conversion to the metric system; problems identified by the Federal Highway Administration in developing and implementing a plan for conversion to SI for the highway industry; and the costs and benefits of metrication. An insert with this article, authored by K.S. Opiela, Senior Program Officer, Transportation Research Board, addresses metrication within the National Cooperative Highway Research Program (NCHRP). Notes: Page range: pp 10-11, 28. ISSN: 0738-6826. OCLC: 00612009. URL: Transportation Research Board.

Fontaine, Henri; Beauvais, Louise; Tran Duc Luong and Vietnam, General Department of Geology, Ho Chi Minh City, Vietnam. 1986. Distribution of the Jurassic Corals in South-East Asia; First Conference on Geology of Indochina. Gen. Dep. Geol. Vietnam, Hanoi, Vietnam. Volume: 1, First Conference on Geology of Indochina, Ho Chi Minh City. Vietnam Conference: Dec. 5-7, 1986. Descriptors: algae; Anthozoa; Asia; benthic taxa; biogeography; Borneo; Brachiopoda; Bryozoa; Burma; Cambodia; carbonate rocks; Chordata; Coelenterata; East Malaysia; Echinodermata; Far East; Foraminifera; Gastropoda; Indonesia; Invertebrata; Jurassic; Laos; limestone; Malay Archipelago; Malaysia; marine environment; Mesozoic; micrite; microfossils; Mollusca; occurrence; paleo-environment; Philippine Islands; Plantae; Protista; Reptilia; Sarawak Malaysia; sedimentary rocks; shallow-

water environment; Southeast Asia; stratigraphy; Sumatra; Tethys; Tetrapoda; Thailand; Vermes; Vertebrata; Vietnam. References: 23; sketch map. GeoRef Accession Number: 1990-020020.

Ford, L. R. 1993. "A Model of Indonesian City Structure." *Geogr. Rev.* Volume 83, Issue 4, Pages 374-396. Descriptors: Descriptive- Water; developing country; model application; urban change; city structure; morphological model; urban form; cities; urbanization. Geographic: Indonesia. Abstract: With approximately 30 cities of more than a quarter-million population, including seven with more than one million, Indonesia is a primary focus for the study of the city in Southeast Asia. By occupying a position midway between the hyper-development of Singapore and the isolation of Burma, Indonesian cities provide insight into both continuity and change in the region. A morphological model identifies political and economic trends that influence urban form through time. Based chiefly on large, coastal provincial capitals, the model applies in some degree to all cities in Indonesia. ISSN: 0016-7428.

Forest land use map, showing management land categories: Bago Forest Division. 1995. [Rangoon, Burma?]: Forest Dept., Ministry of Forestry. 1 map: col. ; 62 x 47 cm. Scale [ca. 1:510,000] (E 95°--E 96°/N 19°--N 18°). Notes: Shows division boundaries and geographical entities. Includes note and location map. Descriptors: Land use --Burma --Pegu (Division) --Maps. Forests and forestry --Burma --Pegu (Division) --Maps. Pegu (Burma : Division) --Maps. LCCN: 2003684660. URL: <http://lccn.loc.gov/2003684660>.

Fortey, R. A., Talent, John (convener), Young, Gavin (convener) and Wright, Tony (convener). 1997. "Ordovician Palaeogeography of the Shan-Thai Terrane; Palaeobiogeography of Australasian Faunas and Floras; Abstracts and Programme." Abstracts - Geological Society of Australia. Geological Society of Australia, Sydney, N.S.W., Australia. Volume 48, Pages 25. Descriptors: ancient ice ages; Arthropoda; Asia; Australasia; Australia; biogeography; Brachiopoda; Burma; Caradocian; carbonate rocks; China; endemic taxa; Far East; faunal studies; glaciation; Gondwana; Invertebrata; limestone; Mollusca;



North China Platform; Ordovician; Pa Kae Formation; Pagoda Limestone; paleogeography; Paleozoic; sedimentary rocks; shallow-water environment; Shan-Thai Terrane; South China Block; synonymy; Thailand; Trilobita; Trilobitomorpha; Upper Ordovician. Database: GeoRef. ISSN: 0729-011X.

"Foundation and Subgrade Sealing for Two Dams Resting on Quartzite and Diorite (Burma): Kutzner, C. Proc 6th National Rock Mechanics Symposium, Aachen, 3-4 April 1985 P177-181. Publ Essen: German Society for Soil Mechanics and Foundation Engineering, 1985." 1986. International Journal of Rock Mechanics and Mining Science & Geomechanics Abstracts. 2. Volume 23, Issue 1, Pages A27-A27. ISSN: 0020-7624. OCLC: 02139425.

Fox, P. G. and Kumchum, S. Affiliation: College of Nursing Department of Public Health, Mental Health and Administrative Nursing, University of Illinois, Chicago, U.S.A. 1996. "Caring for Myanmar Refugees in Thailand." Int. Nurs. Rev. Int. Nurs. Rev. Sep-Oct. Volume 43, Issue 5, Pages 154-8. Additional Info: Switzerland. Descriptors: Nursing Care; Primary Health Care; Refugees; Adult; Child; Health Priorities; Health Services- supply & distribution; Humans; Hygiene; International Cooperation; Myanmar; Nutrition Physiology. Abstract: Massive refugee movements continue due to conflicts between and within nations. To combat the major causes of mortality in refugee camps- under-nutrition, measles, diarrhea, pneumonia and malaria- 13 nurses are following the principles of primary health care and are promoting adequate food, safe drinking water, shelter, environmental sanitation and immunization. ISSN: 0020-8132 (Print); 1466-7657 (Electronic).

Frenken, Karen. 2008. "Land and Water Summary Fact Sheet for Myanmar (from Aquastat)." Data on land, population, renewable water resources, water withdrawal, irrigation, and drainage. For more information visit Aquastat web site. PDF, 35KB: [http://www.fao.org/nr/myanmar/aquastat\\_fact\\_sheet\\_mmr.pdf](http://www.fao.org/nr/myanmar/aquastat_fact_sheet_mmr.pdf)

Frenken, Karen. 2008. "Irrigated areas in percentage of total area (from Aquastat)." Stefan Siebert, Petra Döll, Sebastian Feick, Jippe Hoogeveen and Karen Frenken (2007) Global Map of Irrigation Areas

version 4.0.1. Johann Wolfgang Goethe University, Frankfurt am Main, Germany / Food and Agriculture Organization of the United Nations, Rome, Italy. PDF, 202KB:

[http://www.fao.org/nr/myanmar/myanmar\\_irr\\_area.pdf](http://www.fao.org/nr/myanmar/myanmar_irr_area.pdf)

Fu Hong, Chen Lide, Luo Ping, et al. 1997. "Medium-Short-Impending Prediction and Precursory Anomalous Characteristics on M= 7.3 Earthquake on July 12, 1995 in Border Area between Yunnan's Menglian and Burma; 3." *Dizhen Yanjiu= Journal of Seismological Research*. Seismological Bureau of Yunnan, Yunnan, China. Oct. Volume 20, Issue 4, Pages 343-344. Descriptors: anomalies; Asia; Burma; China; earthquake prediction; earthquakes; Far East; geochemistry; ground water; hydrochemistry; Menglian China; mercury; metals; noble gases; precursors; radon; Yunnan China. References: 1; illus. Abstract: The medium-short-impending anomalies of 151 station-items at 55 stations occurred before Menglian M = 7.3 earthquake in Yunnan and within the epicentral distances of 600 km, including 13 observations, such as short leveling, short base line, tilt, water radon, water level and water mercury, have been studied. The results show that the percentage for medium-short-impending anomaly station-items is 38% before the earthquake, and mainly concentrated within 200-400 km. Medium anomalies have features of long lasting and big amplitude. Features for short-impending anomalies are that medium anomaly tendency ends or observation varies oppositely, partial items appear dramatic anomalies, earlier outside and later nearby, and monthly station-items of anomalies increase with the earthquake approaching. Database: GeoRef. ISSN: 1000-0666.

Fujisaka, S., Moody, K. and Ingram, K. 1993. "A Descriptive Study of Farming Practices for Dry Seeded Rainfed Lowland Rice in India, Indonesia, and Myanmar." *Agriculture, Ecosystems & Environment*. Volume 45, Issue 1-2, Pages 115-128. Descriptors: Crop and livestock production - general; weed control; rice production; labour costs; dry seeded rice; cropping intensity; direct seeding; farmers' practice. Notes: Geographic: Burma India Indonesia. Abstract: Farmers' traditional dry seeded rice systems were examined: practices were matched to field environments and included ways to address not only

weeds, but also poor soil physical properties, water deficit and excess, and poor plant stand. Among others, farmers used pigmented rice cultivars to be able to rogue wild rice and rotated or switched from dry seeded to transplanted rice because of weeds or a too rapid onset of rains. Redistribution of seedlings and manual weeding were used to improve plant stand and soil physical properties in addition to reducing weeds. Farmers' dry-seeding systems did not necessarily reduce labor, but could increase cropping intensity, result in stable yields using low material inputs, or distribute labor demands where some fields are dry seeded and others transplanted. Because of difficult and uncertain environmental conditions, research on direct seeding must build upon farmer practices and knowledge. -from Authors. ISSN: 0167-8809.

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Furuichi, Takahisa. 2005. "A Preliminary Report on Sediment Sources, Erosion Processes, and Sedimentation in Lake Inle in Mid-Eastern Myanmar (Burma); Abstracts of the International Conference on Environmental Hazards and Geomorphology in Monsoon Asia; Progress in Process Study and GIS Mapping." Chikei= Transactions - Japanese Geomorphological Union. Nippon Chikeigaku Rengo, Kyoto, Japan. Apr. Volume 26, Issue 2, Pages 160-161. Descriptors: alkali metals; alkaline earth metals; Asia; Be-7; beryllium; Burma; cesium; cores; Cs-137; drainage basins; erosion; Far East; geochemistry; hydrology; isotopes; lacustrine environment; Lake Inle; lake sediments; major elements; metals; radioactive isotopes; rainfall; sediment supply; sedimentation; sediments; soil erosion; soils. Database: GeoRef. ISSN: 0389-1755.

**G**

Gambrill, M. 1994. "An Engineering Response to the Needs of Burmese Refugees in Bangladesh." *Waterlines*. Volume 13, Issue 1, Pages 7-10. Descriptors: Water supply and sanitation; refugee camp; Burmese refugees; water supply. Geographic: Bangladesh. Abstract: The engineering response to the flood of refugees from Burma in 1992 solved the short-term water supply problems, but recruiting local engineers and handing over the technical work made the situation workable for the long term. -Author. ISSN: 0262-8104.

Gavrilovich, P. and Pichard, P. 1984. *Methodology for Strengthening and Repair of Earthquake Damaged Monuments in Pagan, Burma*. Inc , Englewood Cliffs, New Jersey: Prentice-Hall. Pages: 609-616. Proceedings of the Eighth World Conference on Earthquake Engineering; Proceedings of the Eighth World Conference on Earthquake Engineering. Descriptors: Burma; Historical structures; Strengthening; Repairs; Earthquake hazards; Mathematical models; Reinforced concrete; Nonlinear structures; analysis; Response spectra; Earthquake-Resistant Design. Abstract: A method for repair and strengthening of these monument structures is developed based on seismic studies, seismic hazard assessment, and geophysical and soil investigations to define local soil conditions. Dynamic characteristics of the structures are determined. The properties of the construction materials and the formulated representative mathematical models for dynamic structural response to expected seismic effects are considered. Based on defined seismic design criteria, a methodology for repair and strengthening of this type of structure has been developed and presented. ISBN: 0132463644. Database: Earthquake Engineering Abstracts.

Gordon, Robert, 19th cent. 1989. *Fragment Containing a Discussion of a New Formula for the Flow of Water in Open Channels*. Milano: Tip. e litografia degli ingegneri. Descriptors: Channels (Hydraulic engineering); Stream measurements- Burma; Irrawaddy River (Burma); Microfilm; Master microform. Notes: 48 p., 2 folded leaves of plates: ill. 31 cm. Notes: Part of a report on the Irrawaddy

Embankment Works, printed by the Local Government of Burma for circulation in the Public Works Department of India. Includes bibliographical references. OCLC: 213080079.

Gordon, Robert, 19th cent. 1875. Fragment Containing a Discussion of a New Formula for the Flow of Water in Open Channels. Milano: Tipografia e litografia degli ingegneri. Descriptors: Channels (Hydraulic engineering); Stream measurements- Burma. Notes: 48 p., [2] folded leaves: 1 chart; 31 cm. Notes: Cover title. Part of a report on the Irrawaddy Embankment Works, printed by the Local Government of Burma for circulation in the Public Works Department of India. Includes bibliographical references. OCLC: 14638139.

Green, J. Affiliation: J. Green, 17 King Edwards Grove, Teddington, Middx TW11 9LY Country: United Kingdom E-mail: [jgreen711@btinternet.com](mailto:jgreen711@btinternet.com). 2007. "Morphological Variation of *Keratella Cochlearis* (Gosse) in Myanmar (Burma) in Relation to Zooplankton Community Structure." *Hydrobiologia*. Volume 593, Issue 1, Pages 5-12. Descriptors: Freshwater ecology: community structure and function; community structure; crustacean; flatworm; morphology; morphometry; zooplankton Species Term: Copepoda; Crustacea; Cyclopoida; Diaptomidae; *Heliodiaptomus*; *Keratella cochlearis*; *Keratella*; *Lorica*; *Rotifera*. Notes: References: Number: 19; Geographic: Asia England Eurasia Europe Myanmar Southeast Asia Thames River [England] United Kingdom Western Europe. Abstract: *Keratella cochlearis* was present in 27 of 35 water bodies sampled in Myanmar, and was the most abundant rotifer in 10. Measurements of lorica length and posterior spine length from 20 localities showed that posterior spine length varied both with lorica length and with the composition of the crustacean zooplankton. Long spines were associated with dominance by *Heliodiaptomus*. The shortest spines were found in samples dominated by cladocerans or cyclopoid copepods. Posterior spine length was positively correlated with the number of diaptomid copepods. Forms without posterior spines were found in 17 localities. The lorica lengths of these spineless forms were generally similar to those of co-occurring spined forms ( $r = 0.68$ ), but in a few samples the loricas of the spineless forms were significantly

larger. These larger forms are similar to the 'aspina' forms recently recognised in the River Thames in England. These samples were dominated by cladocerans or cyclopoid copepods. In one locality spineless forms were found without spined forms. The crustacean zooplankton in this locality was also dominated by cladocerans. ISSN: 0018-8158 E- 1573-5117.

Green, J. and Davies, J. 2005. "The Freshwater Medusa *Limnocyclus* and Associated Plankton in the Floodplain of the Ayeyarwaddy River, Myanmar." *J. Nat. Hist.* Volume 39, Issue 23, Pages 2083-2088. Descriptors: Article Subject Terms: Associated species; Catchment area; Flood plains; Freshwater environments; Geographical distribution; Inland water environment; Lakes; Phytoplankton; Plankton; Rivers; Zooplankton; Article Taxonomic Terms: Copepoda; Craspedacusta; *Limnocyclus*; *Limnocyclus indica*; Rotifera; Article Geographic Terms: Africa; Europe; Myanmar; Myanmar, Ayeyarwaddy R. North America; Copepods; Rotifers; Wheel animalcules. TR: CS0517387. Abstract: Freshwater medusae of the genus *Limnocyclus* were found in a shallow lake in the floodplain of the Ayeyarwaddy River. The medusae are described and identified as a small form of *L. indica*. Single immature specimens were found in two other localities in Myanmar, within the Ayeyarwaddy catchment. These records are an eastward extension of the known range of *Limnocyclus*, and indicate that it is probably widespread in the Ayeyarwaddy catchment. The associated phytoplankton and zooplankton are listed, and the zooplankters are compared to those found with *Limnocyclus* in a floodplain lake of the River Sokoto in West Africa. In both situations there was a marked preponderance of rotifers and cyclopoid copepods. This indicates that *Limnocyclus* influences the zooplankton in a manner similar to that found in various studies on the freshwater medusa *Craspedacusta* in Europe and North America. Database: ASFA: Aquatic Sciences and Fisheries Abstracts. ISSN: 0022-2933.

Greenwald, Peter T. 1992. *The United States and Environmental Security: Deforestation and Conflict in Southeast Asia*. Corporate Author: Naval Postgraduate School Monterey, CA. Report Date: June 1992. Report Classification: Unclassified. Abstract: (U) In the post Cold War era, the East-West conflict may be succeeded by a new

confrontation which pits an industrialized North against a developing South. In June 1992, world attention was fixed on the Earth Summit in Rio de Janeiro. This event marked a milestone in global environmental awareness; but just as the end of the Cold War has provided new opportunities for the US, the world is now faced with new sources of conflict which have advanced to the forefront of the national security debate. Among the new sources of conflict, environmental problems are rapidly becoming preeminent. Within national security debates, those environmental problems which respect no international boundary are of particular concern. Worldwide deforestation, and the related issues of global warming and the loss of biodiversity, represent a clear threat to national security. Two percent of the Earth's rainforests are lost each year; one 'football field' is lost each second. Deforestation has already led to conflict and instability within several regions of the world including Southeast Asia. The United States must recognize the character and dynamics of these new sources of conflict in order to successfully realize its policy aims in national security. The US should preempt conflict through cooperation and develop a shared concern for the environment throughout the world. The US military may play a key role in this effort. Rainforest, Deforestation, Tropical timber, Logging, Southeast Asia, Philippines, Malaysia, Indonesia, Thailand, Burma, Laos, Japan Cambodia, Vietnam, Human rights, Plywood, Pulp, Paper, World Bank, U.S. Agency for International Development. Distribution Statement: Approved for public release; distribution is unlimited. Document partially illegible. DTIC: ADA258057. Url: <http://handle.dtic.mil/100.2/ADA258057>

Griffard, B.F., Butts, Kent H. and Bradshaw, Art. 2006. Support to Civil Authority in Seismic Disasters: Regional Initiatives. U.S. Pacific Command Southeast Asia Seismic Disaster Preparedness Conference. Center for Strategic Leadership Issue Paper, Volume 02-06, February 2006. Corporate Author: Army War College, Carlisle Barracks, PA. Center for Strategic Leadership. Report Date: Feb 2006. Report Classification: Unclassified. Abstract: (U) This paper summarizes the results of the "Southeast Asia Seismic Disaster Preparedness Conference", which was held in Honolulu, Hawaii, on 26-28 September 2005. Circling the Pacific Basin, on the bottom of the sea bed, lie a dramatic series of volcanic arcs and oceanic trenches. The zone -- the 'Ring of Fire' -- notorious for frequent earthquakes and volcanic eruptions coincides with the edges of one of the world's main tectonic plates" (BBC News - January 29, 1999). The "Ring of Fire" includes over 75% of the world's active and dormant volcanoes, and along their fence line are a series of dynamic tectonic plates that produce frequent, and sometimes violent, seismic events. This delicate

relationship between man and nature was brought home to Southeast Asia on December 26, 2004 when a 9.0 earthquake off the coast of Sumatra produced a Tsunami that devastated the region. Following the December 2004 tsunami, the establishment of effective disaster preparedness planning capabilities at the national and regional levels became a goal of the governments in the region. In addition to being a sound political initiative, such preparedness planning speeds the national and regional reaction time, and assists international organizations and other countries in identifying appropriate response support. Knowing who to call in a crisis is a key piece of information. The Southeast Asia Seismic Disaster Preparedness Conference allowed the region's key disaster preparedness planners to meet face-to-face and laid the foundations for the friendship and trust necessary in the development of working relationships. Seismic events will continue to occur and impact lives within the "Ring of Fire," however, there is awareness among the Southeast Asian nations that there are actions within their reach that can mitigate the effects of the next major seismic event. Distribution Statement: Approved for public release; distribution is unlimited. DTIC Accession Number: ADA444924. Url: <http://handle.dtic.mil/100.2/ADA444924>

Griffin, W. L., Win, T. T. and Davies, R. 2001. "Diamonds from Myanmar and Thailand: Characteristics and Possible Origins." *Economic Geology and the Bulletin of the Society of Economic Geologists*. January/February 2001. Volume 96, Issue 1, Pages 159-70. Descriptors: Diamond mines and mining; Myanmar; Thailand; Geology/Southeast Asia. Notes: Bibliography; Illustration; Map; Feature Article. Abstract: A study of the characteristics and possible origins of diamonds from Myanmar and Thailand is presented. The alluvial diamond deposits under investigation do not contain typical diamond indicator minerals. Evidence including isotopic data, the dominantly peridotitic nature of the syngenetic inclusions, indications of long surface transport, and association with glacial-marine sediments suggest that these diamonds originated in northwestern Australia or within the Sibumasu terrane itself before the Early Permian separation of the Sibumasu terrane from the Gondwanaland margin. Database: Applied Science & Technology. ISSN: 0361-0128.

Grimaldi, D. A., Engel, M. S. and Nascimbene, P. C. 2002. "Fossiliferous Cretaceous Amber from Myanmar (Burma): Its



Rediscovery, Biotic Diversity, and Paleontological Significance." *Am. Mus. Novit.* American Museum of Natural History: Mar. Volume 361, Issue 1, Pages 1-71. Descriptors: New species; New genera; Morphology; Fossils; Amber; Cretaceous; nychophora; Peripatidae; Ixodidae; Burma; Velvet worms; Ticks. Abstract: Amber from Kachin, northern Burma, has been used in China for at least a millennium for carving decorative objects, but the only scientific collection of inclusion fossils, at the Natural History Museum, London (NHML), was made approximately 90 years ago. Age of the material was ambiguous, but probably Cretaceous. Numerous new records and taxa occur in this amber, based on newly excavated material in the American Museum of Natural History (AMNH) containing 3100 organisms. Without having all groups studied, significant new records and taxa thus far include the following (refers to extinct taxa): For Plants: An angiosperm flower (only the third in Cretaceous amber), spores and apparent sporangia of an unusual but common fungus, hepatophyte thalli and an archegoniophore of Marchantiaceae, and leafy shoots of *Metasequoia* (Coniferae). *Metasequoia* is possibly the source of the amber. For Animals: nematodes and other Nematoda; the oldest ixodid tick (larval *Amblyomma*); bird feathers; and the only Mesozoic record of the Onychophora ('velvet' worms), described as *Cretoperipatus burmiticus*, n. gen., n. sp. (Peripatidae). Poinar's classification of the Onychophora is substantially revised. Still largely unstudied, the fauna of mites (Acari) and spiders (Araneae) appears to be the most diverse ones known for the Mesozoic. For Insecta: Odonata indet. (wing fragment); Plecoptera indet. new genera of Dermaptera, Embiidina, and Zoraptera (the latter two as the only definitive Mesozoic fossils of their orders). Within Hemiptera, there are primitive new genera in the Aradidae, Hydrometridae, Piesmatidae, Schizopteridae, and Cimicomorpha (Heteroptera), as well as in Tjaderidae (Aphidoidea), and Tjaderidae. An adult snakefly (Raphidioptera: Mesoraphidiidae) is the smallest species in the order, and new genera occur in the Neuroptera: Coniopterygidae, Berothidae, and Psychopsidae, as well as larvae of apparent Nevrothidae. Coleoptera are largely unstudied, but are probably the most diverse assemblage known from the Cretaceous, particularly for Staphylinidae. An adult lymexylid, the most primitive species of *Atractocerus*, is the first

Mesozoic record of the family. In Hymenoptera there are primitive ants (Formicidae: Ponerinae n. gen., and Sphecomyrma n. sp [Sphecomyrminae]), the oldest record of the Pompilidae, and significant new records of Serphitidae and Stigmaphronidae, among others. Diptera are the most diverse and abundant, with the oldest definitive Blephariceridae and mosquito (Culicidae), as well as new genera in the Acroceridae, Bibionidae, Empidoidea; a new genus near the enigmatic genus Valseguya, and an unusual new genus in the Archizelmiridae. Chimeromyia (Diptera: Eremoneura), known previously in ambers from the Lower Cretaceous, is also represented. The stratigraphic distribution of exclusively Mesozoic arthropods in Burmese amber is reviewed, which indicates a probable Turonian-Cenomanian age of this material (90-100 Ma). Paleofaunal differences between the NHML and AMNH collections are discussed, as is the distinct tropical nature of the original biota. Burmese amber probably harbors the most diverse biota in amber from the Cretaceous, and one of the most diverse Mesozoic microbiotas now known. Database: BioOne Abstracts and Indexes. ISSN: 0003-0082.

Gross, Dorit. 2008. "Soil Map for Myanmar." Geographical distribution of 10 dominant soil types in Myanmar. Map created by FAO/NRL from Harmonized World Soil Database (HWSD). United Nations Food and Agricultural Organization (FAO). JPEG (875KB): [http://www.fao.org/nr/myanmar/SoilMap\\_Myanmar\\_300dpi.jpg](http://www.fao.org/nr/myanmar/SoilMap_Myanmar_300dpi.jpg) ; PDF (448KB): [http://www.fao.org/nr/myanmar/SoilMap\\_Myanmar\\_300dpi.jpg](http://www.fao.org/nr/myanmar/SoilMap_Myanmar_300dpi.jpg)

Grossman, R. L. and Durran, D. R. 1984. "Interaction of Low-Level Flow with the Western Ghat Mountains and Offshore Convection in the Summer Monsoon." Mon. Weather Rev. Volume 112, Issue 4, Pages 652-672. Descriptors: Hydrology; Meteorology And Climatology; India; Burma; Thailand; Philippines; boundary layer; summer monsoon experiment. Abstract: Seven-year averaged values of percent frequency of occurrence of highly reflective cloud for the months June, July, and August indicate that offshore convection is a major component of the cloudiness of the southwest monsoon. Principal areas of convection occur off of the western coasts of India, Burma,

Thailand, and the Philippines. Analysis of a special boundary layer mission flown during the WMO/ICSU Summer Monsoon Experiment leads us to believe that partial deceleration of the monsoon flow by upstream blocking effects of the mountains initiates and maintains a vertical and horizontal motion field that could support the observed convection.-from Authors. ISSN: 0027-0644.

"Ground Water; Beyond 2000; What Future for Asian Supplies." 1987. Water Resour. J. United Nations, Economic and Social Commission for Asia and the Pacific, New York, NY, International (III). Sep. Volume 154, Pages 76-81. Descriptors: Afghanistan; Asia; Bangladesh; Bhutan; Burma; Cambodia; China; Commonwealth of Independent States; Far East; ground water; hydrogeology; India; Indian Ocean Islands; Indian Peninsula; Korea; Laos; Malaysia; Maldives Islands; Mongolia; Nepal; Pakistan; Singapore; Sri Lanka; surveys; Thailand; USSR; Vietnam. ISSN: 0377-8053.

Grundy-Warr, C. 1993. "Coexistent Borderlands and Intra-State Conflicts in Mainland Southeast Asia." Singapore Journal of Tropical Geography. 2005 Elsevier Ltd. All rights reserved.: Volume 14, Issue 1, Pages 42-57. Descriptors: Political; WATER; geopolitical relations; border area; developing region; political geography; intra-state conflict; borders; conflict; state control. Geographic: Burma Thailand Cambodia Asia- (Southeast). Abstract: This paper examines recent developments in two distinct borderlands of mainland Southeast Asia, namely Burma-Thailand and Thailand-Cambodia. It aims to show how an analysis of cross-border space provides a better understanding of the political and military conflicts within Burma and Cambodia and the international dimensions of these conflicts. In both cases the intra-state conflicts have at times become externalized involving considerable inter-state tension. Borderlands reflect the inter-state and transnational dimensions of these mostly intra-state level conflicts. - Author. ISSN: 0129-7619.

Gugliotta, Guy; Sawyer, Kathy; Weiss, Rick; Sawyer, Kathy and Weiss, Rick. 1999. Science Notebook. WP. Oct 18. pages: A, 9:1. Descriptors: Paleontology; Moon; Breast cancer; Water; Drug therapy. Abstract:

Paleontologists have discovered a new species of early primate in central Burma, offering fresh evidence that the ancestor of all monkeys and apes may have been from Asia, rather than Africa. The Burmese-French scientific team found fossilized teeth and jawbone fragments from Bahinia in Burma's Pondaung Formation, along with the jawbone of a more advanced primate. The fossils are about 40 million years old. Team leader Jean-Jacques Jaeger, of the Universite Montpellier- II, said the new fossil was definitely anthropoid--an ancestor of modern monkeys and apes--and showed strong similarities to a more fragmentary fossil found in China. ISSN: 0190-8286.

Gupta, S. M. and Srinivasan, M. S. 1992. "Late Miocene Radiolarian Biostratigraphy and Paleoceanography of Sawai Bay Formation, Neill Island, Andamans, India." *Micropaleontology*. Volume 38, Issue 3, Pages 209-235. Descriptors: Micropalaeontology; Geochronology, stratigraphy and palaeontology; radiolaria; palaeoceanography; palaeogeography; palaeoclimate; Miocene; biostratigraphy; radiolarian; Sawai Bay Formation Species Term: Radiolaria (protozoans); Didymocyrtis; Bacillariophyta; Botryostrobus; Peregrina. Notes: Geographic: India- Andaman Islands- Neill Island India- Andamans- Neill Island. Abstract: Stichocorys peregrina, Didymocyrtis penultima and Didymocyrtis antepenultima Late Miocene radiolarian zones are encountered from mudstone strata of Sawai Bay Formation, Neill Island, Andamans. Percentage data of 45 coarser taxonomic groups of radiolarians were subjected to Q-mode cluster analysis. Based on the ecology of the modern homeomorphs of the dominant radiolarian groups, it is suggested that the resulting clusters indicate colder and warmer periods due to the monsoonal upwelling during warmer periods. This finding is also substantiated with diatom/radiolaria ratio. Presence and absence of deep (1200-2000m) and intermediate (700-1200m) water dwelling radiolarians like the Plectopyramids, Botryostrobus and Sethoperinids groups indicate basinal shallowing during Late Miocene. It may be due to subduction of the Indian plate below the Asian plate, coupled with huge sediment discharged from the Irrawaddy River of Burma during monsoon dominated warmer periods (5.0-6.3 and 8.5-7.7 Ma) in Late Miocene. - from Authors. ISSN: 0026-2803.

Gyi, L. T. 1973. "Seismic Zoning Map of the Union of Burma." Individual Studies by Participants at the International Institute of Seismology and Earthquake Engineering. Volume 9, Pages 218-237. Descriptors: Maps; seismic zoning; Burma; Alpide-Himalayan Belt; Seismology; Earthquake Risk. Abstract: Burma is located at the easternmost end of the Alpide-Himalayan belt. The whole country can be divided into three seismic zones, namely: (1) active zone comprising central and northern Burma above 21 degree N latitude, (2) less active zone comprising south Burma, below 21 degree N latitude and (3) nonseismic zone of the east and southeastern border regions. The frequency of occurrence of earthquakes and their magnitude are found to increase in the north and northwest along the Indian border. The "b" value obtained from the calculation for the whole country is 0.99 and the "A" values are calculated according to the formula  $A = 2.70 \log N(\text{det})/D + 2.93$ . Here A is selected as the measure of seismicity. A lower D value of 0.58 is taken. This paper has its limitations because of the lack of data and earthquake records due to the absence of seismological observatories. Further studies on earthquakes should be made utilizing this new method for quantitative seismicity maps. Database: Earthquake Engineering Abstracts. ISSN: 0074-6606.

Han, A. M. and Myint, T. M. 1986. "Knowledge, Attitudes and Behaviour in Relation to Diarrhoea in a Rural Community in Burma." Southeast Asian J. Trop. Med. Public Health; Southeast Asian J. Trop. Med. Public Health. Mar. Volume 17, Issue 1, Pages 59-62 Additional Info: THAILAND. Descriptors: Adult; Behavior; Child, Preschool; Defecation; Diarrhea- prevention & control; Female; Food Contamination; Handwashing; Humans; Infant; Male; Myanmar; Rural Health; Soaps; Water Supply. Notes: Chemical Subst: Soaps [0]. Abstract: A study was conducted in a rural community in Burma, to determine how people perceive the importance of food, water and defecation in the causation of diarrhoea and to determine whether people wash hands or use soap after defecation or before preparing and eating food. 90% of mothers with under-five children in the community were interviewed. 53 to 86% of people were aware of the importance of food, water and defecation in the causation of diarrhoea.

Although 34 to 88% practised hand washing before eating/food handling or after defecation, only 5 to 12% regularly used soap. Furthermore, drinking water for under-five children was obtained by dipping the drinking mug or cup into the drinking water pot (83%) which could result in contamination of drinking water. ISSN: 0125-1562 (Print).

Han, A. M., Oo, K. N., Aye, T. and Hlaing, T. Affiliation: Epidemiology Division, Department of Medical Research, Yangon, Myanmar. 1991. "Bacteriologic Studies of Food and Water Consumed by Children in Myanmar: 2 Lack of Association between Diarrhoea and Contamination of Food and Water." J. Diarrhoeal Dis. Res. Jun. Volume 9, Issue 2, Pages 91-3 Additional Info: BANGLADESH. Descriptors: Food Microbiology; Water Microbiology; Child, Preschool; Diarrhea, Infantile- epidemiology; Enterobacteriaceae- isolation & purification; Humans; Incidence; India- epidemiology; Infant; Risk Factors. Abstract: The association between contamination of morning samples of food and water of 208 children aged 6-29 months and the incidence of diarrhoea was investigated for 3 months in Yangon, Myanmar. Contamination of the samples was determined by isolation of faecal coliforms (FC) by standard methods. The children were divided into three groups, high, medium and low, according to the proportion of food and water samples found to be contaminated. The incidence of diarrhoea was recorded by weekly recall. Of the 779 food samples, 504 (65%), and of the 860 drinking water samples, 187 (22%) were positive for FC. The association between food and water contamination and the incidence of diarrhoea was assessed by comparing the cumulative incidences in the high and medium groups with that in the low group which served as reference. Diarrhoea risk ratios (RR) for children in the medium and high contamination groups (food, RR = 1.04 in medium and 0.78 in high vs 1 in low; water, RR = 0.73 and 0.73 vs 1) were not significantly different from those who were in the low-contamination group even after controlling for the confounding variables. ISSN: 0253-8768 (Print).

Han, A. M., Oo, K. N., Midorikawa, Y. and Shwe, S. Affiliation: Epidemiology Division, Department of Medical Research, Rangoon,

Burma. 1989. "Contamination of Drinking Water during Collection and Storage." *Trop. Geogr. Med. Apr.* Volume 41, Issue 2, Pages 138-40  
Descriptors: Water Microbiology; Water Pollution- prevention & control; Water Supply; Bacillus- isolation & purification; Feces-microbiology; Hygiene; Myanmar. Abstract: Drinking water contamination during abstraction, storage and use was determined in a suburban community in Rangoon, Burma, by detecting faecal coliforms (FC) with membrane filtration method. Increasing contamination during water collection, from the source to home storage, was found in all the studied households using 4 different types of drinking water. The implications of the findings are discussed. ISSN: 0041-3232 (Print).

Hands Across The River- The Greater Mekong Subregion. 1995. John Wiley & Sons, Incorporated. Infrastructure. Descriptors: Asia (Southeastern); Public works; Southeast Asia; Transportation. Abstract: Joint Projects for China, Burma, Thailand, Laos, Cambodia And Vietnam Including Road, Rail And Water Transportation And Airports. Notes: Infrastructure, Dec. 1995, P. 14-16: ILL. ISSN: 1081-7174. OCLC: 00871443. URL: Transportation Research Board.

Hanrahan, Charles E. 2005. Indian Ocean Earthquake and Tsunamis: Food Aid Needs and the U.S. Response. Corporate Author: Library of Congress, Washington, DC. Congressional Research Service. Report Date: 16 Feb 2005. Report Classification: Unclassified. Abstract: (U) On December 26, 2004, an undersea earthquake of magnitude 9.0 off the coast of Aceh Province (Sumatra) in Indonesia set off a series of large tsunamis across the Indian Ocean region. In all, 12 countries were hit by wave surges, with the brunt of the impact in coastal communities in Indonesia, the Maldives, Sri Lanka, and Thailand. The death toll has been estimated at 140,000-200,000. It is believed that between 3 and 5 million people have been affected, including those displaced, or who have lost their homes and livelihoods. An estimated 2 million people are in urgent need of food aid. Thus far, the United States, other countries, and international organizations have pledged over \$4 billion in emergency assistance. The U.S. pledged contribution, including food aid valued at \$34.5 million, currently stands at \$350 million. The President requested, on February 14, 2005, an additional \$701 million in supplemental appropriations for tsunami relief, some of which could be used for food aid. Prior to the Indian Ocean disaster,

U.S. and global food aid resources were facing considerable demand for emergency food aid to respond to urgent needs, especially in sub-Saharan Africa. Congress may be confronted with a number of interrelated food aid issues early in the 109th Congress, including reconciling emergency and non-emergency uses of food aid, determining the U.S. share of global food aid for tsunami victims as well as other food-insecure people in Africa and elsewhere, and funding alternatives for U.S. emergency and non-emergency food aid. This report will be updated. Distribution Statement: Approved for public release; distribution is unlimited. DTIC Accession Number: ADA461392. Url: <http://handle.dtic.mil/100.2/ADA461392>

Haupt, M., Leithoff, H., Meier, D., Puls, J., Richter, H. G. and Faix, O. 2003. "Heartwood Extractives and Natural Durability of Plantation-Grown Teakwood (*Tectona Grandis* L.) - A Case Study." *Holz Als Roh - Und Werkstoff*. Springer Verlag: Volume 61, Issue 6, Pages 473-474. Descriptors: Wood; Extraction; Durability; Plants (botany); Growth kinetics; Composition; Enzyme inhibition; Biosynthesis; Fungi; Gas chromatography; High performance liquid chromatography. Abstract: The causes of the exceptionally low natural durability of one individual plantation-grown teak tree from Panama were investigated. In durability tests with *Coriolus versicolor* (Leithoff et al. 2001) the heartwood of this tree had shown a mass loss between 32% und 43% while the reference material of a durable teak from Myanmar revealed only 2.3% up to 12.1% mass losses. Further studies on the antifungal effects of extractives of this specimen have been performed and the results compared with those of durable teak woods from the same plantation and from natural forests in Myanmar as well. As highest antifungal activity was found in the acetone/water extract, this extract will be analysed here in relation to the inhibitor effect of fractionated substances on mycelium growth of *Coriolus versicolor* (white rot) and *Coniophora puteana* (brown rot). In parallel studies Windeisen et al. (2003) surveyed the chemical composition of plantation-grown teakwood from the same origin in Panama. ISSN: 0018-3768.

Hawkes, Rebecca B., Franzmann, Peter D., O'Hara, Graham and Plumb, Jason J. 2006. "Ferroplasma Cupricumulans Sp. Nov., a Novel Moderately Thermophilic, Acidophilic Archaeon Isolated from an Industrial-Scale Chalcocite Bioleach Heap." *Extremophiles: Life Under*



Extreme Conditions, 2006 Dec. 10(6):525-30. Epub: 2006 May 24: Germany. Volume 10, Issue 6, Pages 525-530. Descriptors: Biodegradation, Environmental; Copper; DNA, Archaeal: analysis; Environmental Remediation; Ferric Compounds: metabolism; Ferrous Compounds: metabolism; Hydrogen-Ion Concentration; Industrial Waste: analysis; Kinetics; Metallurgy; Myanmar; Oxidation-Reduction; Phylogeny; RNA, Ribosomal, 16S: genetics; Ribotyping; Sequence Homology, Nucleic Acid; Temperature; Thermoplasma: classification; Thermoplasma: genetics; Thermoplasma: growth & development; Thermoplasma: isolation & purification; Thermoplasma: metabolism. Notes: RN: 0 (DNA, Archaeal); 0 (Ferric Compounds); 0 (Ferrous Compounds); 0 (Industrial Waste); 0 (RNA, Ribosomal, 16S); 10028-22-5 (ferric sulfate); 7440-50-8 (Copper); 7720-78-7 (ferrous sulfate). Abstract: A new species of Archaea was isolated from an industrial mineral sulphide bioleach heap. Strain BH2, a non-motile pleomorphic coccus, was capable of chemomixotrophic growth on ferrous sulphate and yeast extract. Growth was not supported in the absence of yeast extract. Phylogenetic analysis based on the 16S rRNA gene showed that strain BH2 was most closely related to the species *Ferroplasma acidiphilum*; however, it showed only 95% sequence similarity with this species. Strain BH2 had a temperature optimum of 53.6 degrees C and a temperature range for growth between 22 and 63 degrees C. Thus, it is the first moderately thermophilic member of the genus *Ferroplasma*. The optimum pH for the growth of the strain occurred between pH 1.0 and 1.2 and the lowest pH at which growth was observed was 0.4. Based on 16S rRNA gene sequence analysis and other physiological characteristics, strain BH2 constitutes a new species within the genus *Ferroplasma*. The name *Ferroplasma cupricumulans* is proposed for the new species and strain BH2 (DSM 16651) is proposed as the type strain. Database: TOXLINE. ISSN: 1431-0651. Availability: Print-Electronic.

Hawkes, Rebecca B., Franzmann, Peter D. and Plumb, Jason J. 2006. "Moderate Thermophiles Including "*Ferroplasma Cupricumulans*" Sp. Nov. Dominate an Industrial-Scale Chalcocite Heap Bioleaching Operation." *Hydrometallurgy*. Volume 83, Issue 1-4, Pages 229-236. Descriptors: Leaching; Microorganisms; Cell culture; Metabolism;

Molecular structure; Microbiology; Genes. Abstract: This study describes the microbiology of the MICCL Monywa chalcocite heap bioleaching operation. Microorganisms were detected in the heap using culture-based techniques and culture-independent PCR-DGGE analysis of the 16S rRNA gene. The metabolic requirements, temperature and pH optima were determined for selected strains isolated from the heap material. Six strains (BH1-BH6) were enriched and isolated from heap solids and leachate samples. Phylogenetic analysis of the 16S rRNA genes showed that strains BH3 and BH4 were closely related to the acidophilic bacterium *Acidithiobacillus caldus* and strains BH5 and BH6 were closely related to *Leptospirillum ferriphilum*. The optimum growth temperature for one of the *L. ferriphilum* strains was 41.3°C and the optimum pH range was 1.1 to 1.5. A new species of Archaea was isolated from the heap samples. Cells of the proposed species, "*Ferroplasma cupricumulans*" (formerly "*Ferroplasma cyprexacervatum*"), were non-motile pleomorphic cocci, capable of chemomixotrophic growth with ferrous sulphate and yeast extract. Cells grew anaerobically on potassium tetrathionate and yeast extract as electron donors with ferric iron as the electron acceptor. Growth occurred from 22°C to 63°C, with an optimum temperature of 53.6°C. The optimal pH for growth was 1.0-1.2. Phylogenetic analysis based on the 16S rRNA gene showed the most closely related described species to strain BH2 was *Ferroplasma acidiphilum* YT (95% sequence similarity). Molecular analysis of mine samples (16S rRNA PCR-DGGE) detected the above-mentioned cultured strains as well as species of *Sulfobacillus* and unknown representatives of the Proteobacteria. The microbial community of the Myanmar bioleach heaps contained similar levels of diversity to a dump bioleach operation in Chile, but contained greater amounts of biomass than another heap bioleach operation in Australia. The operating parameters of the Myanmar heaps have selected for the growth of moderately thermophilic microorganisms that are more commonly found in extremely low pH acidic mine drainage sites than in heap bioleach systems. The novel species of *Ferroplasma* is considered to be involved in the aerobic and anaerobic cycling of iron within the heap bioleaching environment. ISSN: 0304-386X.

He, Yuanqing, Zhang, Zhongli n., Theakstone, Wilfred H., et al. 2003. "Recent Variability of the Climate and Glaciers in China's Monsoon Region." IAHS-AISH Publication. IAHS Press, Wallingford, Oxfordshire, OX10 8BB, United Kingdom: Issue 280, Pages 104-116. Descriptors: Global warming; Glaciers; Ice; Precipitation (chemical). Abstract: Climatic data, ice core records, the tree-ring index and recorded glacier variations have been compared, and used to reconstruct a history of climatic and glacial changes in the monsoonal temperate-glacier region of southwestern China during the last 400 years. The results indicate that the region's temperature has increased in a fluctuating manner during the 20th century, after the two cold stages of the Little Ice Age of the 17th-19th centuries, with a corresponding retreat of most of the glaciers during the 20th century, against a background of global warming. Rates of retreat accelerated after the 1980s. The few advancing glaciers that did exist have started to retreat in recent years. The amount, trend and amplitude of variation of precipitation have differed in different parts of the region. The climatic records in the Dasuopu ice core, from the Himalaya area in the western part of the region, show a decreasing trend in precipitation, the converse of the trend in temperature. However, in the Hengduan Mountains and other areas of the eastern part of the region, a rising trend in rainfall has accompanied increasing temperatures, a result of the variable atmospheric circulations from different sources. The data indicate that the Southwest Monsoon, which is the principal controlling factor in the Chinese monsoonal temperate-glacier region, can be classified into two parts. One is the Indian Monsoon from the Arabian Sea, passing across the Indian Peninsula. This transports the vapour for precipitation in the Himalaya area, the western part of the monsoonal temperate-glacier region. The other part is the Bengal Monsoon originating in the Bay of Bengal, passing over Bengal and Burma. This is the major source of precipitation in the Hengduan Mountains and other areas in the eastern part of the region. In addition, the eastern part is influenced by the Southeast Monsoon arriving from the western Pacific, whilst the western part is affected in winter by the southern branch of the westerly circulation. This complex atmospheric situation results in differing patterns of precipitation in the western and eastern zones. Although it is clear that both

temperature and precipitation affect the glaciers, further work is needed to confirm which is the major factor influencing present glacier change. ISSN: 0144-7815.

Health Data Publications No. 30. Burma (Union of Burma). 1966. Corporate Author: Walter Reed Army Medical Center Washington, DC. Report Date: Jan 1966. Abstract: Geography, area, and population; Socio-economic; Government and education; Resources and commerce; Transportation and communications; Diet, nutrition, and food sanitation; Housing and water supplies; Sewage waste, garbage disposal; Plants of medical importance; Animals of medical importance; Diseases of Burma; Community health services; Medical personnel and facilities. Report Classification: Unclassified. Distribution Limitation(s): Approved For Public Release. Accession Number: ADA001424. Url: <http://handle.dtic.mil/100.2/ADA001424>

Health Unlimited. 2006. She Qu Huan Jing Wei Sheng Yu Gai Shui Gai Ce = Yingguo Wu Guo Jie Wei Sheng Zu Zhi (HU) Miandian Shan Bang Dong Bu Di 4 Te Qu Wei Sheng He Zuo Xiang Mu Pei Xun Jiao Cai. Eastern Shan State, Myanmar: HU-Special Region 4 Porject Office. Pages: 36. Descriptors: Public health- Burma; Water-supply- Burma; Toilets- Burma. Notes: ill. 29 cm. Other Titles: Community's environmental sanitation manual. Responsibility: [Health Unlimited]. OCLC: 80018831.

"The Henzadah Plain and Reclamation Works." 1889. S.l: s.n., Surveyor General. Descriptors: Flood control- Burma- Henzada District- Maps; Flood control- Burma- Bassein River- Maps; Flood control- Burma- Irrawaddy River- Maps; Reclamation of land- Burma- Henzada District- Maps; Hydraulic engineering- Burma- Henzada District- Maps; Floods- Burma- Bassein River; Government publication; National government publication. Notes: Description: 1 map; mounted on linen; 61 x 41 cm. Map Info: Scale [ca. 380,160]. 6 miles: 1 inch. Category of scale: Relief shown by shading. Includes "Profile of Nawoon River thalweg and floods," and profiles of Henzada embankment, and Taboo Canal. "Photozincographed at the Surveyor General's Office, Calcutta, August 1889." "XXII."; Other Titles: Alternate title: Henzadah Plain. OCLC Accession Number: 53058900.

Heymann, Johannes. 2000. "Mapping and Land-use Planning for Watershed Management and Land Degradation Assessment in Myanmar." *Petermanns Geographische Mitteilungen*. VEB Hermann Haack Geographisch-Kartographische Anstalt Gotha/Leipzig, Gotha-Leipzig, Federal Republic of Germany: Federal Republic of Germany. Volume 144, Issue 4, Pages 4-5. Descriptors: aerial photography; Asia; Burma; drainage basins; erosion; Far East; image analysis; land management; land use; remote sensing; satellite methods; soil erosion; soils; thematic mapper; water management. Notes: geol. sketch maps. Database: GeoRef In Process. ISSN: 0031-6229.

Heymann, Johannes and Loeffler, Ernst. 1997. "Mangrove Degradation in the Ayeyarwady Delta, Myanmar." *Petermanns Geographische Mitteilungen*. VEB Hermann Haack Geographisch-Kartographische Anstalt Gotha/Leipzig, Gotha-Leipzig, Federal Republic of Germany: Federal Republic of Germany. Volume 141, Issue 5-6, Pages 291-306. Descriptors: Asia; Burma; conservation; degradation; deltas; ecosystems; erosion; Far East; land use; littoral erosion; mangrove swamps; mires; remote sensing; satellite methods; shore features; swamps; vegetation; water erosion. References: 21; illus. incl. geol. sketch maps. Database: GeoRef In Process. ISSN: 0031-6229.

Hila-Gyaw, S., Sann-Myint, K., Chen, H. and Tu, M. 1971. "Bacteriological Findings in Lake, River and Well Water Supplies of Rangoon." *Union Burma J Life Sci*. Vol 4, no 1. P 95-103. 1971. Illus. Descriptors: *Alcaligenes-Faecalis*; *Baxillus-Sp*; Bacteriological Studies; Burma(Rangoon); *Citrobacter-Freundii*; *Clostridium-Perfringens*; *Enterobacter-Aerogenes*; *Escherichia-Coli*; *Klebsiella-Aerogenes*; *Proteus-Mirabilis*; *Proteus-Morganii*; *Proteus-Vulgaris*; *Providencia*; *Pseudomonas-Aeruginosa*; *Pseudomonas-Fluorescens*; *Streptococcus-Faecalis*; Water Supply. Abstract: water samples, both unchlorinated and chlorinated, from 20 natural water sources in rangoon towns comprising lakes, river and wells were examined during the period July 1966 to July 1968 for the presumptive coliform count, the presumptive enterococcus count and the presence of presumptive clostridium perfringens. Bacteria isolated from macconkey bile salt lactose peptone water and sodium azide medium primary cultures were

identified. Using as criteria the presumptive coliform count, the presumptive enterococcus count and the isolation of escherichia coli and/or klebsiella aerogenes and/or streptococcus faecalis, 18 out of 20 samples were found unsatisfactory for drinking purposes. The bacteria isolated were e. Coli, k. Aerogenes, citrobacter freundii, enterobacter aerogenes, alcaligenes faecalis, a bacillus sp., proteus mirabilis, p. Morganii, p. Vulgaris, a providencia strain, pseudomonas aeruginosa, p. Fluorescens and s. Faecalis. Database: Environmental Sciences and Pollution Mgmt.

"The Himalaya-Ganges Problem in the Context of Peace and Resource-use Conflict Management." 1984. Mountain Research & Development. Volume 4, Issue 4, Pages 363-365. Abstract: Conflict over resource use has been identified as between ethnic and religious groups for forest and agricultural land; for forest and mineral resources between urban commercial enterprises and hill peoples; different uses of water; pressures on land through migration; and nationalistic rivalries between Bangladesh, China, India, Pakistan, Afghanistan, Bhutan, Nepal, Burma, and the USSR. ISSN: 0276-4741.

Hirsch, Philip. Affiliation: U Sydney. 2006. "Water Governance Reform and Catchment Management in the Mekong Region." J. Environ. Dev. June. Volume 15, Issue 2, Pages 184-201. Descriptors: Economic Development: Agriculture; Natural Resources; Energy; Environment; Other Primary Products; Economic Development: Regional, Urban, and Rural Analyses; Socialist Systems and Transitional Economies: Urban, Rural, and Regional Economics; Socialist Systems and Transitional Economies: Natural Resources; Environment; Renewable Resources and Conservation: Water; Environmental Economics: Government Policy; Rivers; Water. Notes: Geographic: Cambodia China Laos Myanmar Thailand Vietnam Region: Asia. Abstract: This article investigates complexities and dynamics of water governance reforms at a number of levels in the Mekong Region. It looks comparatively at countries within the region and at the Mekong as a transboundary basin. The study takes catchment management processes as a focus for reform agendas related to water and relates water management in a river basin context to wider issues of governance reform. A central

argument is that the effectiveness of water governance cannot be assessed in terms of simple environmental, economic, or social outcomes, or even against a more comprehensive "triple bottom line." Governance agendas and definitions are too diverse, and stakeholder interests too complex, to come up with a straightforward "best practice" of catchment-oriented water governance toward which policy reform should aspire. Rather, catchment governance in the Mekong is an arena for negotiating more sustainable, equitable, and productive use and management of water at multiple scales. ISSN: 1070-4965.

Availability:

<http://www.sagepub.co.uk/journalsProdDesc.nav?prodId=Journal200786>.

Hong Kong, Fugro Scott Wilson Joint Venture, Hong Kong, China (CHN) and Hong Kong, Fugro Scott Wilson Joint Venture, Hong Kong, China (CHN). 2001. "Section 1; Detailed Study of Slope Distress at Queen's Hill, Burma Lines Camp, Fanling; Investigation of some Selected Landslides in 1998; Volume 5." China: The Government of the Hong Kong Special Administrative Region, Civil Engineering Department, Geotechnical Engineering Office, Hong Kong, China. GEO Report. Aug 2001. Volume: 112, Pages: 5-106. Descriptors: Asia; Burma Lines Camp; China; erosion; Fanling China; Far East; geologic hazards; Hong Kong; landslides; mass movements; Queen's Hill; slope stability; slopes; stability; water erosion. References: 6; illus. incl. 4 tables, sects. Database: GeoRef. GeoRef: 2003-050510.

Hori, Hiroshi. 2000. *The Mekong; Environment and Development*. Japan: United Nations University Press, Tokyo, Japan. Descriptors: Asia; Burma; Cambodia; dams; development; drainage basins; environmental analysis; Far East; hydrology; hydropower; international cooperation; Lancang Basin; land use; Laos; Mekong Delta; Mekong River basin; mineral resources; natural resources; rivers and streams; Thailand; tropical environment; Vietnam; water resources; water rights. Notes: Transl. from the Japanese, publ. by Koken Shoin, April 1997; individual chapters are not cited separately; illus. incl. 48 tables, geol. sketch maps. ISBN: 9280809865. Database: GeoRef.

Hsü, Kenneth J., Li, Jiliang, Chen, Haihong, Wang, Qingchen, Sun, Shu and Sengör, A. M. C. 1990. "Tectonics of South China: Key to Understanding West Pacific Geology." *Tectonophysics*. 11/1. Volume 183, Issue 1-4, Pages 9-39. Abstract: South China is not a post-Caledonian platform, but a composite of orogenic belts. This late Proterozoic/Mesozoic orogen is a collage of three continental fragments. The three blocks are Yangzi, Huanan, and Dongnanya, and they are separated by the Banxi-Nanpanjiang (formerly Xianggangzhe) and Gunanhai Suture zones. Yangzi was separated from Gondwanaland during Late Precambrian when an open ocean, called Banxi, was present between the two continents. Tectonic processes at an active margin during Sinian and Early Paleozoic time led to the genesis of an accretionary wedge complex, the Banxi Melange and the Huanan Flysch Nappes, on the northern margin of Huanan, which was then the northern margin of the Gondwana Continent. Reorganization of plates during the Devonian suspended subduction at the Huanan active margin. Huanan was uplifted and unconformably overlain by transgressive deposits of Devonian and/or Carboniferous age. A remnant ocean, the Nanpanjiang Sea, still existed between Yangzi and Huanan, and deep-water sedimentation continued both at the southern margin of Yangzi and at the northwestern margin of Huanan. The latter again became an active margin during Late Paleozoic, when Permian and Triassic flysch sediments were deposited in foredeeps ahead of advancing nappes. Huanan and Yangzi collided during the Triassic, and resulted in the deformation of the passive margin of the latter to form the Yangzi Deformed Belt. Huanan was separated from a more southerly continent, Dongnanya, in the Devonian by seafloor spreading which created a Late Paleozoic and early Mesozoic ocean (Gunanhai Ocean). A continuously deposited sequence, ranging in age from Devonian to Triassic, was laid down on the southern passive margin of Huanan. On the other side of the ocean, the Dongnanya Permian strata include glacial marine deposits of Gondwanaland affinity. Dongnanya became separated from Gondwanaland during the Late Permian, when it marched northward to be reunited with Huanan. The Huanan passive margin sequence was deformed by folding and overthrusting after the late Mesozoic collision of Huanan and Dongnanya. Scattered outcrops of the Suture melange resulting from



this collision occur at a few localities in coastal Fujian. Dongnanya, in our model, was the Mesozoic continent of Southeast Asia, peripheral to mainland Asia. This may or may not have been the eastern continuation of the microcontinent Sibumasu (Siam (Thailand)-Burma-Malaysia-Sumatra). The collision of Dongnanya and Asia gave rise not only to the Gunanhai Melange of coastal Fujian, but also to the ophiolite melanges, parts of which are present in Taiwan (Tailuko), the Philippines and western Malaysia. ISSN: 0040-1951.

Huke, Robert E. 1962. Temperature change with Elevation in Burma: A Study. Bloomington, IN: Indiana University Foundation Research Division. July 1962. Descriptors: Atmospheric temperature- Burma. Mountains- Burma. By Robert E. Huke; edited by Don C. Bennett. Notes: Includes bibliographical references. Publication: 143 pages: ill., maps; 23 cm. OCLC: 1933371.

Huke, Robert E. 1965. Rainfall in Burma. Corporate Author: Dartmouth College, Hanover, NH. Report Date: Jan 1965. Report Classification: Unclassified, Distribution Limitation(s): Approved For Public Release. Accession Number: AD0622073. Url: <http://handle.dtic.mil/100.2/AD622073>

Hundley, H. G. 1961. "The Forest Types of Burma." Tropical Ecology. International Society for Tropical Ecology, Allahabad, India. Volume 2, numbers 1 & 2, pages 48-76. ISSN: 0564-3295

Husaini, S. H. 1964. Report on Fellowship to Study Conditions in Inland Water Transport in Burma, the United Kingdom, the Federal Republic of Germany and the Netherlands, March to August, 1964. Geneve: Descriptors: Inland water transportation- Burma; Inland water transportation- Great Britain; Inland water transportation- Germany (West); Inland water transportation- Netherlands. Notes: iii, 84 l. 28 cm. Responsibility: by S.H. Husaini. LCCN: 75-270946. OCLC: 163597.

Hutchison, J. H. and Holroyd, P. A. 1996. "Preliminary Report on the Lower Vertebrate Fauna of the Late Middle Eocene Pondaung Sandstones; Fifty-Sixth Annual Meeting; Society of Vertebrate Paleontology; Abstracts of Papers." Journal of Vertebrate Paleontology.

University of Oklahoma, Norman, OK, United States: United States. 19 Sep. Volume 16, Issue 3, Pages 43. Descriptors: Agamidae; Anapsida; Archosauria; Asia; assemblages; biogeography; biostratigraphy; Burma; Cenozoic; Chelonia; Chindwin-Irrawaddy Basin; Chordata; Crocodilia; Diapsida; endemic taxa; Eocene; Far East; fluvial environment; fresh-water environment; Mammalia; middle Eocene; new taxa; Paleogene; Pondaung Sandstones; Reptilia; species diversity; Tertiary; Testudines; Tetrapoda; Vertebrata. Database: GeoRef. ISSN: 0272-4634.

"Hydropower Plays a Leading Role in Myanmar's Power Development Plans." 2005. Int. J. Hydro. Dams. Volume 12, Issue 2, Pages 119-123. Descriptors: Article Subject Terms: Dam Construction; Dams; Electric Power Production; Export; Hydroelectric Power; Priorities; Article Geographic Terms: Myanmar. Abstract: With eight major schemes under construction and 16 more planned, Myanmar is moving ahead with a major programme of hydropower development. The Ministry of Electric Power regards hydro development as a priority, both to meet domestic needs and for export to neighbouring countries. With only about 2 per cent of hydro resources currently developed, the Ministry's Department of Hydroelectric Power has much work ahead. This article gives an overview of plans and current activities, including a description of the 132 m-high Yeywa RCC dam and 790 MW hydro scheme now under construction near Mandalay. Database: Water Resources Abstracts. ISSN: 1352-2523.

India, Geological Survey, Strategic Branch. 1945. "Burma; Ramree, Cheduba, and the Baronga Islands." India, Geol. Surv., Strategic Branch, Tech. Note. Strategic Branch, Tech. Note. Volume 43, Pages 48. Descriptors: Asia; Burma; construction materials; Far East; geology; military geology; Ramree- Cheduba-Baronga islands; Ramree-Cheduba-Baronga islands; water supply. Notes: (processed), geol. sketch maps. Abstract: An account of the physical and geologic features, soils, water supply, and construction materials of military significance of an island group off the west coast of central Burma which includes Ramree, Cheduba, and the Baronga islands. Database: GeoRef.

India, Geological Survey, Strategic Branch. 1944. "Burma; the Rangoon Area." India, Geol. Surv., Strategic Branch, Tech.Note. Strategic Branch, Tech. Note. Volume 39, Pages 11. Descriptors: Asia; Burma; Far East; geology; military geology; Rangoon region; road materials; water supply. Notes: (processed), geol. sketch map. Abstract: Brief notes on Tertiary and younger formations, soils, physical features, water supply, and road materials of the Rangoon region, Burma. Database: GeoRef.

"Indochina Becoming Prime Target for Foreign Investment in E&D." 1992. Oil & Gas Journal. May 18. Volume 90, Pages 19-22+. Descriptors: Oil and gas leases/Indochina; Oil and gas leases/Thailand; Petroleum industry/Myanmar. Notes: Physical Description: Illustration; Map. Abstract: Indochina is emerging as a prime candidate for foreign investment in oil and gas exploration and development (E&D) and should retain that status for the rest of the decade as the trend toward privatization accelerates there. With the exception of Thailand and its market-oriented economy, the region's countries have been experiencing years of international isolation caused by war or civil unrest, and some are looking for foreign private investment in oil and gas for the first time in more than 10 years. According to A. D. Melzer, managing director at Premier Consolidated Oilfields, oil firms generally take a cautious but favorable stance toward E&D in Indochina. However, progress could be impeded by the confusing array of boundary claims among Southeast Asian countries and by the vast number of unexploded bombs and ordnance left by decades of war in the region. E&D efforts in Thailand, Myanmar, Cambodia, Laos, and Vietnam are discussed. ISSN: 0030-1388.

Infrastructure Opportunities In Southeast Asia. Held In San Francisco, California On June 18-20, 1996. 1996. Louis Berger and Associates, Incorporated. Pages: 308 p. Descriptors: Asia (Southeastern); Energy sector; Exports; Feasibility analysis; Feasibility studies; Financing; Financing plans; Infrastructure; Infrastructure economics; International trade; Planning; Programming (Planning); Project management; Project planning; Project profiles; Southeast Asia; Transportation; Transportation sector. Abstract: This briefing book was

prepared for the U.S. Trade and Development Agency (TDA) by Louis Berger International to be presented at TDA's conference in San Francisco, CA, June 18-20, 1996. The document presents profiles on a total of 61 infrastructure projects in the transportation and energy sectors in Southeast Asia. The potential for exports of goods and services deriving from these projects is estimated to be at least \$34.6 billion. Included in Section I is a regional overview and Section II presents country reports for Burma, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam. Section III addresses project financing issues while Section IV presents case studies of major TDA feasibility studies in the Southeast Asia region. Section V contains profiles of 22 transportation sector projects and, finally, Section VI contains profiles of 39 energy sector projects. Notes: This document was provided to NTIS by the U.S. Trade and Development Agency, Rosslyn, VA. OCLC: 00730655. URL: Transportation Research Board.

Inouye, J. 1987. "On Floating Rice and its Ecological Traits in Southeast Asia." *Southeast Asian Studies* (Kyoto). Volume 25, Issue 1, Pages 51-61. Descriptors: General Microbial Ecology; rice; ecotype Species Term: *Oryza sativa*. Notes: Geographic: Thailand Vietnam Cambodia Burma. Abstract: Floating rice (grown in low-lying areas of Thailand, Vietnam, Cambodia and Burma) is characterized by its ability to elongate at the internod in large phases during the rise in water level. -from English summary.

International Boundary Study. Series A. Limits in the Seas. Number 14, Straight Baselines: Burma. 1970. Corporate Author: Bureau of Intelligence and Research (State) Washington DC. Report Date: 14 Mar 1970. Abstract: The following declaration by the Chairman of the Revolutionary Council of the Union of Burma is published for general information: WHEREAS International Law has always recognised that the sovereignty of a State extends to a belt of sea adjacent to its coast, AND WHEREAS international practice is not uniform as regards the extent of this sea belt commonly known as the territorial sea of the State, and consequently it is necessary to make a declaration as to the extent of the territorial sea of the Union of Burma, the Chairman of the Revolutionary Council of the Union of Burma hereby declares-- That notwithstanding any rule of law or practice to the contrary which may have been observed in the past

relating to the Union of Burma or any part thereof, the territorial sea of the Union of Burma shall extend into the sea to a distance of twelve nautical miles measured from the appropriate base line. Except as provided for in paragraph 3, the low-water line along the coast, as marked on large-scale charts officially recognised by the Government of the Union of Burma, shall be the base line for measuring the breadth of the territorial sea of the Union of Burma. That where it is necessary by reason of the geographical conditions prevailing on the Union of Burma coasts, and for the purpose of safeguarding the vital economic interest of the inhabitants of the coastal regions, to establish the system of straight base lines drawn between fixed points on the mainland, on islands or rocks, the breadth of the territorial sea shall be measured from such base lines. The fixed points between which such straight base lines shall be drawn are indicated in detail in the schedule annexed to this declaration. Report Classification:

Unclassified. Distribution Limitation: approved for public release.

Accession Number: ADA090816. Url:

<http://handle.dtic.mil/100.2/ADA090816>

International Energy Agency. 1999. South East Asia Gas Study. Paris and Washington, D.C.: Organisation for Economic Co-operation and Development, International Energy Agency. Descriptors: Gas Utilities; Pipelines; Water Utilities- L950; Energy: Demand and Supply; Energy Supply; Energy; Gas. Abstract: Supplement to the IEA's Asia Gas Study (1996) reviews the situation and prospects of the gas sectors of the Philippines, Vietnam, and Myanmar. For each country, describes the economy, energy supply and demand, the current status and future plans for the gas sector, and the challenges ahead. No index. Notes: 76. ISBN: 92-64-17174-6. OCLC: 0531208.

Inthavanh, Chanpheng. 1996. The Mekong Basin Under Legal International Cooperation (Myanmar, Laos, Thailand, Vietnam). University of Calgary (Canada). Adviser: Alastair R. Lucas. May. Volume: 35, 01, Page(S): 230-114. Descriptors: Political Science, International Law And Relations; Environmental Sciences; Urban And Regional Planning. Abstract: This thesis studies legal aspects and institutional issues of cooperation in utilizing and conserving water of the international Mekong River flowing through six countries in South-East Asia: China, Myanmar, Laos, Thailand, and Viet Nam before emptying into the South China Sea. Needs for the use of waters of this

"giant sleeping river" constitute an important area for cooperation among these countries in particular the four lower Mekong States. The thesis examines, inter alia, three key international instruments: (1) the '1957 Statute of the Mekong Committee'; (2) the '1975 Joint Declaration of Principles for Utilization of the Waters of the Lower Mekong' operated under the sole body Mekong Committee's mandate at the time and; (3) the present '1995 Agreement on Co-operation for the Sustainable Development of the Mekong River Basin' undertaken by the Mekong River Commission. Finally the thesis will also discuss the effectiveness of the new agreement on large dam projects.

Degree: LL.M. ISBN: 0-612-12931-4.

"Investor Focus on Lancang-Mekong River Region, Yunnan Province, China." 1997. Hydro Power and Equipment. Volume 3, Pages 89-92. Descriptors: Water resources development - general; river basin development; water resources; hydropower development; transport system. Notes: Geographic: China- Yunnan Province- Lancang-Mekong River. Abstract: This international river originates in China and runs for almost 5000km through the south-east Asian countries of Myanmar, Laos, Thailand, Cambodia, and Viet Nam. It has a total basin area of 180 000km<sup>2</sup>. A number of regional financial institutes and foreign investors are showing interest in its development, particularly hydroelectric power development. International co-operation will be key to multipurpose development and utilisation of such rivers in future. This article briefly reviews the importance of this river in terms of ecology; social, historical and cultural heritage; economy; and natural resources. China's past development activities and plans for its sub-region of the river are outlined. These include a number of dams and associated hydroelectric power stations, and water transportation and dredging projects. River trade is outlined. ISSN: 1007-4740.

## J

Jaeger, J. -J, Thein, Tin and Benammi, M. 1999. "A New Primate from the Middle Eocene of Myanmar and the Asian Early Origin of Anthropoids." Science. October 15. Volume 286, Issue 5439, Pages 528-530. Descriptors: Paleontology/Myanmar; Fossil primates;

Paleontology/Eocene. Notes: Physical Description: Bibliography; Illustration. Abstract: A new genus and species of anthropoid primate, *Bahinia pondaungensis* gen. et sp. nov., is described from the Yashe Kyitchaung locality in the Late Middle Eocene Pondaung Formation (Myanmar). It is related to *Eosimias*, but it is represented by more complete remains, including upper dentition with associated lower jaw fragment. It is interpreted as a new representative of the family Eosimiidae, which corresponds to the sister group of the Amphipithecidae and of all other anthropoids. Eosimiidae are now recorded from three distinct Middle Eocene localities in Asia, giving support to the hypothesis of an Asian origin of anthropoids. ISSN: 0036-8075.

Jancloes, M. Affiliation: Division of Intensified Cooperation with Countries and Peoples in Greatest Need, World Health Organization, Geneva, Switzerland. [jancloesm@who.ch](mailto:jancloesm@who.ch). 1998. "The Poorest First: WHO's Activities to Help the People in Greatest Need." World Health Forum; World Health Forum. Volume 19, Issue 2, Pages 182-7. Descriptors: Poverty; Delivery of Health Care, Integrated- organization & administration; Developing Countries; Humans; World Health Organization- organization & administration; Guinea-bissau; Health; International Cooperation; Low Income Population; Primary Health Care; Social Development; Social Policy; Viet Nam; Who Africa; Africa South Of The Sahara; Americas; Angola; Arab Countries; Asia; Bangladesh; Bolivia; Burkina Faso; Central America; China; Delivery Of Health Care; Developed Countries; Eastern Asia; Eastern Europe; Economic Factors; Europe; French Speaking Africa; Guatemala; Health Services; International Agencies; Latin America; Middle Africa; Moldova; Myanmar; New Independent States; North America; Organizations; Policy; Portuguese Speaking Africa; Social Class; Socioeconomic Factors; Socioeconomic Status; South America; Southeastern Asia; Southern Asia; Un; Western Africa; Western Asia; Yemen. World Health Forum. Abstract: Through its Division of Intensified Cooperation with Countries and Peoples in Greatest Need, WHO is giving special attention to the relationship between poverty and ill-health. The work of the Division is outlined in the present article. Poverty is the main reason why babies are not vaccinated,

clean water and sanitation are not provided, curative drugs and other treatments are not available, and mothers die in childbirth. It is the main cause of low life expectancy, handicap, disability, and starvation, and a major factor in mental illness, stress, suicide, family disintegration, and substance abuse. Poverty is spreading, just as the gap between rich and poor is growing in both developed and developing countries. In 1989, the World Health Assembly asked the World Health Organization (WHO) to pay attention to the special needs of the most poor countries, a request which led to the development and launching of the Intensified Cooperation with Countries and Peoples in Greatest Need initiative. The goals of the initiative are to enable poor countries to develop public policies and implement strategies for improving the health status of their populations, to promote innovative intersectoral action, and to make the best possible use of international cooperation in health matters. The main task has been to develop and implement community-based strategies for primary care in approximately 30 countries. In-country actions are described for Angola, Bangladesh, Bolivia, Burkina Faso, China, Guatemala, Guinea-Bissau, Moldova, Myanmar, Vietnam, and Yemen. Lessons learned are presented and future requirements considered. ISSN: 0251-2432 (Print).

Jayaram, K. C. 1981. The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka: A Handbook. Calcutta: The Survey. pages: xxii, 475. Descriptors: Fishes, Fresh-water- India; Bibliography. Aquatic Biology And Ecology, Animals. Notes: 14 leaves of plates: ill. (some col.); 24 cm. OCLC: CAT83787315.

Jayawardena, A. W. and Mahanama S.P.P. Affiliation: Prof. A.W. Jayawardena, Dept. of Civil Engineering, The Univ. of Hong Kong Country: Hong Kong E-mail: [hrecjaw@hkucc.hku.hk](mailto:hrecjaw@hkucc.hku.hk). 2002. "Meso-Scale Hydrological Modeling: Application to Mekong and Chao Phraya Basins." J. Hydrol. Eng. Volume 7, Issue 1, Pages 12-26 Additional Info: United States. Descriptors: Runoff, streamflow and basins; hydrological modeling; river flow; river discharge; atmospheric forcing. Notes: References: Number: 32; Geographic: Asia- Mekong Basin Asia- Chao Phraya Basin. Abstract: In this paper, an attempt has been



made to predict river flow in meso-scale basins using the general circulation model generated atmospheric forcing by coupling a land surface model and a river routing model. Several versions of the variable infiltration capacity model were used as the land surface model, including one that incorporates a double parabolic curve to describe the infiltration capacity of the soil. In the runoff routing model, which uses a much finer grid, backward distribution of observed river discharges to upstream cells as well as flood plain inundation are introduced. The proposed models and the procedures are applied to two major river basins in the Southeast Asian Region- the Mekong and the Chao Phraya. The Mekong is an international river that runs through China, Myanmar, Lao, Thailand, Cambodia, and Vietnam, and the Chao Phraya River is contained within Thailand. Despite the limitations in the data availability, the results of daily river discharge predictions seem to be reasonable in the scale concerned. ISSN: 1084-0699.

Jayawardena, A. W. and Mahanama, S. P. P. 2002. "Meso-Scale Hydrological Modeling: Application to Mekong and Chao Phraya Basins." *J. Hydrol. Eng.* Jan-Feb. Volume 7, Issue 1, Pages 12-26. Descriptors: Article Subject Terms: Basins; Hydrologic models; Hydrology; Infiltration; Model Studies; River Flow; River discharges; River flow forecasting; Runoff; Watersheds; Article Geographic Terms: Cambodia, Mekong R. China, People's Rep., Lancang Jiang R. Laos, Menam Khong R. Myanmar, Mekong R. Southeast Asia, Mekong R. Thailand, Chao Phraya R. Thailand, Mekong R. Abstract: In this paper, an attempt has been made to predict river flow in meso-scale basins using the general circulation model generated atmospheric forcings by coupling a land surface model and a river routing model. Several versions of the variable infiltration capacity model were used as the land surface model, including one that incorporates a double parabolic curve to describe the infiltration capacity of the soil. In the runoff routing model, which uses a much finer grid, backward distribution of observed river discharges to upstream cells as well as flood plain inundation are introduced. The proposed models and the procedures are applied to two major river basins in the Southeast Asian Region - the Mekong and the Chao Phraya. The Mekong is an international river

that runs through China, Myanmar, Lao, Thailand, Cambodia, and Vietnam, and the Chao Phraya River is contained within Thailand. Despite the limitations in the data availability, the results of daily river discharge predictions seem to be reasonable in the scale concerned. Database: Water Resources Abstracts. ISSN: 1084-0699.

Johari, Zaiton B. 2000. The Role of the Tatmadaw in Modern Day Burma: An Analysis. Corporate Author: Naval Postgraduate School, Monterey, CA. Report Date: Mar 2000. Report Classification: Unclassified. Abstract: (U) The Tatmadaw (Burmese Army) has dominated Burma's politics since the Japanese and British occupation of Burma until today. Its role in Burma has received international attention, especially while other countries in Southeast Asia have seen the decline of military power, the most recent that being Indonesia. The Tatmadaw seems unshaken with all the recent development affecting the military institution in Southeast Asia. This study is significant in that it attempts to understand how the Tatmadaw can continue to play an important role in the politics of Burma despite popular opposition. From this study, much will be learned about how Burma's military managed to sustain its rule. It also tries to provide an answer as to why the Tatmadaw has become what it is today. Distribution Limitation(s): APPROVED FOR PUBLIC RELEASE. Accession Number: ADA378032. Url: <http://handle.dtic.mil/100.2/ADA378032>

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Kadushkin, Anatoly, Siddiqui, Zuhaib and Shipin, Oleg. 2004. "Groundwater Quality Assessment and Management in Selected Countries of East and South-East Asia." Water Resour. J. United Nations, Economic and Social Commission for Asia and the Pacific, New York, NY, International (III). Dec. Volume 216, Pages 83-108. Descriptors: aquifer vulnerability; aquifers; arsenic; Asia; Bangladesh; Burma; cadmium; Cambodia; carcinogens; China; chromium; copper; decision-making; drinking water; ecosystems; Far East; fluorine; fresh-water environment; geologic hazards; ground water; halogens; heavy metals; India; Indian Peninsula; international cooperation; Iran; Laos; lead; mercury; metals; Middle East; Nepal; nickel; numerical models; Pakistan; policy; pollutants; pollution; public health; risk assessment; soils; Southeast Asia; surface water; Thailand; toxicity; water management; water quality; water resources; water supply;

West Bengal India; zinc. References: 51; illus. incl. 5 tables, sketch map. Abstract: Supply of fresh and clean drinking water is a basic need for all human beings the Earth, yet it has been observed that millions of people worldwide are deprived of this service. An estimated 668 million people in Asia and the Pacific still lack access to safe drinking water, while an estimated 1,888 million lack adequate sanitation, representing 18 per cent and 52 per cent of the region's population, respectively. In the Millennium Declaration 2000, Governments across the world pledged to "reduce by half of the proportion of people without sustainable access to safe drinking water" by 2015. The Johannesburg Plan of Implementation (JPOI) of the World Summit on Sustainable Development in September 2002 called for the water supply goal to be extended to include sanitation. In simple numerical terms, over Asia as a whole this implies that improved water and sanitation services should be provided for an additional 40 million people each year, or more than 100,000 people each day for the next 15 years. This represents a highly significant challenge. Despite some notable achievements, the Asia and Pacific region, as well as some individual countries, have not, so far, done too well in making significant progress towards achieving water-related MDG and JPOI goals. The contamination of soil, groundwater and surface water by heavy metals/metalloids has become a major environmental and public health hazard and a major constraint to sustainable development in many countries of Asia and the Pacific. Many rivers, lakes and groundwater resources are becoming increasingly polluted. The main source of freshwater pollution can be attributed to discharge of untreated waste, dumping of industrial effluent, mineral mining, and run-off from agricultural fields. Industrial growth, urbanization and the increasing use of synthetic organic substances have serious and adverse impacts on freshwater bodies. It is a generally accepted fact that the developing countries of East and South-East Asia are facing problems of agriculture run-off into water sources, toxic chemical discharges from industries polluting drinking water, which leads to water-borne diseases and affects the human health. The levels of suspended solids in Asian rivers have risen by a factor of four over the last three decades. Millions of people worldwide are consuming water from groundwater sources that contain arsenic

above safe levels. Long-term exposure to such poisoned water can lead to serious health problems, collectively called arsenicosis, which include skin lesions, skin cancers, internal cancers affecting the bladder, kidney and lungs, and hypertension. The total exposed population in various parts of world is estimated at approximately 100 million, which makes it a disaster of global dimensions. The research on arsenic contamination of groundwater in the region during the last decade confirmed its existence in the groundwater resources of Bangladesh, Cambodia, China, the Islamic Republic of Iran, Lao PDR, Myanmar, Nepal, Pakistan, Thailand, Viet Nam and the West Bengal Province of India. Bangladesh, Nepal and the West Bengal Province of India are believed to be among the most affected areas in Asia. The severity and dimensions of the arsenic crisis in Asia, however, are only now becoming fully understood. Conservative estimates put the total number of people drinking arsenic-contaminated water from 60 to 75 million in the Asia region. Overall, arsenic contamination of the groundwater threatens at least 20 million people in the East and South-East Asia region. Arsenic contamination is a complex problem, involving both technological and policy challenges, and its solution requires clear thinking and a comprehensive strategic response. A number of critical technological, institutional and policy-related problems are still to be overcome. There exists an urgent necessity for much stronger regional cooperation of such international organisations as ESCAP, UNICEF, WHO etc., local NGOs, governments and other relevant stakeholders. It appears the current situation is such that only the urgent measures will prevent a crisis situation in the East and South-East Asia to occur on the scale of the current calamity in Bangladesh. The paper overviews status quo of the problem in the light of the past and future human risk dynamics in the East and South-East Asian region and puts forward recommendations for proper mitigation measures. Database: GeoRef. ISSN: 0377-8053.

Kajisa, T., Oo, A. T. and Fujiki, K. 2005. "Data Generation of Daily Rainfall Time Series for Myanmar's Water Resources Planning." *Int. Agric. Eng. J.* Volume 14, Issue 1, Pages 29-34. Descriptors: Article Subject Terms: Agricultural Engineering; Hydrologic Data; Planning; Precipitation; Rain; Rainfall; Structural Engineering; Water Resources;

Article Geographic Terms: Japan; Myanmar. Abstract: The time stochastic structure of daily precipitation in Japan and Myanmar were analyzed using data for 30 years from 1962 to 1991. In this analysis, the daily precipitation data generation method, which consisted of two components of the rain characteristics, the occurrence and rain intensity, was applied for Japan where there is no rainy season, making it possible to be used for Myanmar, which has a rainy season. It was expected that the data generation of daily precipitation for the dry season in Myanmar could be the same as Japan, because simulation of continuous dry days is more reasonable than the simulation of continuous rainy days for the dry season in Myanmar. On the other hand, simulation of continuous rainy days is more reasonable than the simulation of continuous dry days for the rainy season in Myanmar. In addition, the time independency of daily precipitation of the rainy season in Myanmar was found to be as large as that in Japan. Therefore, the effect of daily precipitation on the next day's precipitation was confirmed to be small in both places. Database: Environmental Sciences and Pollution Mgmt. ISSN: 0858-2114.

Karen Rivers Watch (Organization). 2004. Damming at Gunpoint: Burma Army Atrocities Pave the Way for Salween Dams in Karen State. Kawthoolei: Karen Rivers Watch. Pages: 78. Descriptors: Human rights- Burma- Karen State; Hydroelectric power plants- Burma- Salween River. Notes: iv; illustrations (chiefly color), color maps; 21 cm. Notes: "November 2004." Other Titles: Burma army atrocities pave the way for Salween dams in Karen State. OCLC: 57551837.

Karenni Development Research Group. 2006. Dammed by Burma's Generals: The Karenni Experience with Hydropower Development--from Lawpita to the Salween. Burma: Karenni Development Research Group (KDRG). Pages: 69. Descriptors: Water-power- Political aspects- Burma- Kayah State; Water-power- Social aspects- Burma- Kayah State; Water-power- Economic aspects- Burma- Kayah State. Notes: ill., col. maps; 25 cm. Notes: "A report by the Karenni Development Research Group"--Cover. Includes bibliographical references. OCLC: 133996207.

Karmanov, I. I. 1997. "A Characterization of Dark Tropical Vertisols." Eurasian Soil Sci. Scripta Technica, Silver Spring, MD, United States: United States. Jun. Volume 30, Issue 6, Pages 587-594. Descriptors: Asia; Burma; Calcareous soils; characterization; chemical properties; Far East; granulometry; homogeneity; leaching; physicochemical properties; sediment-water interface; size distribution; soil group; soils; Vertisols. References: 17; 3 tables. ISSN: 1064-2293.

Kawamoto, F., Win, T. T., Mizuno, S., et al. 2002. "Unusual Plasmodium Malariae-Like Parasites in Southeast Asia." J. Parasitol. American Society of Parasitologists: Apr. Volume 88, Issue 2, Pages 350-357. Descriptors: Malaria; Polymerase chain reaction; Variants; Plasmodium malariae; yanmar; Asia; new forms. Abstract: During malaria surveys in Myanmar, 2 peculiar forms of Plasmodium malariae-like parasites were found. The morphologies of their early trophozoite stages were distinct from that of the typical P. malariae, resembling instead that of Plasmodium vivax, var. minuta, reported by Emin, and Plasmodium tenue, reported by Stephens, both in 1914. Two polymerase chain reaction (PCR)-based diagnoses, which target the same regions in the small subunit ribosomal RNA (SSUrRNA) genes, indicated that these parasites were new variant forms of P. malariae and that they could be separated into 2 genetic types that correlated with the 2 morphological types. Sequence analysis of the SSUrRNA and the circumsporozoite protein genes revealed that they were distinct both from each other and from other known P. malariae isolates and that the P. tenue-like type was closer to a monkey quartan malaria parasite, Plasmodium brasilianum. These results illustrate that the microscopic appearance of human P. malariae parasites may be more varied than previously assumed and suggest the value of molecular tools in the evaluation of malaria morphological variants. Database: BioOne Abstracts and Indexes. ISSN: 0022-3395.

**Full Text (pdf) Availability:** [View Full Text \(pdf\)](#) **File:** /U2/a439426.pdf

Kelley, Sean W. 2005. An Analysis of the Use of Medical Applications Required for Complex Humanitarian Disasters and Emergencies via Hastily Formed Networks (HFN) in the Field. Naval Postgraduate School Monterey CA. Dept of Informational Sciences.  
Report Date: 01 Sep 2005. Abstract: This thesis analyzes the feasibility, efficacy and usability of medical operations working in concert with a Fly-Away-Kit (FLAK) and the forming of Hastily Formed Networks (HFNs) in support of Humanitarian Assistance and Disaster Relief (HA/DR) operations. The initial focus of this research is on the requirements, situation, area of operations, and mission differences between nongovernmental organizations and governmental organizations. The thesis researches and discusses the possibilities for implementing medical technology in the field and the conditions and scenarios in HA/DR that may affect its success. This process will also define the requirements for medical operations as well as facilitate a methodology for ensuring those requirements are met. This thesis investigates the suitability of currently available COTS hardware and software components for medical operations. In addition, it includes a comprehensive review of the value of electronic medical records and telemedicine technologies. Virtually all organizations responding to the December 26, 2004 Southeast Asia tsunami did not have the benefit of large scale medical information technology. For example, the ability to ascertain the real extent of injuries due to the tsunami was hampered by the lack of a central database. Initial media reports claimed a death toll of over 300,000 people, when in fact hindsight now provides a more accurate tally of just over 200,000 dead. This disparity resulted from an archaic system of tracking and accounting. Undoubtedly, humanitarian medical organizations will greatly benefit from the implementation of medical information technology capabilities. This thesis lays the groundwork for further research into medical technologies that can be deployed in the field with humanitarian medical teams in the near future. Distribution Statement: Approved for public release; distribution is unlimited. Accession Number: ADA439426. **Url:** <http://handle.dtic.mil/100.2/ADA439426>.

Kemmer, Teresa M., Bovill, Maria E., Kongsomboon, Wantanee, Hansch, Steven J. and et al. 2003. "Iron Deficiency is Unacceptably High in Refugee Children from Burma." Volume 133, Issue 12, Pages 4143-9. Descriptors: anemia; iron deficiency; refugee; micronutrient; zinc protoporphyrin. Notes: Community and international nutrition. Abstract: Iron-deficiency anemia (IDA) in refugees is reported to be among the major medical problems worldwide. Because food rations

are typically inadequate in iron, long-term reliance is a key predictor of anemia among displaced people. Comprehensive nutritional assessments of refugee children from Burma have not previously been completed. Refugee children aged 6-59 mo were studied to determine 1) the prevalences of anemia, iron deficiency (ID) and IDA and 2) the factors associated with anemia and ID. Cluster sampling in three camps and convenience sampling in two additional camps were used. Hemoglobin (Hb) levels were measured and  $\mu\text{mol}$  zinc protoporphyrin/mol hæme were determined in 975 children. Logistic regression analyses (95% CI) determined predictors of anemia and ID. The prevalences of IDA, anemia and ID in these refugee children were 64.9, 72.0 and 85.4%, respectively. Predictors of anemia included young age ( $P < 0.001$ ), food ration lasting  $<1$  mo ( $P = 0.001$ ), daily consumption of dietary iron inhibitors ( $P < 0.05$ ), weight-for-height Z-score of  $<-2$  ( $P < 0.05$ ), male gender ( $P < 0.05$ ) and uneducated father ( $P < 0.001$ ). Predictors of ID were young age ( $P < 0.001$ ) and recently reported illness ( $P < 0.05$ ). Laboratory tests confirmed that anemia and ID are major health problems among these refugee children and that ID is the leading cause of anemia. A comprehensive nutrition and public health-focused approach to combating anemia and ID is essential. Following the presentation of results to policy makers, the improvement of the micronutrient content of rations has been initiated. *J. Nutr.* 133: 4143-4149, 2003. ISSN: 0022-3166.

Kenney, R. A. 1956. "Physiology of Water and Electrolyte Regulation." *Burma Med. J.* Jul. Volume 4, Issue 3, Pages 33-5. Descriptors: Body Fluids. ISSN: 0007-6295 (Print).

Khaing M. Affiliation: M. Khaing, Design and Technology Branch, Department of Hydropower Implementation, Ministry of Electric, Power. 2006. "Development of Hydropower in Myanmar." *SHP News*. Volume 23, Issue Winter, Pages 21-24 Additional Info: China. Descriptors: Fuel and Energy: Energy; electricity supply; hydroelectric power; natural gas; power generation; power plant. Abstract: Water is the source of life and electricity is the symbol of modern civilization. The topography combined with heavy rainfall from the South-West monsoon endows the country with abundant hydropower resources. In



the last two-decades, country's power supply system mainly depends on a number of gas turbine and combined cycle power plants, which requires relatively shorter implementation time and lower investment cost. Presently, on-shore natural gas available for domestic utilization become insufficient and so power generation from gas turbine and combined cycle power plants gradually declined and become power shortage in the country. In order to overcome the present insufficient power supply situation and to meet the future power demand, the Ministry of Electric Power had developed many hydropower stations throughout the country. Since 1988, (28) Nos. of small and medium size hydropower stations were put into operation. At present, about 16 Nos. off medium to large-scale hydropower projects are in various stages of implementation and several more are under planning. This report describes the status of the projects under implementation and in planning. ISSN: 0256-3118.

Khan, M. U. and Munshi, M. H. 1983. "Clinical Illnesses and Causes of Death in a Burmese Refugee Camp in Bangladesh." *Int. J. Epidemiol.* Dec. Volume 12, Issue 4, Pages 460-4. Descriptors: Morbidity; Mortality; Refugees; Adolescent; Adult; Aged; Bangladesh; Child; Diarrhea- epidemiology; Diarrhea- microbiology; Diarrhea- mortality; Female; Humans; Infant; Male; Myanmar- ethnology. Abstract: In 1978 almost 200,000 Burmese refugees entered Bangladesh. Thirteen camps were set up for refugees. Data for the camp at Leda is presented here. There were four medical clinics; including a diarrhoea clinic operated by the International Centre for Diarrhoeal Disease Research, Bangladesh. The four clinics recorded a total of 174 201 visits by the refugees, of which 28% were for watery diarrhoea, 32% for dysentery and 40% for other illnesses. Of 2321 diarrhoea stools cultured, 29.2% yielded pathogens of which 22% were *Shigellae* alone. Coliform count of water was extremely high. The death rate (89/1000/year) was higher than the birth rate (28/1000/year). Most of the deaths were among infants (640), children (357) and old people (131). Main causes of death were clinical diarrhoea (11.8%), fever (23%) and poor nutrition (52%). Prompt arrangements for food, identifying the vulnerable groups, and proper sanitation perhaps could

have reduced the number of deaths considerably. ISSN: 0300-5771 (Print); 1464-3685 (Electronic).

Khan, P. K. and Chakraborty, P. P. 2005. "Two-Phase Opening of Andaman Sea: A New Seismotectonic Insight." *Earth Planet. Sci. Lett.* Jan. Volume 229, Issue 3-4, Pages 259-271. Descriptors: Burma; Indonesia; Pacific Ocean; Seas; Seismology; Tectonics; Slabs; Deformation; Seamounts; Correlation analysis; Seismic engineering; Seismic phenomena. Abstract: High-resolution reconstruction of Benioff zone depth-dip angle trajectory for Burma-Java subduction margin between 2 and 17N Lat. reveals two major episodes of plate geometry change expressed as abrupt deviation in subduction angle. Estimation of effective rate of subduction in different time slices (and then length of subducted slab) allowed drawing of isochrones in Ma interval through these trajectories for the time period 5-12 Ma. With these isochrones, the deformation events on the subducting Indian plate are constrained in time as of 4-5 and 11 Ma old. This well-constrained time connotation offered scope for the correlation of slab deformation events with the well-established two-phase opening history of the Andaman Sea. While the 11 Ma event recorded from southern part of the study area is correlated with early stretching and rifting phase, the 4-5 Ma event is interpreted as major forcing behind the spreading phase of the Andaman Sea. Systematic spatio-temporal evaluation of Indian plate obliquity on the Andaman Sea evolution shows its definite control on the early rifting phase, initiated towards south near northwest Sumatra. The much young spreading phase recorded towards north of 7 Lat. is possibly the result of late Miocene-Pliocene trench retreat and follow-up transcurrent movement (along Sagaing and Sumatran fault system) with NW-SE pull-apart extension. Nonconformity between plate shape and subduction margin geometry is interpreted as the causative force behind Mid-Miocene intraplate extension and tearing. Enhanced stretching in the overriding plate consequently caused active forearc subsidence, recorded all along this plate margin. Initial phase of the Andaman Sea opening presumably remains concealed in this early-middle Miocene forearc subsidence history. The late Miocene-Pliocene pull-apart opening and spreading was possibly initiated near the western part of the Mergui-Sumatra

region and propagated northward in subsequent period. A temporary halt in rifting at this pull-apart stage and northeastward veering of the Andaman Sea Ridge (ASR) are related with uplifting of oceanic crust in post-middle Miocene time in form of Alcock and Sewell seamounts, lying symmetrically north and south of this spreading ridge. Database: Earthquake Engineering Abstracts. ISSN: 0012-821X.

Khin Maung, U., Thein Thein, Myint, Butler, T., Myo, Khin, Nyunt Nyunt, Wai and Nyi Win, Hman. 1992. "Risk Factors for the Development of Persistent Diarrhoea and Malnutrition in Burmese Children." *Int. J. Epidemiol.* Volume 21, Issue 5, Pages 1021-1029. Descriptors: Water; persistent diarrhoea; malnutrition; hygiene; risk factors; diarrhoeal disease. Abstract: To identify socioeconomic and behavioural risk factors for development of persistent diarrhoea and malnutrition in children, a case-control study was carried out in Burma. Results indicated that persistent diarrhoea and malnutrition in Burma is caused by a complex of several interrelated socioeconomic factors, unsanitary behaviour pertaining to personal hygiene, the practice of demand breastfeeding and lack of certain weaning foods, and low education of mothers. ISSN: 0300-5771.

Khin, M. M. and Than, K. A. 1983. "Transovarial Transmission of Dengue 2 Virus by *Aedes Aegypti* in Nature." *Am. J. Trop. Med. Hyg.* *Am. J. Trop. Med. Hyg.* May. Volume 32, Issue 3, Pages 590-4 Descriptors: Aedes- microbiology; Animals; Dengue- transmission; Dengue Virus- growth & development; Female; Larva- microbiology; Male; Ovum- microbiology. Abstract: Dengue 2 virus was recovered from three of 123 pools of naturally infected *Aedes aegypti* larvae (6,200 insects) collected from water containers in Rangoon. The virus was also isolated from two of 76 pools (7,730 mosquitoes) of male *Ae. aegypti*, collected as larvae and reared in the laboratory to adults. Minimum field infection rates among these two groups of mosquitoes were 1:2,067 and 1:3,865, respectively. Insect pools were inoculated into *Toxorhynchites splendens* mosquitoes and dengue viral antigen was subsequently detected in headsquash preparations by direct fluorescent antibody technique. Identification of the dengue serotype was done by complement-fixation test. This is the first report of

dengue virus isolation from naturally infected mosquito larvae. These findings suggest that transovarial transmission of dengue virus occurs in nature. ISSN: 0002-9637 (Print); 1476-1645 (Electronic).

Khin-Maung-Naing, Cho-Nwe-Oo, Tin-Tin-Oo and Thane-Toe Affiliation: Nutrition Research Division, Department of Medical Research, Rangoon, Burma. 1989. "A Study on the Aetiology of Endemic Goitre in Lowland Burma." *Eur. J. Clin. Nutr. Oct.* Volume 43, Issue 10, Pages 693-8. Descriptors: Adolescent; Adult; Cross-Sectional Studies; Environment; Female; Goiter, Endemic- etiology; Humans; Iodine-deficiency; Iodine- urine; Male; Myanmar. Notes: Chemical Subst: Iodine [7553-56-2]. Abstract: The prevalence and aetiology of lowland endemic goitre was studied in Bawlle Village, Htan-ta-bin Township, Rangoon Division. The total goitre rate was found to be 40.9 per cent. Low urinary iodine excretion and high 24-h uptake of <sup>131</sup>I by the thyroids of the subjects indicated iodine deficiency which was further confirmed by direct chemical analysis of diet samples. The serum thiocyanate level of non-smokers from this area was found to be low, which indicates that dietary goitrogens do not appear to play a role in the aetiology of endemic goitre in this area. The iodine content of water was also very low and the iodine content of soil was also about 10 times lower than soil samples from urban Rangoon. Thus, the present study indicates that the aetiology of endemic goitre in lowland Burma is due to environmental iodine deficiency, the same aetiological factor as in hilly regions of Burma. ISSN: 0954-3007.

Khin-Maung-U, Myo-Khin, Nyunt-Nyunt-Wai, et al. 1990. "Effect of Short-Term Intermittent Antibiotic Treatment on Growth of Burmese (Myanmar) Village Children." *The Lancet.* 11/3. Volume 336, Issue 8723, Pages 1090-1093.

Khin-Maung-U, Nyunt-Nyunt-Wai, Myo-Khin, Mu-Mu-Khin, Tin-U and Thane-Toe. 1986. "Effect of Boiled-Rice Feeding in Childhood Cholera on Clinical Outcome." *Hum. Nutr. Clin. Nutr. Jul.* Volume 40, Issue 4, Pages 249-54. Descriptors: *Oryza sativa*; Body Weight; Child, Preschool; Cholera- complications; Cholera- therapy; Clinical Trials as Topic; Dehydration- etiology; Dehydration- therapy; Diarrhea- diet

therapy; Diarrhea- etiology; Female; Fluid Therapy; Humans; Male; Myanmar; Random Allocation; Water-Electrolyte Balance. Abstract: Forty-eight children, aged 2-5 years, presenting with watery diarrhoea of less than 48 h duration at home prior to hospitalization, were admitted into a randomized controlled clinical trial, 24 children being treated during the first 24 h of admission with oral rehydration solution (ORS) alone and 24 children being given 'ORS plus boiled-rice feeding'. The latter group received boiled-rice to supply at least 55 kcal/kg/d (about 150 g boiled-rice per feed, given four times daily). *Vibrio cholerae* were isolated by stool culture on admission from all children. No antibiotics were given. Clinical characteristics of children in the two treatment groups were comparable. Among children given 'ORS plus boiled rice', there was a significant increase in volume of diarrhoea stools ( $P$  less than 0.05), duration of diarrhoea in hospital ( $P$  less than 0.01), and more frequent diarrhoea motions (not significant statistically). However, the children fed boiled rice absorbed and retained 176 ml more fluid, and had gain in body weight comparable to that observed in children who were not fed during the first 24 h of hospitalization. ISSN: 0263-8290.

Khin-Maung-U, Tin-Aye, Myo-Khin, Nyunt-Nyunt-Wai and Thane-Toe. 1986. "Composition and Contamination of Oral Rehydration Solutions Prepared with Well Water by Village Mothers in Burma." Transactions of the Royal Society of Tropical Medicine and Hygiene. Volume 80, Issue 2, Pages 329-332. Abstract: A field study was carried out at Htaukkyant village in Burma to assess (i) whether village mothers could use condensed milk tins to measure one litre of water with reasonable accuracy for the preparation of oral rehydration solutions (ORS) and (ii) whether the extent of bacterial contamination of well water was serious and if this affected the bicarbonate content of the ORS solution. Empty condensed milk tins have a fairly uniform volume around 330 ml and using three condensed milk tins full of water mothers made up one litre quite consistently. Mothers also proved capable of preparing ORS solution by dissolving one packet of oral rehydration salt (ORS) in three condensed milk tins full of water to obtain solutions which contained acceptable and safe concentrations of sodium and potassium. Contamination of well water with faecal

coliforms was present. Both storing water in domestic vessels and boiling water reduced the coliform count. Storing could be a good way of reducing the risk of infection if repeated contamination from dipping in to the water could be avoided. The counts on coliforms and faecal coliforms in ORS both increased by about 1 log per day over the first and second 24 hours after the preparation with contaminated well water. Despite this the bicarbonate content of ORS remained stable. In the absence of boiled water, ORS solution can be made using the cleanest available water and using it within 24 hours. ISSN: 0035-9203.

Kite, G. Affiliation: G. Kite, Hydrologic-Solutions, Bryn Eithin, Cefn Bychan Rd., Pantymwyn, Flintshire, UK. E-mail: [geoffkite@hydrologic-solutions.com](mailto:geoffkite@hydrologic-solutions.com). 2001. "Modelling the Mekong: Hydrological Simulation for Environmental Impact Studies." *Journal of Hydrology*. 15 NOV. Volume 253, Issue 1-4, Pages 1-13 Descriptors: Runoff, streamflow and basins; environmental impact assessment; hydrological cycle; Internet; hydrological modeling. References: Number: 28; Geographic: China- Mekong River Laos- Mekong River Myanmar- Mekong River Thailand- Mekong River Cambodia- Mekong River Viet Nam- Mekong River. Abstract: The Mekong, with a basin area of almost 800,000 km<sup>2</sup> and a length of 4500 km, is one of the most important rivers of the world. The many lakes and wetlands along the river, including Cambodia's Tonle Sap (Grand Lac), are major sources of fish for the riparian peoples and form an important part of the regional economy. This resource may be affected by proposed developments in the basin. Using climatic, topographic and land cover data from the Internet, the semi-distributed land-use runoff process (SLURP) hydrological model was used to simulate the complete hydrological cycle of the Mekong and its tributaries, Information on dam locations and reservoir characteristics were obtained from local sources. The model was verified by comparing simulated flows with recorded daily flows for the Mekong River and by comparing simulated levels of the Tonle Sap lake with recorded daily levels. The daily computed levels of the Tonle Sap lake were then converted into flooded areas for each land cover around the lake which were then used in a fish production model to evaluate the possible impacts of basin development on the fisheries. Model outputs may also be used to investigate issues such as water

allocations and the effects of land use change or climate change on water resources and the aquatic and riparian environments. ISSN: 0022-1694.

Knott, David. 1997. "Exiting Myanmar." *Oil & Gas Journal*. December 15. Volume 95, Pages 25. Descriptors: American corporations- Myanmar; Petroleum industry-Political aspects; Atlantic Richfield Co. Abstract: In mid-November 1997, ARCO announced its intention to reduce its operations in Myanmar by selling an interest in gas-prone blocks in Gulf of Martaban- a withdrawal that appears to have been forced by protest groups in the U.S. that have been targeting companies with interests in Myanmar. The reactions of other petroleum companies that have been targeted by these protest groups are discussed. ISSN: 0030-1388.

Kojicic, Bozidar; Berggren, Gretchen Glode; Khin Maung U; UNICEF and International Nutrition Communication Service. 1979-1986. [Nutrition Policy and Children in Burma Materials]. Descriptors: Nutrition- Burma; Nutrition policy- Burma; Children- Burma- Nutrition; Diarrhea in children- Burma; Public health- Burma; Water-supply- Burma. Abstract: Guidelines for drilling water wells Bozidar Kojicic, UNICEF. 1979- Consultant report for Burma: policy recommendations for alleviating national maternal and infant nutrition problems Gretchen Glodé; INCS. 1980 (v.2)- Interactions in diarrhoea, intestinal absorption and child growth, nutrition by Khin Maung U. 1986. Notes: 3 pieces: ill. 28-36 cm. Notes: Includes bibliographical references. OCLC: 64057348.

Kollars, T. M., Jr and Sithiprasasna, R. 2000. "New Host and Distribution Record of *Amblyomma Javanense* (Acari: Ixodidae) in Thailand." *J. Med. Entomol. Entomological Society of America*. Jul. Volume 37, Issue 4, Pages 640. Descriptors: Geographical distribution; Host preferences; Thailand; Burma; xodidae; *Amblyomma javanense*; *Manis javanica*; *Sus scrofa*; Acari; Pig. Abstract: *Amblyomma javanense* (Supino) was collected from a Malayan pangolin (*Manis javanica* Desmarest) and a wild boar (*Sus scrofa* L.) from Tak province on the western boundary of Thailand along the Myanmar (Burma)

border. To date, this tick species has not been recorded from this area and from a wild boar. Database: BioOne Abstracts and Indexes. ISSN: 0022-2585.

Kraññ` Khan`, U". 1997. Nam`' Kinnari Jat` Lam`". Ran` kun`: Ca pe Biman'. Pages: 270. Descriptors: Hydroelectric power plants- Burma. Abstract: Reminiscences of the author about the project to set up the hydroelectric power plant in Burma. Notes: ill. 19 cm. Notes: "1996 khu nhac`, a myui` sa" chon` pud` mya" ca pe pruin` pvai, kyam`" ca mu, tatiya chu ra." Includes bibliographical references (p. 263). Responsibility: Kraññ` Khan`. LCCN: 98-903216. OCLC: 40550995.

Krishna, K. and Grimaldi, D. A. 2003. "The First Cretaceous Rhinotermitidae (Isoptera): A New Species, Genus, and Subfamily in Burmese Amber." Am. Mus. Novit. American Museum of Natural History: Feb. Volume 390, Issue 1, Pages 1-10. Descriptors: New species; New genera; Fossils; Amber; Rhinotermitidae; Burma; Isoptera. Abstract: A new subfamily, genus, and species, Archeorhinotermitinae, Archeorhinotermes rossi, from Burmese amber, dated as Turonian-Cenomanian (90-100 mya) of the Cretaceous period, are described and figured. Comparisons are made between the other subfamilies of the Rhinotermitidae and the new subfamily. This is the first fossil record of the family Rhinotermitidae from the Cretaceous. Database: BioOne Abstracts and Indexes. ISSN: 0003-0082.

Kumar, Arun and Sanoujam, Manichandra. 2007. "Landslide Studies Along the National Highway (NH 39) in Manipur; Hazards and Disaster Mitigation." Nat. Hazards. Kluwer Academic Publishers, Dordrecht, Netherlands. Mar. Volume 40, Issue 3, Pages 603-614. Descriptors: Asia; atmospheric precipitation; Burma; Churachandpur-Mao Thrust; creep; displacements; failures; Far East; faults; fluctuations; geologic hazards; ground water; India; Indian Peninsula; Indo-Myanmar subduction zone; kinematics; landslides; Manipur India; mass movements; National Highway 39; Northeastern India; pressure meters; rain; slip rates; slope stability; slopes; strike-slip faults;



subduction zones; transportation; water table. References: 22; illus. incl. 6 tables, sketch map. ISSN: 0921-030X.

Kumar, M. R., Rao, N. P. and Chalam, S. V. 1996. "A Seismotectonic Study of the Burma and Andaman Arc Regions using Centroid Moment Tensor Data." *Tectonophysics*. 10 Mar. Volume 253, Issue 1-2, Pages 155-165. Descriptors: Burma arc; Andaman arc; Tectonics; Seismology. Abstract: The concept of a "mean slip angle" is introduced. This enables a classification of focal mechanisms in any region into predominantly strike-slip, thrust and normal categories. Based on this concept, the Harvard Centroid Moment Tensor (CMT) data, in the Burma and Andaman arc regions for 1977 to 1992, comprising 167 focal mechanism solutions, are examined and categorized. Distinct trends on the surface and in depth sections emerge on examination of these categories. ISSN: 0040-1951.

Kumar, P. L., Fenton, B., Duncan, G. H., Jones, A. T., Sreenivasulu, P. and Reddy, D. V. R. 2001. "Assessment of Variation in *Aceria cajani* using Analysis of rDNA ITS Regions and Scanning Electron Microscopy: Implications for the Variability Observed in Host Plant Resistance to Pigeonpea Sterility Mosaic Disease." *Ann. Appl. Biol.* Aug. Volume 139, Issue 1, Pages 61-73. Descriptors: Article Subject Terms: Biotypes; Biotyping; DNA; Host plants; Nucleotide sequence; Pest resistance; Plant viruses; Restriction fragment length polymorphism; Spacer region; Vectors; rRNA; Article Taxonomic Terms: *Aceria cajani*; *Cajanus cajan*; Eriophyidae; Article Geographic Terms: Burma; India; Myanmar; Nepal; Pigeonpea; pigeonpea sterility mosaic disease. Notes: RX: 1 (on May 07, 2008). Abstract: *Aceria cajani* on pigeonpea (*Cajanus cajan*) is the vector of the agent of pigeonpea sterility mosaic disease (PSMD), a very damaging virus-like disease in the Indian subcontinent. PCR was used to amplify *A. cajani* nuclear ribosomal DNA (rDNA) internal transcribed spacers (ITS) and associated rDNA genes. They were assessed for variation in this genome region by nucleotide sequencing and RFLP. *A. cajani*-specific rDNA primers are described. Several *A. cajani* populations were collected from pigeonpea plants from various PSMD endemic locations in India, Nepal and Myanmar. No significant variation was identified in rDNA regions, or in

morphological features. These results suggest strongly that *A. cajani* on pigeonpea across the Indian subcontinent constitutes one species and that no other *Aceria* species and probably no *A. cajani* biotypes that differ in vectoring ability are involved in the transmission of the agent of PSMD. The implications of these findings for the variability observed in PSMD-resistant pigeonpea genotypes across various locations in India are discussed. ISSN: 0003-4746.

Kumar, S. 1981. "Geodynamics of Burma and Andaman-Nicobar Region, on the Basis of Tectonic Stresses and Regional Seismicity." *Tectonophysics*. 20 Oct. Volume 79, Issue 1/2, Pages 75-95.  
Descriptors: Seismicity; Andaman-Nicobar region; Burma; tectonics; Seismology. Abstract: The nature and distribution (in depth and latitude) of earthquakes and deformation in different regions of Burma and Andaman-Nicobar indicate rather unequal horizontal compression and relative movement of different segments. The east-west longitudinal distribution of earthquakes delineates well-defined zones of seismicity dipping 30-50 degrees from the Andaman trench to a depth of about 180 km under the Andaman Islands. Fault-plane solutions show that the strike-slip, normal, and thrust faults are associated with seismic and aseismic regions. The change in nature of volcanism from andesite (south) to basalt (north) in Burma suggested that the stress field changed from compressional to tensional. The mechanical coupling, by the deformation of two different segments, caused an extensive contortion of the sediments in the southern Assam massif. Database: Earthquake Engineering Abstracts. ISSN: 0040-1951.

Kundal, Pradeep and Wanjarwadkhar, K. M. 2003. "Dasycladacean Algae from Late Paleocene Limestone of Middle Andaman Island, Andaman, India; Implication to Paleoenvironments, Paleobathymetry and Stratigraphy; Recent Developments in Indian Micropaleontology." *Gondwana Geological Magazine*. Gondwana Geological Society, Nagpur, India. Aug. Volume Special volume 6, Pages 277-288.  
Descriptors: *Acroporella indica*; algae; Andaman Islands; Asia; Baratang Formation; Bengal Islands; biostratigraphy; Burma Dera Member; Cenozoic; Chlorophyceae; Chlorophyta; Cymopolia;

Dactylopora minuta; Dasycladaceae; depositional environment; floral studies; Furcuporella diplopora; India; Indian Peninsula; marine environment; microfossils; Middle Andaman Island; morphology; new taxa; paleobathymetry; Paleocene; paleoenvironment; Paleogene; Plantae; shallow-water environment; taxonomy; Tertiary; Trinocladus bellus; upper Paleocene. References: 52; illus. incl. strat. cols., 3 plates, geol. sketch map. Abstract: The Cenozoic Dasycladales include about 40 genera and 200 species and the rich Cenozoic assemblages have been found during Paleocene and Paleocene-Eocene in different parts of the world while from Indian Paleocene-Eocene sedimentary sequences only 15 Dasycladacean species are known. The greyish white algal limestone belonging to Burma Dera Member (Late Paleocene) of Baratang Formation is exposed at Burma Dera and Budha Nala localities of Middle Andaman Island, Andaman, India. Thin sections of this limestone show a rich assemblage of Dasycladacean algae comprising six species, namely Acroporella indica sp. nov., Cymopolia elongata (Defrance) Monier-Chalmas, C. mayaense Johnson and Kaska, Dactylopora minuta sp. nov., Furcuporella diplopora Pia and Trinocladus bellus Yu-Jing. The species have Tethyan affinities and indicate that the limestone of Burma Dera Member of Baratang Formation was deposited in shallow marine tropical water at a depth of about 10-12 m below low tide level. Database: GeoRef. ISSN: 0970-261X.

Kuo, Albert; Lewis, J. K. and Fang, C. S. 1976. Hydrography and Hydrodynamics of Virginia Estuaries: VII. Mathematical Model Studies of Water Quality of the Pagan Estuary. Gloucester Point, Va: VIMS. Pages: 78. Descriptors: Water quality- Burma- Pagan Estuary. Notes: ill. 28 cm. OCLC: 3716178.

Kyaw Myint. 1957. Freight Rates of the Inland Water Transport Board of Burma. Rangoon: Departments of Economics, Statistics & Commerce University of Rangoon. Pages: 38. Descriptors: Shipping-Rates- Burma; Burma (Union). Inland Water Transport Board. Notes: illustrations; 27 cm. Notes: Bibliography: p. 38. LCCN: 79-313259. OCLC: 5445421.

Kyaw, U. W., Zaw, U. M., Dredge, A., Fischer, P. and Steiger, K. 2007. "Myanmar's Yeywa RCC Dam." *Int. J. Hydro. Dams*. Volume 14, Issue 4, Pages 77-82. Descriptors: Article Subject Terms: Dam Construction; Dam Design; Dams; Hydroelectric Plants; Materials Testing; Pozzolans; Article Geographic Terms: Myanmar. Abstract: This article provides an overview of the development and design of Myanmar's largest dam and hydro project, Yeywa, with emphasis on the RCC dam. Details are included of the investigations for, and testing of, natural pozzolans located near the site, as well as and ongoing progress with construction. ISSN: 1352-2523.

Kyi, B. A. 1970. "Lower and Middle Irrawaddy Floods in Relation to Heavy Rainfall in the Head Water Regions of Chindwin and Irrawaddy Rivers." In: *Forecasting of Heavy Rains and Floods*, Proc Joint Seminar of Regional Associations 2 and 5 of World Meteorological Organization, Nov 11-23, 1968, Kuala Lumpur, Malaysia. Published by the World Meteorological Organization, Geneva. Volume P 221-242, Pages 4. Descriptors: Floods; Rainfall-Runoff Relationships; Flood Forecasting; Monsoons; Tropical Cyclones; Synoptic Analysis; Rainfall Intensity; Storms; Weather Forecasting; Climatology; Meteorology; Ecafe; Burma. Abstract: Studies of 15 floods in the middle and lower Irrawaddy River, Burma indicated that all widespread floods were associated with rainstorms in the monsoon trough of at least 3 days duration. Because the northern part of the country is a mountainous region it appears that the active monsoon trough effect was added by the orographic effect, thereby producing intense rainstorms favoring formation of floods in the middle and lower Irrawaddy catchments. For major floods the lag time between the end of significant rain in the head-water regions and the time of occurrence of peak at henzada was about 15 days. Forecasting of floods along middle and lower Irrawaddy by using known meteorological conditions in the head-water regions of Chindwin and upper Irrawaddy appears to have advantages over any of the existing methods because preliminary warning can be issued well in advance. Database: Water Resources Abstracts. OCLC: 66857337; 222391725.

**L**

Lahiri, S. and Chanthaphone, S. Affiliation: Water and Sanitation Program, Vientiane, Lao PDR. [Slahiri@worldbank.org](mailto:Slahiri@worldbank.org). 2003. "Water, Sanitation and Hygiene: A Situation Analysis Paper for Lao PDR." Int. J. Environ. Health Res. Int. J. Environ. Health Res. Jun. Volume 13 Suppl 1: S107-14. Descriptors: Hygiene; Sanitation; Water Supply; Community-Institutional Relations; Decision Making; Humans; Laos; Public Health; Rural Population. Abstract: The Lao People's Democratic Republic (Lao PDR) is located in the Greater Mekong sub-region in East Asia, neighboring with China, Cambodia, Myanmar, Thailand and Vietnam, with a land area of 236,800 square kilometers, and an average population density of 22 persons per square kilometer. The population of Lao PDR is 5.5 million with 49 ethnic groups. Most of the population is located in rural areas, with a significant number of the neediest villages in remote localities. In the past decade, there have been many positive developments in the rural water supply and sanitation (RWSS) sector. Despite improved coverage in latrine and water supply services, health remains a serious problem. The improved services were often not sustained or poorly maintained, while hygiene received inadequate attention. In Lao PDR, as in many other countries, the provision of a safe and reliable water supply and appropriate sanitation services, based on sustainable approaches, therefore, remains a challenge. This paper will provide an overview of the Lao PDR's RWSS Sector. Special emphasis is placed on actual field level application of informed choices for water supply, sanitation and hygiene awareness. ISSN: 0960-3123 (Print); 1369-1619 (Electronic).

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Lee, Kyung-Hee, Chai, Hee-Byung, Tamez, Pamela A., et al. 2003. "Biologically Active Alkylated Coumarins from Kayea Assamica." *Phytochemistry*. 9. Volume 64, Issue 2, Pages 535-541. Descriptors: Kayea assamica; Clusiaceae; Alkylated coumarins; Xanthones; Cytotoxicity; Antimalarial activity. Abstract: Four coumarin derivatives, theraphins A (1), B (2), C (3), and D (4), along with three known xanthones, 2-hydroxyxanthone, 1,7-dihydroxyxanthone, and 5-hydroxy-1-methoxyxanthone, were isolated from the bark of Kayea assamica (Clusiaceae) native to Myanmar. Their structures were determined using spectroscopic and chemical techniques. The absolute configuration of 1 was established by the modified Mosher ester method. Theraphins A (1), B (2), and C (3) exhibited good cytotoxicity against Col2, KB, and LNCaP human cancer cell lines. Theraphin D (4) showed mild activity only against the KB cell line. The coumarins also exhibited mild antimalarial activities.

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dates; Far East; Hermyingyi Burma; hydrothermal alteration; hydrothermal processes; igneous processes; interpretation; isotopes; Jurassic; magmas; Mesozoic; metal ores; metals; metasomatism; mineral assemblages; mineral deposits, genesis; mineral exploration; mineralization; Paleocene; Paleogene; Pilok Thailand; Rb/Sr; Sr-87/Sr-86; stable isotopes; strontium; Tertiary; Thailand; tin ores; tungsten ores. ISSN: 0743-9547.

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processes; Indian Peninsula; Indian Plate; Jammu and Kashmir; Kashmir; metasomatism; petrology; Qiangtang Plateau; Southwestern China; Tengchong; Tibet; volcanic belts; volcanism; volcanology; Yunnan China. References: 13; sketch maps. Database: GeoRef.

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Liu, Heng, Liu, Jiufu and Tang, Haixing. 1998. "Present and Future of Water Resources Development in Lancang River Basin in Yunnan Province." Shuikexue Jinzhan/Advances in Water Science. Volume 9, Issue 1, Pages 70-76. Abstract: Lancang River is an international river flowing from China to Vietnam via Myanmar, Laos, Thailand and Cambodia. The downstream river from the border of China, Laos and Myanmar to the river mouth is called Mekong River. Lancang is the largest international river in China and one of very important hydropower bases in southwest China. There are 8 cascade dams that are planned with one completed. The Lancang river basin abounds with natural resources and has great potential for further development, but the water resources development is lower in potential. The further development will focus on hydropower, navigation and irrigation. The development has some special characters, i.e. integrated, hydropower priority and international cooperation. Referring to the international



river and riparian countries' concerns, the water resources development in Lancang should follow principles of peaceful use, friendly negotiation and equally mutual benefits. ISSN: 1001-6791.

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3 (MAR. 1996), P. 19-20: Illustrations, Map. ISSN: 0744-5326. OCLC: 00872789.

## M

MacDonald, Rhona. 2007. "Human Rights Abuses Threaten Health in Burma." *Lancet*. Aug 4-Aug 10, 2007: Aug 4-Aug 10. Volume 370, Issue 9585, Pages 375-376. Descriptors: Humanitarian aid; Human immunodeficiency virus--HIV; Public health; Water supply; Population; Mortality; Medical supplies; Malaria; Living conditions; Health services; Geneva Conventions; Disease; Civilians; Armed forces; Tuberculosis. Notes: Details: Photographs. Geographic: Burma. Abstract: According to a recent report by researchers from the Human Rights Center of the University of California at Berkeley and Johns Hopkins Bloomberg School of Public Health, the Burmese military is destroying medical supplies intended for civilian populations and detaining and killing medical workers in areas of internal conflict. The report-which is based on data on infectious diseases gathered from health clinics and interviews with health professionals, governmental officials, and non-governmental and community-based organisations-also states that decades of neglect, civil war, and corruption have rendered the country's health system incapable of responding to these endemic infectious diseases and that even with substantial amounts of foreign aid Burma's capacity to curb these diseases is hindered by its military leaders. ISSN: 0140-6736.

Malik, Mohan. 2005. *Regional Reverberations from Regime Shake-Up in Rangoon*. Corporate Author: Asia-Pacific Center for Security Studies Honolulu, HI. Report Date: Jan 2005. Report Classification: Unclassified. Abstract: (U) The reverberations from the recent regime shake-up in Rangoon continue to be felt in regional capitals. Since Prime Minister Khin Myunt was the chief architect of closer China-Burma strategic ties, his sudden removal has been interpreted as a major setback for China's strategic goals in Burma. However, an objective assessment of China's strategic and economic needs and Burma's predicament shows that Beijing is unlikely to easily give up what it has already gained in and through Burma. From China's perspective, Burma should be satisfied to gain a powerful friend, a permanent member of the UN Security Council, and an economic

superpower that comes bearing gifts of much needed military hardware, economic aid, infrastructure projects and diplomatic support. The fact remains that ASEAN, India and Japan cannot compete with China either in providing military assistance, diplomatic support or in offering trade and investment benefits. With the UN-brokered talks on political reconciliation having reached a dead end, it might be worthwhile to start afresh with a dialogue framework of ASEAN+3 (ASEAN plus China, India and Japan) on Burma. This would also put to test China's oft-stated commitment to multi-lateralism and Beijing's penchant for "Asian solutions to Asian problems. Distribution Statement: Approved for public release; distribution is unlimited. DTIC Accession Number: ADA445161. Url: <http://handle.dtic.mil/100.2/ADA445161>

Manfrino, Annick. 1998. "Letpadaung, Myanmar; Mineralisation Controls and Indicator Variographic Analysis on a Large Porphyry Copper Deposit; Geoscience for the New Millennium; Abstracts." Abstracts - Geological Society of Australia. Geological Society of Australia, Sydney, N.S.W., Australia. Volume 49, Pages 287. Descriptors: andesites; Asia; breccia; Burma; Cenozoic; clastic rocks; copper ores; enrichment; Far East; fracture zones; framework silicates; geochemical controls; hydrothermal alteration; igneous rocks; intrusions; Letpadaung Deposit; metal ores; metasomatism; mineral deposits, genesis; models; oxidation; porphyry copper; quartz; sedimentary rocks; silica minerals; silicates; spatial distribution; statistical analysis; structural controls; sulfides; Tertiary; upper Tertiary; variance analysis; variograms; volcanic rocks. ISSN: 0729-011X.

Manimaran, G. and Ravindran A. Affiliation: G. Manimaran, School of Tectonics, Department of Geology, V.O. Chidambaram College, Tuticorin 628 008, India. E-mail: [acugemmani@yahoo.co.in](mailto:acugemmani@yahoo.co.in). 2007. "A Caution on Forthcoming Volcanogenic Tsunami in Indian Ocean." Res. J. Chem. Environ. Volume 11, Issue 1, Pages 19-22 Additional Info: India. Descriptors: Coastal protection; Earthquakes; Indian Ocean tsunami 2004; aftershock; earthquake event; island arc; landslide; marine sediment; nuclear explosion; submarine volcano; tsunami; volcanic eruption. References: Number: 11; Geographic: Andamans and Nicobars Andamans Asia Eurasia Greater Sunda Islands India

Indian Ocean islands Indian Ocean Indonesia Java Malay Archipelago Myanmar South Asia Southeast Asia Sunda Isles. Abstract: Tsunamies are generated due to sudden displacement of vertical sea water column during the events of earthquakes [Magnitude>7], eruptions of submarine and coastal volcanoes, sudden slumping of marine sediments, land slides near the coast, the large meteor impact on sea from space and manmade nuclear explosion in the sea. Recently on 26 December 2004, a destructive Tsunami of Indian Ocean was generated due to the second largest earthquake of the world ever recorded (Magnitude 9.3) which occurred at off the west coast of Northern Sumatra. Subsequently on 28 March 2005 a weak tsunamigenic but great earthquake of magnitude 8.7 occurred at western shelf region of Northern Sumatra. Northernly moving thousands of after-shocks of December 2004 earthquake up to Burma border and Southeasternly moving hundreds of after shocks of March 2005 earthquakes occurred upto Java are still going on and releasing tremendous energy along this seismic belt. The couplet of the great earthquakes and their aftershocks were triggered eruptions of inland volcanoes like Talang volcano of Central Sumatra and of Barren Volcano of Andaman. A chain of hundreds of active volcanoes are seen along the Andaman - Indonesian Volcanic Arc System. It is a right time to remember the tsunamigenic, violent explosion of Krakatau Volcano on 27 August 1883, which was triggered due to the Tsunamigenic Car Nicobar earthquake (Magnitude 7.9) occurring on 31 December 1881 and had its aftershocks upto August 1883. On considering the above scenario, it is possible for a consecutive great earthquake of December 2004 and March 2005 with their ongoing aftershocks to trigger and explode any one of the submarine volcanoes of the Andaman - Indonesian Arc System. As a result, a Volcanogenic Tsunami may be generated in Indian Ocean probably before the end of the year 2007 or in near future. ISSN: 0972-0626.

Margesson, Rhoda. 2005. Indian Ocean Earthquake and Tsunami: Humanitarian Assistance and Relief Operations. Corporate Author: Library of Congress Washington DC. Congressional Research Service. Report Date: 10 Feb 2005. Report Classification: Unclassified. Abstract: (U) On December 26, 2004, a magnitude 9.0 undersea earthquake off the west coast of northern Sumatra, Indonesia,

unleashed a tsunami that affected more than 12 countries throughout south and southeast Asia and stretched as far as the northeastern African coast. Current official estimates indicate that more than 160,000 people are dead and millions of others are affected, including those injured, missing, or displaced, making this the deadliest tsunami on record. News reports suggest that the death toll may be well above 200,000. Sections of Indonesia, Sri Lanka, India, and Thailand have suffered the worst devastation. Eighteen Americans are confirmed dead, with another sixteen presumed dead, and 153 remain unaccounted for. In response, the United Nations, the United States, and other donor nations have organized what some have called the world's largest relief and recovery operation to date. President Bush pledged \$350 million in aid and mobilized the U.S. military to provide logistical and other assistance. Funding the Indian Ocean tsunami relief and reconstruction effort is likely to be a challenge faced by the 109th Congress. Even before the disaster struck, Congress was expected to struggle to find the resources to sustain U.S. aid pledges amid efforts to tackle rising budget deficits by, among other measures, slowing or reducing discretionary spending. Congress also may wish to consider debt relief as a means of helping those nations hit by the tsunami to recover economically. Additionally, there have been calls to institute a tsunami detection and warning system in the Atlantic and/or Indian Oceans, both of which would require allocations of funds. Distribution Statement: Approved for public release; distribution is unlimited. DTIC Accession Number: ADA461370. Url: <http://handle.dtic.mil/100.2/ADA461370>

Marshall, T. R., Amos, B. J. and Stephenson, D. 1983. "Base Metal Concentrations in Kaolinised and Silicified Lavas of the Central Burma Volcanics; Residual Deposits; Surface Related Weathering Processes and Materials." Special Publication - Geological Society of London. Geological Society of London, UK. Volume 11, Pages 59-68.

Descriptors: Asia; base metals; Burma; central Burma; economic geology; exogene processes; Far East; hydrothermal alteration; igneous rocks; kaolinization; leaching; metal ores; metasomatism; mineral deposits, genesis; minor elements; potential deposits; processes; silicification; tropical environment; volcanic rocks; weathering. References: 1 p. illus. incl. 7 anal., 1 table, sketch map, sect., sketch map. ISSN: 0375-6440.

Maryland Univ Baltimore Dept of Microbiology and Wisseman, Jr, Charles L. 1978. "Clinical and Epidemiological Studies on Rickettsial Infections." 01 OCT. Descriptors: Infectious Diseases; Tickborne Diseases; Rickettsia; Rats; Rodents; Ethiopia; Burma; Epidemiology; Tables (Data); Medicine And Medical Research. Abstract: The observations reported confirm and extend the material previously reported. Thus, in Ethiopia and Burma, as in other areas we are studying, murine typhus is intimately associated with introduced commensal rodents (*Rattus*, *Mus musculus*, etc.) and shrews (*Suncus*) and their ectoparasites, indoors. In Ethiopia, native rodents, like *Praomys* and *Mastomys*, that may act like commensals do not seem to play a role in the ecology of this rickettsiosis in the absence of concurrent infestation with *Rattus*, even though they may be common in domiciles and parasitized by *Xenopsylla cheopis*, the presumed vector. If *Rattus* coexist indoors with *Praomys*, then the latter (and probably other native murines as well) may become secondarily infected on a limited scale. In Rangoon, 5 species of small mammals are peridomestic and all have been frequently found naturally infected with *Rickettsia mooseri*, the etiological agent. Among the naturally infected fleas found in this study are *X. bantorum*, *Leptopsylla segnis* and *Ctenocephalides felis*. Rat-lice in Ethiopia and Rangoon have also been found to harbor *R. mooseri*. Rats from shops in Kuching, Sarawak, were demonstrated to have a high rate of natural infection with this rickettsiosis. Infection with the spotted fever-group of rickettsiae was shown to be widespread in Ethiopian rodents, including some 'wild' rodents that entered domiciles. Notes: Distribution Statement: Approved for public release. Database: DTIC. DTIC: ADA061952. URL: <http://handle.dtic.mil/100.2/ADA061952>.

Mastny, Lisa. 2003. "Messing with the Mekong." *World Watch*. Nov./Dec. Volume 16, Issue 6, Pages 21-28. Descriptors: Regional economic development- Southeast Asia; Water resources development- Southeast Asia. Notes: Details: il map tab. Geographic: Mekong River valley. China- Foreign relations- Southeast Asia. Southeast Asia- Foreign relations- China. Abstract: A number of concerns have been raised about planned development by China on the Mekong River, Southeast Asia. China aims to open up northern

segments of the Mekong River to year-round navigation by large cargo ships. If fully implemented, dredging and subsequent channelization would more than double the annual shipping capacity of the Mekong. Laos, which, together with Burma and Thailand, has formally agreed to the plans, hopes the development will bring economic rewards. However, villagers fear that incoming Chinese vessels will flood local markets with inexpensive goods and undermine local shopkeepers and farmers. There are also concerns about the potential environmental effects of blasting and channeling the river. Resistance, although slow to emerge, is underway. ISSN: 0896-0615.

Matsubara, Takumi, Higuchi, Atsushi, Nakamura, Kenji and Akimoto, Fumie. 2005. "Characteristics of Precipitation Distribution Over the Irrawaddy and the Mekong Watersheds using Tropical Rainfall Measuring Mission (TRMM) Data." J. Japan Soc. Hydrol. Water Resour. Japan Society of Hydrology and Water Resources. Volume 18, Issue 2, Pages 116-131. Descriptors: Article Subject Terms: Climatology; Fronts; Global precipitation; Precipitation; Precipitation distribution; Radar; Rainfall Distribution; Rainfall amount; River Basins; Satellite data; Tropical Rainfall Measuring Mission (TRMM); Watersheds; Weather; Wind direction; Article Geographic Terms: Asia, Mekong R. basin; Myanmar, Irrawaddy R. Southeast Asia. Abstract: The Precipitation Radar (PR), boarded on Tropical Rainfall Measuring Mission (TRMM), has a higher horizontal resolution than global precipitation datasets such as Global Precipitation Climatology Project (GPCP) and makes it possible to observe rain distribution over the watershed scale. This study focused on the two river basins, the Irrawaddy river basin and the Mekong river basin on the southeast Asia region, and analyzed the rain distribution characteristics by four years and seasonal averaged TRMMPR data, around the divides of two watersheds. Results were summarized as follows. 1). The intersection angle of lower wind direction with the line of strike influenced on the amount of precipitation. The case of the lower wind to blow in upslope of mountain with a right angle was larger rain than the others. Averaged rainfall frequencies, rainfall amount and rain rate depended on the surface elevation in the all cases. 2). The tendency of precipitation increased far windward of the mountain slope and

represented the maximum in the front of the divide. In the mountainous areas, the peak of precipitation corresponded to the locations of valleys. 3). Relationship between IPDD (Index of Precipitation Distribution over the Divide), defined as the normalized ratio of the rainfall amount in windward and leeward, and divide elevation was appeared, but also confirmed with seasonality and regionality. However, it was suggested that some threshold elevation of the divide separate the nature of rainfall, such as barrier effect. 4). This study could not demonstrate universal relationship for the effect of divide over all analyzed area. However, it was proposed that IPDD could be applied as useful indicator for the estimation of the river basin rainfall amount from global precipitation datasets with coarse horizontal resolution. ISSN: 1349-2853.

Matsui S Affiliation: Graduate School of Global Environmental Studies, Kyoto University, Yoshida-honmachi, Sakyo-ku, Kyoto City, Japan. [matsui@eden.env.kyoto-u.ac.jp](mailto:matsui@eden.env.kyoto-u.ac.jp). 2005. "Protecting Human and Ecological Health Under Viral Threats in Asia." Water Sci. Technol. Volume 51, Issue 8, Pages 91-7. Descriptors: Disease Outbreaks; Public Health; Social Conditions; Agriculture; Animals; Animals, Domestic; Animals, Wild; Asia, Southeastern- epidemiology; Birds; Feces- virology; Housing; Humans; Influenza Vaccines; Influenza in Birds- epidemiology; Influenza in Birds- transmission; Influenza, Human- epidemiology; Influenza, Human- prevention & control; Influenza, Human- transmission; Mammals; Risk Factors; Severe Acute Respiratory Syndrome- epidemiology; Severe Acute Respiratory Syndrome- transmission; Waste Disposal, Fluid- methods; Zoonoses. Abstract: Severe acute respiratory syndrome (SARS) outbreak in 2003, and the avian influenza A (H5N1) also outbreak in 2003 and continued to 2004. These pandemic viral diseases originated in South East Asia. Many human and animal lives were lost. Economic damages due to the pandemics were also very large. The question arises of why did the pandemics originate from South East Asian areas. Human influenza A consists of many sub-types of coronaviruses including the SARS virus and the avian influenza (H5N1) that are all variants of RNA of avian coronavirus. Variants are formed during infection of a coronavirus through not only birds but also mammals, including



human beings. There are hot spots where viral infection rates are accelerated among birds, mammals and human beings. Suspicious areas are in South East Asia, where living conditions of birds, mammals and human beings are so close that there are always risks of viral infection. When we see the living conditions of farmers in southern China, northern Vietnam, Laos and northern Myanmar, they commonly raise ducks/chickens with pigs sharing ponds into which they discharge household wastewater, including human excreta, and pig excreta that are significant carriers of viruses. Bird faeces are also key carriers of the viruses. In the ponds, they raise ducks and conduct fish culture. Other important players are migrating birds from North Asia, which are principal vectors of avian influenza viruses. There is an urgent necessity of improving human and ecological health in South East Asia to control viral infection among birds, mammals and human beings. We can hinder the vicious cycle of virus infection through water contamination in ponds by providing good human, pig and chicken sanitation. It is easy to provide good sanitation practices for human, pigs and chickens, introducing collection and treatment of excreta. Our modern water technology can find good solutions for the problem. ISSN: 0273-1223 (Print).

May, W. 2004. "Simulation of the Variability and Extremes of Daily Rainfall during the Indian Summer Monsoon for Present and Future Times in a Global Time-Slice Experiment." *Clim. Dyn. Mar.* Volume 22, Issue 2-3, Pages 183-204. Article Subject Terms: Atmospheric convergences; Atmospheric precipitations; Climate; Climates; Climatology; Coasts; Convergence zones; Daily precipitation; Data reanalysis; Future climates; General circulation models; Global Precipitation Climatology Project (GPCP); Hydrologic Data; Monsoon rainfall variations; Monsoons; Oceans; Rainfall; Rainfall Intensity; Rainy season; Summer; Summer monsoon; Tropical meteorology; Variability; Article Geographic Terms: Bangladesh; China, People's Rep., Xizang; China, People's Rep., Xizang, Tibetan Plateau; Arabian Sea; Bangladesh, Bengal Bay; Indian Ocean, Bengal Bay; Myanmar; Pakistan; Tropical Indian Ocean; India; India, Himalaya Mts. Myanmar; Pakistan; Pakistan, Himalayas; Marine. Notes: TR: CS0408979. Abstract: In this study the simulation of the variability

and extremes of daily rainfall during the Indian summer monsoon for the present-day and the future climate is investigated. This is done on the basis of a global time-slice experiment (TSL) with the ECHAM4 atmospheric general circulation model (GCM) at a high horizontal resolution of T106. The first time-slice (period: 1970-1999) represents the present-day climate and the second (2060-2089) the future climate. Moreover, observational rainfall data from the Global Precipitation Climatology Project (GPCP, 1997-2002) and rainfall data from the ECMWF re-analysis (ERA, 1958-2001) are considered. ERA reveals serious deficiencies in its representation of the variability and extremes of daily rainfall during the Indian summer monsoon. These are mainly a severe overestimation of the frequency of wet days over the oceans and in the Himalayas, where also the rainfall intensity is overestimated. Further, ERA shows unrealistically heavy rainfall events over the tropical Indian Ocean. The ECHAM4 atmospheric GCM at a horizontal resolution of T106, on the other hand, simulates the variability and extremes of daily rainfall in good agreement with the observations. The only marked deficiencies are an underestimation of the rainfall intensity on the west coast of the Indian peninsula and in Bangladesh, an overestimation over the tropical Indian Ocean, due to an erroneous northwestward extension of the tropical convergence zone, and an overestimation of the frequency of wet days in Tibet. Further, heavy rainfall events are relatively strong in the centre of the Indian peninsula. For the future, TSL predicts large increases in the rainfall intensity over the tropical Indian Ocean as well as in northern Pakistan and northwest India, but decreases in southern Pakistan, in the centre of the Indian peninsula, and over the western part of the Bay of Bengal. The frequency of wet days is markedly increased over the tropical Indian Ocean and decreased over the northern part of the Arabian Sea and in Tibet. The intensity of heavy rainfall events is generally increased in the future, with large increases over the Arabian Sea and the tropical Indian Ocean, in northern Pakistan and northwest India as well as in northeast India, Bangladesh, and Myanmar. ISSN: 0930-7575.

McCrae, Alister; Prentice, Alan and Joint Author. 1978. Irrawaddy Flotilla. Paisley: James Paton Limited. Descriptors: Inland water

transportation- Burma- History; Irrawaddy Flotilla Company- History. Notes: 195 p., [12] p. of plates: ill., 2 maps; 23 cm. Notes: Includes index. Bibliography: p. 191. Responsibility: by Alister McCrae and Alan Prentice; with a foreword by Bernard Fergusson. ISBN: 0950606103; 9780950606101. OCLC: 5125832.

McShea, W. J., Wemmer, C., Monfort, S., Aung, M. and Poszig, D. 2001. "Forage, Habitat use, and Sexual Segregation by a Tropical Deer (Cervus Eldi Thamin) in a Dipterocarp Forest." J. Mammal. Volume 82, Issue 3, Pages 848-857. Descriptors: Foraging behavior; Habitat utilization; Aggregation behavior; Sex differences; Cervus eldi thamin; Myanmar; sexual segregation. Abstract: We monitored use of plants and habitat in a population of thamin (Cervis eldi thamin) in Chatthin Wildlife Sanctuary in central Myanmar from 1996 through 1999. Habitat use within the deciduous dipterocarp forest was monitored by radio tracking 19 individuals during daylight hours and conducting biannual fecal pellet surveys along 87 km of marked transects. Habitat abundance was determined by classifying a LANDSAT image of the region, collecting vegetation parameters at 201 plots located within the sanctuary, and pacing habitat types along marked transects. Thamin consumed primarily forbs, grasses, and agricultural crops but also fruits of 8 common tree species. Thamin used dipterocarp forest habitat but showed some seasonal shifts and distinct individual differences in habitat use. Except during of the mating season (January-April), females were found more often in degraded forests and closer to crops than males. Sex differences in habitat selection were due to either female selection of habitats with lower predation risk or increased nutritional needs associated with lactation. ISSN: 1545-1542.

"The Mekong: Dammed if You Don't." 1995. ECT. Economist Newspaper Group, Incorporated. Nov 18, 1995: Volume 337, Issue 7941, Pages 38. Descriptors: Asia & the Pacific; Short articles; Natural resources; Economic policy & planning; Water supply; Treaties; Problems; Dams; Rivers; International relations. Notes: Geographic: Southeast Asia Vietnam Thailand Myanmar Mekong River Laos China Cambodia. Abstract: Thailand, Vietnam, Laos and Cambodia intend to

share the resources of the Mekong River if China and Myanmar will cooperate. A special meeting of the new Mekong River Commission on Nov 20, 1995 may smooth relations. ISSN: 0013-0613.

Mekong Development Research Network. 1993-1999. Investigation and Study of the Current Status of the Mekong River and the River Basin Area in Myanmar. Bangkok, Thailand: Mekong Development Research Network. Descriptors: Water resources development- Mekong River Watershed; Water resources development- Burma; Irrigation- Mekong River Watershed; Irrigation- Burma. Notes: 23, [9] leaves: maps; 29 cm. Notes: "Draft copy for workshop review." "Part of a 6-country study of the Mekong River Basin, supported by the International Research Development Center of Canada." Includes bibliographical references. OCLC: 43075178.

Mekong River Commission. Mekong River Commission for Sustainable Development. Phnom Penh: Mekong River Commission. Descriptors: Environmental management; Sustainable development; Water quality management; Cambodia; Laos; Vietnam; Thailand; China; Burma; Mekong River Watershed; Development; Environment. Abstract: Web site of the UN-sponsored Mekong River Commission which promotes sustainable management and development of water and related resources among member countries. Provides background information about the organization and activities. The information resources page includes "Catch and culture" newsletter with back issues and publications. Extensive collection of information about the region includes maps and links to related Web sites. Notes: Named Corp: Mekong River Commission. Genre/Form: Article/Paper/Report. Map. World Wide Web: <http://www.mrcmekong.org/>. Notes: Description based on contents viewed Sept. 18, 2002; title from home page. OCLC: 50628429.

Milton, D. A. and Chenery S.R. Affiliation: D.A. Milton, CSIRO Division of Marine Research, PO Box 129, Cleveland, QLD 4163, Australia E-mail: [david.milton@marine.csiro.au](mailto:david.milton@marine.csiro.au). 2001. "Can Otolith Chemistry Detect the Population Structure of the Shad Hilsa *Tenualosa ilisha*? Comparison with the Results of Genetic and Morphological Studies."

Mar. Ecol. Prog. Ser. 05 NOV. Volume 222, Pages 239-251.

Descriptors: Fisheries and aquatic resources; Case studies; stock assessment; genetic structure; otolith; chemical composition; morphology; fishery management Species Term: *Tenualosa ilisha*; Hilsa; Ilisha; *Tenualosa*. Notes: References: Number: 49; Geographic: Bay of Bengal. Abstract: The stock structure of the valuable tropical shad *Tenualosa ilisha* ('hilsa') has been studied in Bangladesh and India by analysing morphometric and genetic data. However, these studies had a narrow geographic scope and their results conflict. We made a comprehensive study of the stock structure of hilsa with otolith microchemistry in conjunction with complementary genetic and morphometric studies of the same fish. We examined the trace-element composition of the otolith cores of hilsa with laser-ablation inductively coupled plasma mass spectrometry. The otoliths of fish from 19 collections at 13 sites in Bangladesh and 6 collections at 4 sites from elsewhere within the species' range (Kuwait, SE India, Myanmar and Sumatra) were analysed for 8 trace elements. Samples were collected from Bangladesh mainly during 2 comprehensive surveys (1996 and 1997). When these data were analysed separately, there were significant differences in otolith composition among sites. However, when both years' data were analysed together, there were few significant differences among sites, and some sites separated by hundreds of kilometres that were sampled in different seasons and years had very similar compositions. This was in spite of both large seasonal intra-site and between-site differences in water chemistry. Repeat samples from 5 sites (4 in Bangladesh) showed that differences in otolith composition at a single site were significant and of similar magnitude to that found among sites. Our results support the conclusion from allozyme studies that there is extensive movement and mixing of hilsa throughout Bangladesh, and therefore the population should be managed as a single stock. Genetic and otolith data both showed that hilsa from SE India and Myanmar were not significantly different from fish collected in coastal areas of Bangladesh, and suggest that hilsa in the Bay of Bengal were a single stock. Both methods also separated fish from Sumatra and Kuwait from other sites, providing strong evidence of separate stocks in those regions. In contrast, morphometric studies separate fish from several

nearby sites in Bangladesh, but these differences are likely to be largely due to phenotypic variability and are unlikely to be genetically based. Our results suggest that otolith microchemistry may be a good proxy for genetic structure at large scales where differences in water chemistry are highly likely. However, for sedentary species and those without distinct spawning and non-breeding areas, it requires both comprehensive and repeated sampling at finer scales before any confidence should be placed in the results. ISSN: 0171-8630.

Mirumachi, N. and Nakayama M. Affiliation: N. Mirumachi, Department of International Studies, Graduate School of Frontier Sciences, University of Tokyo, Japan. 2007. "Improving Methodologies for Transboundary Impact Assessment in Transboundary Watercourses: Navigation Channel Improvement Project of the Lancang-Mekong River from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Laos." *Int. J. Water Resour. Dev.* Volume 23, Issue 3, Pages 411-425  
Additional Info: United Kingdom. Descriptors: Concepts and issues in environmental planning; Environmental Assessment and Monitoring; economic impact; environmental impact assessment; environmental monitoring; underpinning. References: Number: 13; Geographic: Asia Eurasia Laos Mekong River Southeast Asia. Abstract: This paper analyzes the factors underpinning transboundary Environmental Impact Assessment (EIA) methodologies through an examination of the Navigation Channel Improvement Project of the Lancang-Mekong River from China-Myanmar Boundary Marker 243 to Ban Houei Sai of Laos. A comparison of the project's expected and reported trans-boundary impacts shows that the EIA failed to predict a number of adverse impacts, including social and economic impacts. The restricted scale and scope of the transboundary impact assessment (TIA) is probably due to certain fundamental restrictions on how the EIA was conducted. The case study highlights the importance of public involvement (including advance notification) and adequate regulatory frameworks or guidelines in the EIA and TIA processes. ISSN: 0790-0627; Electronic: 1360-0648.

Mitchell, A. H. G. 1986. "Ophiolite and Associated Rocks in Four Settings: Relationships to Subduction and Collision." *Memoir of the*

Geological Society of China (Taiwan). Volume 7, Pages 91-105.  
Descriptors: Mineralogy. Special Feature: 1 map. Abstract: In Burma, Oman and Cyprus detachment of ophiolite from oceanic lithosphere prior to emplacement onto a continent can best be explained by initiation of subduction at a spreading axis. Subduction of the spreading system may have resulted in basic dykes in the detached ophiolite slab, deposition of stratiform massive sulphides, and indirectly in amphibolite facies metamorphism of basalt subducted beneath the young hot ophiolite wedge. Continued subduction of colder remnant ocean-basin lithosphere resulted in volcanism above the ophiolite, and eventually in closure of the remnant basin. Accretion of imbricate nappes of flysch and pelagic sediments beneath the ophiolite preceded and accompanied collision of a continental fragment (Burma) or continental margin (Oman, and possibly Cyprus) with the arc system. In Cyprus and Burma ophiolite emplacement onto the continental margin was probably accompanied by serpentinization of harzburgite with water expelled from underthrust sediments. Serpentinized harzburgite rose as sheets into the overlying sediments. Olistostromes were deposited above or adjacent to the ophiolite after their emplacement into a continental margin. The Lichi melange in Taiwan can speculatively be explained by mobilization, diapiric rise, extrusion of eastward flow of sediments including bentonite clays, tectonically buried by collision-related east-directed back-thrusting. ISSN: 0578-1825.

Mittermayr, Florian. 2006. "Loeslichkeitsexperimente, Kristallisationsversuche Und Analytische Untersuchungen an Korund." Mitteilungen Der Oesterreichischen Mineralogischen Gesellschaft (Print). Oesterreichische Mineralogische Gesellschaft, Vienna, Austria. Volume 152, Pages 68-69. Descriptors: Asia; Burma; color centers; corundum; electron probe; experimental studies; Far East; fluid inclusions; hydrothermal conditions; inclusions; natural materials; oxides; recrystallization; solubility; spectroscopy; synthetic materials; theses. ISSN: 1609-0144.

Moe, Kyaw, Hummelman, Erik G., Oo, Win Mar, Lwin, Thandar and Htwe, Tin Tin. 2005. "Hospital-Based Surveillance for Rotavirus

Diarrhea in Children in Yangon, Myanmar." *The Journal of Infectious Diseases*. Sep 1, 2005. Volume 192, Pages S111-3 (3 pp.). Notes: Rotavirus in Asia: 3rd Workshop of the Asian Rotavirus Surveillance Network, Manila, The Philippines, October 2003. Abstract: Diarrhea is a common childhood illness in Myanmar, and rotavirus is the single most important etiological agent of diarrhea. Surveillance for rotavirus diarrhea in children <5 years of age was conducted in a tertiary pediatric hospital in Yangon, Myanmar, from January 2002 through December 2003. Stool specimens obtained from children admitted to the hospital for acute diarrhea were tested for the presence of rotavirus by use of an enzyme-linked immunosorbent assay. Diarrhea was the cause of 5671 (18%) of all hospitalizations of children <5 years of age during the 2-year study period (n = 30,869). Rotavirus was identified in 923 (53%) of the 1736 stool specimens tested, and rotavirus infection was associated with approximately 10% of all hospitalizations of children. Rotavirus diarrhea most frequently occurred in children 6-17 months of age, and it was more commonly identified in boys (62% of children with rotavirus diarrhea were boys). The seasonal pattern of rotavirus disease mimicked that of diarrheal illness due to all causes, with the peak season for rotavirus disease occurring from November through February (i.e., during the cool, dry season). During the study period, 53 of the children who were hospitalized for diarrhea died. The present study confirms the importance of the etiological role that rotavirus plays in childhood diarrhea. ISSN: 0022-1899.

Mogg, Richard. 1997. "China's Challenge." *Int. Water Power Dam Constr.* Volume 49, Issue 11, Pages 36-38. Descriptors: Dams and embankments; hydroelectric power plant. Geographic: China- Mekong River. Abstract: Reports on challenges and controversy surrounding China's plans to build an extensive cascade of hydroelectric power stations on the Lancang Jiang (Upper Mekong) River. The 1500 MW Manwan run-of-river project was completed in 1994, and the 1350MW Dachaoshan project is currently under construction. Two further schemes totalling 5700MW are planned by 2020 and a further four projects totalling 7000 MW will follow. The effects of the cascade on the 5 downstream countries (Myanmar, Laos, Thailand, Cambodia and



Vietnam) are discussed based on a 1996 document entitled Doenstream implications of China's dams on the Lancang Jiang (Upper Mekong) and their potential significance for greater regional co-operation basin-wide. The various agencies involved in the scheme, associated studies, and China's role in co-ordinating the various political and technical aspects of the project are discussed. ISSN: 0306-400X.

Molnar, A. 1990. "Land Tenure Issues in Watershed Development." IN: Watershed Development in Asia: Strategies and Technologies. World Bank Technical Paper no.127. World Bank, Washington, DC. 1990. Pages 131-158.2. Tab, 76 Ref. append. Descriptors: Asia; Economic aspects; Land tenure; Land use; Public rights; Soil conservation; Water conservation; Watershed management; Watersheds; Arable soils; Burma; China; Federal jurisdiction; Financial feasibility; Government finance; Human population; India; Indonesia; Java; Malaysia; Philippines; Population density; Subsidies; Taiwan; Thailand. Abstract: Watershed development projects aim at improving the overall productivity, sustainability and equity of land use in fragile, arable and nonarable lands. Land tenure can be an important factor in achieving these goals. Systems of land tenure in the Asian uplands are often adapted to certain ecological/economic conditions, cultural/historical traditions, and population densities, and may be (1) watersheds with relatively stable land tenure systems, such as the island of Java or Taiwan; (2) watersheds with relatively ancient, state-recognized land tenure systems, such as Burma, China, India and Nepal; or (3) watersheds in frontier areas, such as the Philippines, north Thailand, Malaysia, or the Outer Islands of Indonesia. Certain kinds of tenure changes can have a positive impact on adoption, and in some cases, titling or land consolidation on private land in areas with socially recognized tenure rights is effective. Some positive measures that can be included in projects to support land tenure changes or to broaden the range of adoption within existing tenure systems include: providing increased extension support, providing sources of credit, focusing on technologies with quicker and higher returns, strengthening local institutions, and providing mediation or legal aid to participants. The World Bank needs to continue to study the

relationship between land tenure and the adoption of soil and water conservation technologies, so that clearer directives can be given to task managers as to what strategies are most productive, sustainable, and equitable in different Asian settings. OCLC: 21902908; 150444674.

Mooley D.A. Editor: Ikeda, S. 1980. "Suitable Probability Model for Severe Cyclonic Storms Striking the Coast Around the Bay of Bengal." Elsevier Scientific. Pages: 349-357. Descriptors: Hydrology; Meteorology and Climatology; cyclonic storms; Arakan Coast; Burma; Bangladesh; India; Sri Lanka; Swed and Eisenhart's runs test; Mann Kendall Rank Statistic test; interval; random. Abstract: All the 141 severe cyclonic storms which struck the Arakan Coast of Burma and the coasts of Bangla Desh, E. India and Sri Lanka during the period 1877-1977 have been considered in this study. Swed and Eisenhart's runs test for runs above and below the median to detect trend or oscillation and Mann-Kendall Rank Statistic test for randomness were applied to the time interval between successive severe cyclonic storms which struck the coast. The results of these tests suggest that this interval can be generally taken to be random. Special Features: 2 figures, 5 tables, 11 refs. OCLC: 0031682.

Moore, E. and Win S. Affiliation: E. Moore, Department of Art and Archaeology, SOAS, University of London, UK. 2007. "The Gold Coast: Suvannabhumi? Lower Myanmar Walled Sites of the First Millennium A.D." Asian Perspectives. Volume 46, Issue 1, Pages 202-232 Additional Info: United States. Descriptors: The Holocene; Iron Age; archaeological evidence; architectural design; artifact; historical perspective; settlement history; water management. References: Number: 68; Geographic: Asia Eurasia Myanmar Southeast Asia. Abstract: The high rainfall of the Lower Myanmar coast is balanced by the aridity of the country's inland plains. The article profiles three sites in a laterite-rich area located in the northern part of the Lower Myanmar peninsula. The walls and moats of these sites underline their role in water management, one where control of water was the decisive catalyst. The sites of Kyaikkatha, Kelasa, and Winka illustrate how slight changes in topography signal critical junctures, the points where walls and moats were constructed. As a result, up to seven

walls flank the higher edges of these sites; these protected the interior by diverting excess water to lower areas. Using large finger-marked bricks and terra-cotta artifacts such as votive tablets, plaques, and architectural elements, a broad chronology of c. the sixth to ninth centuries a.d. is proposed, although a majority of the pieces dated to the seventh century a.d. Attention is also drawn to evidence of Lower Myanmar prehistoric habitation in lowland areas close to the coast, where natural and man-made changes continue to alter the ecology and affect archaeological interpretation. The survey is used to encourage comparative studies, drawing in environmentally diverse but culturally related areas of South and Southeast Asia. ISSN: 0066-8435.

Moravec, F., Taraschewski, H., Anantaphruti, M. T., Maipanich, W. and Laoprasert T Affiliation: Institute of Parasitology, Biological Centre, Academy of Sciences of the Czech Republic, Branisovská 31, České Budejovice, Czech Republic. [moravec@paru.cas.cz](mailto:moravec@paru.cas.cz). 2007. "Heliconema Longissimum (Ortlepp, 1923) (Nematoda: Physalopteridae) from Pisodonophis Boro (Teleostei: Ophichthidae) in Thailand, with Remarks on the Taxonomy of the Proleptinae Schulz, 1927." Syst. Parasitol. Jan. Volume 66, Issue 1, Pages 73-80. Descriptors: Animals; Eels-parasitology; Microscopy, Electron, Scanning; Spirurida- anatomy & histology; Spirurida- classification; Spirurida- isolation & purification; Spirurida- ultrastructure; Stomach- parasitology; Thailand. Abstract: Physalopterid nematodes identified as *Heliconema longissimum* (Ortlepp, 1923) were collected from the stomach of rice-paddy eels *Pisodonophis boro* (Hamilton) (Anguilliformes: Ophichthidae) from two brackish-water localities (mangroves) in Thailand: one in Phan-Nga Province, southwestern Thailand, northeast of Phuket Island, and one in Ranong Province, near the border with Myanmar. Study of the morphology of this hitherto insufficiently known nematode species, including its first SEM examination, enabled a detailed redescription of *H. longissimum*. Present taxonomic problems in the subfamily Proleptinae Schulz, 1927 are discussed, where a new delimitation of *Proleptus* Dujardin, 1845, *Heliconema* Travassos, 1919 and *Paraleptus* Wu, 1927 is proposed based on the cephalic dentation. *H. minnanensis* [sic] Damin & Heqing, 2001 is transferred to *Paraleptus* Wu, 1927 as

*P. minnanensis* (Damin & Heqing, 2001) n. comb. and *Paraleptus chiloscyllii* Yin & Zhang, 1983 transferred by Damin & Heqing (2001) to *Heliconema*, is retained in *Paraleptus*. *H. ahiri* Karve, 1941 is considered a junior synonym of *H. longissimum* (Ortlepp, 1923). The present finding of *H. longissimum* in *Pisodonophis boro* represents the first host record and the first record of this nematode from Thailand. ISSN: 0165-5752.

Morgan, Dan. 1996. Water Project Funding Drained in House Bill. WP. Jul 26. Pages: A, 4:1. Descriptors: Government spending; Federal legislation; Water supply; Foreign investment. Abstract: Congress moved ahead on more spending bills Jul 25, 1996, and in the process put its stamp on matters as close to home as a major water project in Colorado and as far-flung as US investment in military-ruled Burma. Notes: Details: Photograph; Named Corp: Congress; Geographic: Colorado; Burma. ISSN: 0190-8286.

Mukherjee, A., Sengupta, M. K., Hossain, M. A., et al. 2006. "Arsenic Contamination in Groundwater: A Global Perspective with Emphasis on the Asian Scenario." *Journal of Health Population and Nutrition*. Jun. Volume 24, Issue 2, Pages 142-63. Descriptors: Arsenic- adverse effects; Arsenic- analysis; Arsenic Poisoning- epidemiology; Arsenic Poisoning- etiology; Arsenic Poisoning- prevention & control; Water Pollutants, Chemical- adverse effects; Water Pollutants, Chemical- analysis; Water Supply- analysis; Water Supply- statistics & numerical data; World Health; Asia- epidemiology; Cause of Death; Environmental Exposure- adverse effects; Environmental Exposure- analysis; Environmental Exposure- statistics & numerical data; Environmental Monitoring; Health Services Needs and Demand; Health Status; Humans; Incidence; Population Surveillance; Public Health- statistics & numerical data; Risk Factors; Water Purification. Notes: References: Number: 161; Chemical Subst: Water Pollutants, Arsenic [7440-38-2]. Abstract: The incidence of high concentrations of arsenic in drinking-water has emerged as a major public-health problem. With newer-affected sites discovered during the last decade, a significant change has been observed in the global scenario of arsenic contamination, especially in Asian countries. This communication

presents an overview of the current scenario of arsenic contamination in countries across the globe with an emphasis on Asia. Along with the present situation in severely-affected countries in Asia, such as Bangladesh, India, and China, recent instances from Pakistan, Myanmar, Afghanistan, Cambodia, etc. are presented. ISSN: 1606-0997.

Murray, D. 1994. "From Battlefield to Market Place' - Regional Economic Co-Operation in the Mekong Zone." *Geography*. Volume 79, Issue 4, Pages 350-353. Descriptors: Geographical Abstracts: Human Geography; Water; infrastructure development; regional trade; trading block; economic association; developing region; geopolitical relations; trading bloc; regional cooperation. Geographic: Asia- (Southeast)- Mekong Delta Asia- (Southeast). Abstract: Since 1993 some progress has occurred towards developing a regional trading bloc in mainland Southeast Asia. Improved infrastructure has been identified as a prerequisite to economic growth in an Asian Development Bank report whose recommendations are briefly discussed. Consideration of recent activity in the area suggests that the proposals' prospects are bright. Though sources of funding for projects appear to be available, there are difficulties related to the stability of peace and political problems such as the human rights record of Myanmar (Burma). Doubts also exist about the complementarity of the economies of the countries involved. While prospects for inter-regional trade and infrastructure development are good, there is the prospect that capitalist competition rather than neighbourly co-operation will influence economic development in the Mekong zone. ISSN: 0016-7487.

Musa, A. G. and Tarnoff, A. 2005. "An Enduring Commitment to Sustainable Community Development in Myanmar: The Yetagun Socio-Eco Development Program." Kuala Lumpur, Malaysia: Society of Petroleum Engineers. Volume: 2005, Pages: 71-74. 2005 SPE Asia Pacific Health, Safety and Environment Conference and Exhibition - Proceedings. Conference: Sep 19-20 2005. Descriptors: Petroleum industry; Health care; Oil wells; Economic and social effects; Education; Pipelines; Knowledge acquisition. Abstract: In 1997, three years before the production of gas and condensate went on-line in the

Yetagun Field of the Andaman Sea in territorial waters of the Union of Myanmar, the start of the Yetagun Socio-Economic Development Program represented the collective commitment and vision of Yetagun Joint Venture Partners. The objective is to improve the social and economic condition of local residents in the onshore pipeline corridor of operations and the country as a whole. The Yetagun Socio-Economic Development Program has been implementing a series of complementary programs to address the most essential health, education and income generating needs of disadvantaged communities, especially women and children. The Yetagun Socio-Economic Development Program has reached over 150,000 beneficiaries. Immediate and measurable improvements in the quality of life for thousands of beneficiaries have also strengthened the capacity and empowered communities with the knowledge, skills and tools to achieve long-term and sustainable impact for generations to come. T3: 2005 SPE Asia pacific health, safety and environment conference and exhibition - proceedings. OCLC: 61747848.

Mya, Maung. 1994. "On the Road to Mandalay: A Case Study of the Sinonization of Upper Burma." *Asian Survey*. Volume 34, Issue 5, Pages 447-459. Descriptors: Water; socioeconomic impact; trade. Notes: Geographic: Burma- Mandalay; China. Abstract: Since 1988, Chinese traders, engineers, and trucks loaded with Chinese goods and modern arms have been traveling on the famous Burma Road that runs across the Shan state of northern Burma to the ancient "Golden City' of Mandalay. This study analyzes and evaluates the socioeconomic impact of China's free access to Burma and is based mostly on Burmese sources. ISSN: 0004-4687.

Myanmar; UNDP and FAO. 2000. Myanmar: Watershed Management for Three Critical Areas: Project Findings and Recommendations. Rome: UNDP: FAO. Descriptors: River Basins; River Basin Development; Water Management; Sustainable Development; Myanmar; Project Activities; UNDP- Programme management; Government publication; International government publication. Abstract: Conclusion: collaborative borders 111(2): Carrying Cargo in the Borderlands 113(25) Introduction: independence and regulation

113(1) Long-distance truck and boat operations 114(10) Long-distance transport and the state 124(10) Conclusion: regulatory nonchalance? 134(4) Women, Space and History: Long-Distance Trade 138(25) Introduction: mobile women 138(2) From Chiang Khong to Oudomaxai and Mengla 140(10) A space of opportunity 150(9) Conclusion: travelling identities 159(4) Entrepreneurs, Bureaucrats and the Army: Sawmills and the Timber Trade 163(23) Introduction: incident at Sin Udom 163(3) Entrepreneurs: Thai investment in sawmilling 166(4) Bureaucrats: regulating the timber industry 170(7) The Army: changing the rules 177(5) Conclusion: a new regional resource economy? 182(4) Conclusion 186(8) Regulation and liberalisation 186(3) The future of the Economic Quadrangle 189(5) Epilogue: The Legend of the Golden Boat 194(2) Bibliography 196(29) Index 225 ( ). Notes: vii, 30 pages. Notes: FO:DP/MYA/93/005. Terminal report. Report prepared for the Government of Myanmar by the Food and Agriculture Organization of the United Nations, acting as executing agency for UNDP. Material type: Development projects. Material type: Specialized agencies (incl. GATT and IAEA) material. OCLC: 78363019.

"Myanmar Faces Energy Crisis Despite Potential." 1999. Oil & Gas Journal. August 30. Volume 97, Issue 35, Pages 42+. Descriptors: Petroleum supply/Myanmar; Electric power/Consumption; Fuel supply/Myanmar; Foreign investments/Myanmar. Abstract: Although Myanmar possesses huge energy resources in terms of potential petroleum reserves and hydroelectric power potential, it is facing an increasing shortfall in energy supply. A report presented by Energy Minister Lun Thi highlighted the fact that an anticipated significant rise in demand and a deficiency in energy infrastructure required to support the anticipated demand growth are making the issue of energy availability increasingly serious. Significant domestic and foreign capital is required to initiate large-scale energy infrastructure projects. However, obtaining such funding is extremely difficult due to the fact that Myanmar's poverty and serious political problems have prompted most overseas investors to look beyond the country for project development. ISSN: 0030-1388.

"Myanmar's Upstream Sector Hobbled by Pipeline Controversy, Poor E&D Results." 2000. Oil & Gas Journal. June 26. Volume 98, Issue 26, Pages 24-29. Descriptors: Oil and gas leases/Myanmar; Natural gas pipe lines/Myanmar; Civil rights. Physical Description: Diagram; Map. Abstract: Although a number of large offshore gas discoveries in the early 1990s boosted Myanmar's oil and gas industry, the sector is faltering once again. Several factors are causing problems for the sector, including tensions between state oil company Myanma Oil & Gas Enterprise and the ruling military government that are hampering development and disappointing results from onshore oil exploration. Both of these factors are leading operators to reduce investment in the sector. Furthermore, the domestic and international pressures facing America's Unocal Corp. and Britain's Premier Oil plc over allegations of serious human rights abuses in pipeline projects in which they are involved are putting a further strain on the sector. Meanwhile, the Clinton administration in May 2000 renewed unilateral sanctions against Myanmar. ISSN: 0030-1388.

"Myanmar's Mann Field Awaits Search, Investment." 2000. Oil & Gas Journal. March 20. Volume 98, Issue 12, Pages 80-81. Descriptors: Oil and gas leases/Myanmar. Abstract: A big onshore oil field in Myanmar has responded to initial production improvement work and is in line for a big waterflood scheme later in 2000. Mann field also appears to be ready for subthrust, flank, and deeper pool exploration, according to the field's new operator. Myanmar Petroleum Resources Ltd. (MPRL), Yangon, Myanmar, with 100 percent working interest, has bought a workstation and is interpreting reprocessed data from a 31,000-acre 3D seismic survey carried out in 1997. MPRL is operating the field under a production compensation contract with state Myanma Oil & Gas Enterprise. ISSN: 0030-1388.

Myat Thein and Naing Oo. 1986. An Evaluation of Rural Water Supply Project in Ayadaw Township, Burma. Rangoon: PHC-BHS Project, Dept. of Health. Descriptors: Water-supply, Rural- Burma- Sagaing (Division); Drinking water- Burma- Sagaing (Division); Water resources development- Burma- Sagaing (Division). Notes: 44 leaves; 28 cm. Notes: "In honour of 1986 Sasakawa health prize winner."



"March 1986"--P. [4] of cover. Includes bibliographical references (leaves 43-44). Responsibility: Myat Thein, Naing Oo. OCLC: 64007953.

Myat, U. A. K. 1994. Preliminary Study on Earthquake Resistant Capacity of some Famous Pagan Pagodas (Theoretical Approach). [Yangon, Burma]: [Dept. of Civil Engineering, Yangon Inst. of Technology]. Pages: 1 vol. Descriptors: Structural Dynamics; Pagodas; bending; Temples; stress analysis; Pagan; Burma; religious structures; Stupas. Abstract: Calculation of lateral seismic forces on integrated portions of some famous Pagan pagodas has been carried out in this project. For simplification the prescribed ground motions (a subscript h = horizontal component of ground acceleration = 50 gals and 100 gals) are used to compute seismic coefficient "K." Successive steps involved in calculations are as follows: (Step I-1) Computation of weights and masses of pagodas. (Step I-2) Computation of lateral forces induced by ground motion by Empirical Dynamic Method. (Step I-3) Computation of stresses due to the lateral seismic forces achieved from step I-2. Database: Earthquake Engineering Abstracts.

Myint Aung, U. and Zaw Win, U. 1983. Small Hydro Power Development: The Socialist Republic of the Union of Burma. Vienna: UN. Descriptors: Hydroelectric Power; Energy Resources Development; Myanmar; Government publication; International government publication. Notes: ii, 5 p. Responsibility: by U Zaw Win and U Myint Aung. OCLC: 84204993.

Myint Thein. 1968. "Hydrocarbon Type Composition of Prome Crude from Different Depths." Union of Burma Journal of Science and Technology. Union of Burma Applied Research Institute, Rangoon, Burma. Volume 1, Issue 3, Pages 399-400. Descriptors: Asia; Burma; composition; economic geology; Far East; hydrocarbons; organic compounds; organic materials; petroleum; Prome field. ISSN: 0566-7542.

Myo, Htike H. 2002. "Relocation of Hypocenter and Focal Mechanisms of Myanmar Earthquakes." Individual Studies by Participants at the

International Institute of Seismology and Earthquake Engineering. Volume 38, Pages 89-105. Descriptors: Seismic phenomena; Myanmar; Seismic engineering; Networks; Earthquake engineering; Relocation; Position (location); Time measurements; Seismology; Geology; Positioning. Abstract: Hypocenters and focal mechanisms of earthquakes in Myanmar are determined using data from the bulletins of the International Seismological Center (ISC) and the Myanmar Seismic Network. Hypocenter relocation was carried out for events that occurred in the Myanmar region (10 degrees N - 28 degrees N and 92 degrees E - 101 degrees E) in 1998 that were reported by ISC and four analog stations of the Myanmar Seismic Network. Hypocenters were relocated using HYPOCENTER 3.2, a Fortran program for locating local, regional and global earthquakes. Slight differences exist between the relocated hypocenters in this study and those reported by ISC. Location did not seem to be improved due to the limited data and the small number of seismic stations used in this study. However, it is shown that it would be possible to improve the accuracy of hypocenters using both the Myanmar Seismic Network data and the ISC data if the timing system were improved. For determination of the focal mechanisms, data from only the ISC bulletins for the period 1970 to 1999 was used. All earthquakes with ISC magnitudes 5.5 or greater occurring only in the Myanmar region were analysed. Eighteen focal mechanisms were determined using the P-wave first motion method. Six mechanisms indicate reverse faulting and twelve strike-slip faulting. A predominance of strike-slip faulting is consistent with geological evidence for the Sagaing fault. Most of the focal mechanism solutions for these earthquakes are similar to the Harvard CMT solutions. Among the 18 focal mechanisms determined, most of the shallow earthquakes were generated on strike-slip faults and the intermediate-depth earthquakes, on reverse faults. ISSN: 0074-6606.

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Naval Weather Service Command Washington DC. 1972. "Summary of Synoptic Meteorological Observations. Southeast Asian Coastal Marine Areas. Volume 4. Area 12 - Victoria Point, Area 13 - Rangoon, Area 14

- Pagoda Point." SEP. Descriptors: Marine Meteorology; Coastal Regions; Ocean Waves; Wind; Atmospheric Temperature; Humidity; Burma; Ceiling; Cloud Cover; Visibility; Tables (Data); Surface Temperature; Meteorology. Abstract: The report contains data taken from marine surface observations in the areas of Victoria Point, Rangoon, and Pagoda Point. Notes: Distribution Statement: Approved for public release. DTIC: AD0750159. URL: <http://handle.dtic.mil/100.2/AD750159>.

Nelson, B.W. Affiliation: Department of Environmental Sciences, University of Virginia, Charlottesville 22903. [bwn@virginia.edu](mailto:bwn@virginia.edu). 2001. "Sediment Dynamics in Rangoon River, Myanmar." *Sci. Total Environ.* Feb 5. Volume 266, Issue 1-3, Pages 15-21. Abstract: The behavior of fine-grained sediment in Rangoon River depends on seasonal variations in freshwater discharge and tidal amplitudes that range from 2 to 5 m. During the monsoon, freshwater with sediment concentrations of 1 g/l, or less, causes unidirectional, seaward flow. In the dry season, salinities reach 20‰ and sediment concentrations rise to 6 g/l. The saline intrusion advects large quantities of sediment landward from seaward sources. Near-surface sediment concentrations are very low during neap tides, while a layer of 'fluid mud' rests on the bottom. Current speeds greater than 0.2 m/s are needed to entrain sediment into the upper layer. Layered suspensions occur most commonly during decelerating phases of tidal flow and are dispersed by rapidly accelerating flow. When current speeds exceed 0.6 m/s, no 'fluid mud' forms, and sediment concentrations as great as 6-8 g/l extend through the water column. ISSN/ISBN: 0048-9697 (Print).

Nelson, B. W., Tin Tut, U. and Saw Lwin, U. 1990. "Fine-Grained Sediment Transport in Rangoon River, Burma." 13th International Sedimentological Congress; Abstracts. International Sedimentological Congress. International Association of Sedimentologists, Comparative Sedimentology Division, Utrecht, Netherlands. Volume 13, Pages 382. Descriptors: Asia; Burma; Far East; fines; hydrogeology; hydrology; Rangoon River; rivers and streams; sedimentation; sediments; stream transport. OCLC: 27379089.

Nelson, Bruce W. 2001. "Clay Mineral Clues to Estuarine Sediment Provenance." Geological Society of America, 2001 Annual Meeting. Abstracts with Programs - Geological Society of America. Geological Society of America, Boulder, CO. Nov. Volume 33, Issue 6, Pages 407.

Descriptors: Asia; Burma; clay mineralogy; climate; estuarine sedimentation; Far East; hydrology; Irrawaddy River; Malaysia; provenance; Rangoon River; rivers and streams; sediment transport; sedimentation; sediments; Selangor River; stream transport; suspended materials; tributaries; tropical environment; weathering.

Abstract: The clay mineral composition of estuarine sediments reflects tectonic and climatic conditions that exist in the source areas, modified by differential transportation and diagenesis. Rangoon River (Burma) and Selangor River (Malaysia) illustrate extremes that may be compared with mid-latitude estuaries elsewhere. Rangoon River is an estuarine distributary of the Irrawaddy River whose headwaters drain the Himalayas; the main stream then flows within an inter-arc trough adjacent to a Cenozoic volcanic arc. The river carries well-defined muscovite, chlorite, quartz, and feldspar above Mandalay. Below Mandalay and above the delta, the Cenozoic volcanics add significant amounts of fine-grained smectite. The estuary is macro-tidal. During the dry season, high sediment concentrations and multi-layered suspensions are found and the net transport is landward. Smectite is most abundant in the concentrated suspensions, while muscovite and chlorite dominate in the low concentration suspensions during average and neap tidal flows. This leads to preferential concentration of smectite in estuarine deposits. High discharge during the monsoon often flushes much of the accumulated sediment load seaward. Selangor River drains granitic and metamorphic terrain of Paleozoic age. The deep, tropically weathered soils contain clays rich in kaolinite and gibbsite (and little mica or feldspar). These clay minerals become the most abundant components of the estuarine sediments. The Selangor is a mesotidal estuary where multi-layered suspensions have not been detected. Little differentiation in mineral composition exists between the suspended and deposited sediments. The clay minerals reflect their origin in a mature tropical landscape. The highest freshwater discharges rarely push the 0 o/oo isohaline beyond the mouth, so the sediment load is trapped within the estuary. The clay

mineral composition of estuarine sediment in mid-latitude and temperate estuaries is usually intermediate in composition to those above, and it reflects intermediate tectonic and climatic conditions in their source areas. ISSN: 0016-7592.

Nelson, Bruce W. 2001. "Sediment Dynamics in Rangoon River, Myanmar." *The Science of the Total Environment*. 2/5. Volume 266, Issue 1-3, Pages 15-21. Descriptors: Sediment dynamics; Estuarine; Rangoon River. Abstract: The behavior of fine-grained sediment in Rangoon River depends on seasonal variations in freshwater discharge and tidal amplitudes that range from 2 to 5 m. During the monsoon, freshwater with sediment concentrations of 1 g/l, or less, causes unidirectional, seaward flow. In the dry season, salinities reach 20‰ and sediment concentrations rise to 6 g/l. The saline intrusion advects large quantities of sediment landward from seaward sources. Near-surface sediment concentrations are very low during neap tides, while a layer of 'fluid mud' rests on the bottom. Current speeds greater than 0.2 m/s are needed to entrain sediment into the upper layer. Layered suspensions occur most commonly during decelerating phases of tidal flow and are dispersed by rapidly accelerating flow. When current speeds exceed 0.6 m/s, no 'fluid mud' forms, and sediment concentrations as great as 6–8 g/l extend through the water column. OCLC: 39284343.

Ngo, Quoc-Trung. 1980. *An Economic Analysis of Water Resources Development in Deltaic Regions Of Asia: The Case of Central Thailand*. The University of Wisconsin - Madison. DAI. Volume: 41, 05A, Pages: 301-2226. Descriptors: Economics, Agricultural. Abstract: This study analyzes the process of transforming a large deltaic basin, such as the Chao Phya Plain in central Thailand, into irrigated agricultural lands. The strategic role of infrastructure improvement in the process of agricultural modernization is well recognized. The historical experiences of Japan, Taiwan, Korea, and more recent experience of the Philippines, indicate that increasing population pressure on agricultural land has provided a strong stimulus for irrigation construction, and also for the introduction of land-saving technologies in the form of modern fertilizer-responsive rice varieties and improved

farm practices. But irrigation and drainage facilities, which are a basic condition for the diffusion of the new technology, can require capital investments so large as to overwhelm the financial capacity of many less developed countries. Rainfall patterns and topography are relevant considerations. Where rainfall is well distributed over the year and where the hydrography of the country consists of physically separate watersheds, water control can be achieved through individual projects generally of small or medium size. Such agroclimatic conditions have supported a relatively fast rate of land infrastructure improvement in the insular countries of Asia. In contrast, the deltaic regions of Burma, Thailand, and Viet Nam, which are the traditional rice exporting areas, face very different environmental conditions--sharply seasonal rainfall patterns and vast, flat terrain--which require large scale basin-wide irrigation construction. The mobilization of enormous amounts of resources and complex and lengthy planning are necessary. The development of water resources in the Chao Phya Delta is analyzed, using conventional cost benefit analysis, as a case study to illustrate this problem. There, water control development had to be undertaken in successive phases, with the earliest phases of construction yielding low social returns. The early projects, however, constitute the backbone structure necessary to support the further development of the Delta. The analysis shows that the latent benefits of Phase One construction built in the 1950's and early 1960's were not captured until the intensive construction of Phase Three was completed in the late 1970's. The development of large alluvial deltas requires huge initial investments that can pay off only after an extensive gestation period. The need for international financial assistance is crucial. This pattern is in contrast with the experience of insular countries where irrigation can easily be started with small profitable projects at the earliest stage of agricultural development. Analysis of distribution of the social gains derived from irrigation investments in the Chao Phya Plain indicates that a large share of the benefits accrues to rice consumers in other food-deficit less developed countries. This effect gives added support to the argument calling for international assistance to support the development of large alluvial rice growing deltas in Asia. Finally, results from the analysis of Chao Phya Delta development are used to provide perspectives to the

problem of developing of the Mekong Delta in Viet Nam. Notes:  
Degree: PH.D. OCLC: AAG8015222.

Nieuwolt, S. Editor: Takahashi, K. and Arakawa, H. 1981. "The  
Climates of Continental Southeast Asia." World survey of Climatology,  
v. 9. Pages: 1-66. Descriptors: Hydrology; Meteorology and  
Climatology. Abstract: Describes the climates of Vietnam, Laos,  
Kampuchea, Thailand, Burma, Malaya and Singapore, analysing in  
turn: the NE monsoon season; the inter-monsoon period; the SW  
monsoon season; climatic variations; local factors; the variability of  
the climatic parameters; and sources of statistical data. Concludes  
with 29 tables of climatic data for the region.-L.F. Musk. Notes: Special  
Features: 9 figs, 38 tables, 51 refs. OCLC: 7282817.

Nu Nu San. 2004. Study on Aquatic Birds Around Inle Wetland  
Sanctuary. Taunggyi: Taunggyi University, Zoology Department.  
Pages: 10. Descriptors: Bird refuges- Burma- Inle Lake; Water birds-  
Burma- Inle Lake. Notes: 49 p. of plates: 1 map; 22 cm. Notes: A  
research paper. Includes bibliographical references (p. 38).  
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83252724.

Nuttall, Martin. 1999. "On the Road to Mandalay." Harding Publishing  
Company, Incorporated. International Railway Traveler. Descriptors:  
Burma; Myanmar; Passenger service; Railroads. Abstract: Author's  
Account of a 15-Hour Trip From Yangon (Rangoon). Notes:  
International Railway Traveler, Number 105 (March 1999), Pages 1+:  
Illustrations, Map. ISSN: 0891-7655. OCLC: 00893907.

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Civilizing Mission." CHIJ. Australian National University, Contemporary  
China Centre. July 2006. Issue 56, Pages 83-7. Descriptors:  
International organizations; Economic indicators; Government  
subsidies; Real estate developments; Christianity. Notes: Details:  
Photographs; References. Abstract: Not coincidentally, the expanding  
scope of projects financed by China abroad, mainly in Africa and South  
America but also closer to home in Burma, Cambodia and Laos,

attracted considerable attention from Western media in 2005. From Guyana to Nigeria, China has emerged as a key source of state-led investment in infrastructure projects without the good-governance and human-rights strings that are attached to financing through international development structures, and Chinese companies have become a visible presence as major builders of roads, pipelines, bridges, hospitals, harbors, stadiums, water-supply facilities and so on. 3 In the Sudan, Chinese state-owned enterprises have invested US\$3 billion in the oil industry and helped to build a 1,540-kilometre pipeline and a refinery. 4 In July 2005, censured by the UN for evicting 700,000 people from their houses, Zimbabwe's President Robert Mugabe traveled to China for a US \$300 million loan (he was denied it). The authors' optimistic evaluation contrasts starkly with the view taken by international organizations and their advisors, who are wary of the risks posed by the sudden introduction of a cash economy, the displacement of slash-and-burn agriculturalists, and the commodification of sexual exchanges that accompany such projects, not to mention the smuggling of drugs and gems that finance the Burmese junta and the borderland ethnic armies allied to it. 9 The situation in Sudan (to which, as to Burma, China provides military aid) is similar: while Western-based NGOs blame the Chinese government for fuelling Khartoum's ethnic cleansing, 10 Chinese diplomats and managers portray their investment in the oil industry as a selfless contribution to development: When we started, they were an oil importer, and now they are an oil exporter. 11 A Western company couldn't have done what we did... ISSN: 1324-9347.

**O**

O'Brien, Morrough Parker. 1934. Rangoon Tidal Model. Descriptors: Tidal flats- Models; Hydraulic models. Notes: 1 folder; Geographic: Rangoon River (Burma); Notes: Typescript, bound. OCLC: 27296938.

Obukhova, V. A. and Fedorov, K. N. 1974. "Micromorphology of the Hydromorphic Soils of the Irrawaddy Delta." Moscow University Soil Science Bulletin. Volume 29, Issue 1-2, Pages 29-32. Descriptors: Asia; Burma; deltas; Far East; horizons; hydromorphic; Irrawaddy



River; micromorphology; morphology; soils; tropical. ISSN: 0147-6874.

Obukhova, V. A. and Fedorov, K. N. 1974. "Micromorphology of Hydromorphic Soils of Irrawaddy River Delta, (in Russian)." *Vestnik Moskovskogo Universiteta Seriya VI Biologiya Pochvovedenie*. 29(2), P 85-90. 1974. Descriptors: Clays; Soils; Geomorphology; Deltas; Rivers; Iron; Manganese; Cultivation; Soil Profiles; Burma(Irrawaddy River Delta); Gleying; Hydromorphic Soils; Nodules; Paddy; Burmese Soils. Abstract: permanent use of these Burmese soils for many years under paddy cultivation promoted surface gleying, accumulation of various kinds of Fe and Mn nodules, intensive biochemical decomposition of organic matter, the significant accumulation of oriented clays in meadow gley soils throughout the profile and in illuvial layers of degraded soils. ISSN: 0579-9422.

Ohman, Howard L. 1965. *Climatic Atlas of Southeast Asia (Temperature, Rainfall, Temperature-Humidity Index)*. Technical report, Earth Sciences Div Army Natick Labs Mass. DEC 1965. Pages: 103. Abstract: Eighty-seven maps present the distribution in Southeast Asia (Thailand, Vietnam, Laos, Cambodia, Burma south of 25 degrees N. Latitude, and the peninsular portion of Malaysia) of various climatic statistics of temperature, rainfall, and the temperature-humidity index. Maps for each month of the year have been prepared for: mean monthly temperature, mean daily maximum temperature, mean daily minimum temperature, absolute maximum temperature, mean monthly rainfall, mean number of rainy days per month, and mean daily temperature-humidity index for the warmest hour of the day. Single maps of mean annual rainfall, the physiography of the region, and of the names and location of climatic stations are also included. The maps are drawn in considerable detail having been based not only on the available climatic data but also on the distribution of mountain ranges, major water bodies, and other geographic features. A brief text discusses the preparation of the maps and describes a few of the important distributional aspects of climate shown by the maps. (Author). Distribution Statement: Approved For Public Release. URL: <http://handle.dtic.mil/100.2/AD632878>

Omote, Shunichiro. 1971. *Report on Preliminary Survey of Present Status and Scope of Seismology and Earthquake Engineering in the Union of Burma*. Tokyo: Overseas Technical Cooperation Agency.

Pages: 234. Descriptors: Seismology; Burma; Earthquake engineering; Japanese Mission on Seismology & Earthquake Engineering. Notes: NU: callno 400/O47/1971; oclc 025608546. Database: Earthquake Engineering Abstracts. OCLC: 311376 (EQ).

"On the Road to Burma." 1995. Eng. Min. J. October. Volume 196, Pages 13-14. Descriptors: Mining law/Myanmar; Foreign investments-Myanmar. Abstract: Recent alterations to the mining laws in Myanmar, which was previously known as Burma, have generated renewed interest in this area of Southeast Asia. The law now provides for 3 types of permits. These are 3-year-life for prospecting and exploration in virgin areas, 1-year-life for exploration and feasibility-study in areas with extensive data extant, and 15-year-life for mine development and production. ISSN: 0095-8948.

Oo, H. H., Araki, T. and Kubota, F. 2005. "Effects of Drought and Flooding Stresses on Growth and Photosynthetic Activity of Mungbean, *Vigna Radiata* (L.) Wilczek, Cultivars." J. Fac. Agric. Kyushu Univ. Oct. Volume 50, Issue 2, Pages 533-542. Descriptors: Article Subject Terms: Accumulation; Chlorophyll; Conductance; Damage; Drought; Droughts; Environmental effects; Flooding; Fluorescence; Gas exchange; Growth; Growth Rates; Growth rate; Photosynthesis; Photosystem II; Stress; Article Taxonomic Terms: *Vigna radiata*; Geographic Terms: Myanmar. Notes: TR: CS0741371. Abstract: The responses to drought and flooding stresses and the recovery from stress-induced damages were compared between three mungbean cultivars, Chinese (CN), and newly released cultivars in Myanmar, VC2991-112B-1B (VC) and KPS2 (KP). Growth, gas exchange rate and chlorophyll fluorescence quenching of these cultivars were investigated. The results were as follows: (1) CN was sensitive to both drought and flooding treatments compared to the other cultivars. VC and KP were less sensitive to drought and flooding, respectively. (2) The photosynthetic rate ( $P_{sub(N)}$ ) and stomatal conductance ( $G_{sub(s)}$ ) in VC were less affected by drought, with a quick recovery by re-watering. On the other hand, both parameters in KP were strongly depressed by drought, but less by flooding. (3) VC showed a higher value for the quantum yield of photosystem II ( $\Phi_{sub(e)}$ ) and a lower

value for the photorespiration ratio ( $P_{sub(R)}/T_{sub(C)}$ ) than the other cultivars in the drought treatment. KP had a higher  $\Phi_{sub(e)}$  and lower  $P_{sub(R)}/T_{sub(C)}$  in the flooding treatment. (4) The stomatal behavior was closely related to the stress-tolerance of mungbean cultivars. A partial retainment of gas exchange under the stress conditions was essential to sustain electron transport in the photosystems and prevent functional damages caused by excessive accumulation of energy in leaves. ISSN: 0023-6152.

Oo, K. N., Aung, K. S., Thida, M., Knine, W. W., Soe, M. M. and Aye, T  
Affiliation: Bacteriology Research Division, Department of Medical Research, Yangon, Myanmar. 1993. "Effectiveness of Potash Alum in Decontaminating Household Water." *J. Diarrhoeal Dis. Res. J. Diarrhoeal Dis. Res. Sep. Volume 11, Issue 3, Pages 172-4* Additional Info: BANGLADESH. Descriptors: Alum Compounds; Decontamination-methods; Humans; Myanmar; Water Supply- standards. Notes: Chemical Subst: Alum Compounds [0] aluminum sulfate [10043-01-3]. Abstract: To evaluate the effectiveness of potash alum in purifying household water, this study was carried out in a suburban community in Yangon, Myanmar. It was designed to test whether the application of potash alum (0.05%) regularly into household water storage vessels during water replenishment was capable of decontaminating household water in homes using shallow well water. It was conducted in 100 households (50 each in intervention and control groups). After alum (0.05%) was added, the contamination level of water decreased on the 2nd and 3rd days. The alum-treated water was well tolerated by the users; only one member complained of a metallic taste. We conclude that potash alum was effective and acceptable in this community in decontaminating household water. ISSN: 0253-8768 (Print).

Oo, K. N., Aung, W. W., Thida, M., Toe, M. M., Lwin, H. H. and Khin EE  
Affiliation: Department of Medical Research, Yangon Children Hospital, Myanmar. 2000. "Relationship of Breast-Feeding and Hand-Washing with Dehydration in Infants with Diarrhoea due to Escherichia Coli." *J. Health Popul. Nutr. Sep. Volume 18, Issue 2, Pages 93-6*. Descriptors: Breast Feeding; Escherichia coli Infections- complications; Escherichia coli Infections- microbiology; Cohort Studies; Dehydration- etiology;

Diarrhea, Infantile- complications; Diarrhea, Infantile- microbiology; Escherichia coli- isolation & purification; Handwashing- methods; Humans; Infant; Prospective Studies; Risk Factors; Severity of Illness Index. Abstract: This prospective cohort study was carried out in the neonatal unit of the Yangon Children Hospital, Myanmar, to gather more information on the types of feedings and hand-washing practices of mothers as the determinant of severe dehydration in infants with acute diarrhoea due to Escherichia coli. The study subjects included 100 infants with diarrhoea, aged less than 4 months, admitted to the hospital from June 1997 to May 1998. Data on isolation of E. coli from rectal swab samples, types of feedings, hand-washing practices, and dehydration status were collected. Of the 100 cases, E. coli was isolated from rectal swab samples of 48 infants. Of these 48 cases, 28 had some dehydration and 20 had severe dehydration. Exclusive breast-feeding was observed only in the age group 1-2 month(s). The association of the severity of dehydration with other types of feedings compared to exclusive breast-feeding was not statistically significant. In this study, most mothers washed their hands with water only after cleansing their children's defaecation, and before and after feeding their children. The severity of dehydration was statistically significant in hand-washing practices when compared to washing with water only and washing with soap and water. This study has shown the association between types of feedings and hand-washing practices with dehydration in infants with acute diarrhoea due to E. coli. The results of the study suggest that there is a need for appropriate intervention programmes to promote exclusive breast-feeding and hand-washing practices with soap and water after cleansing children's defaecation, and before and after feeding children. ISSN: 1606-0997 .

Oo, K. N., Han, A. M., Hlaing, T. and Aye T Affiliation: Bacteriology Division, Department of Medical Research, Yangon, Myanmar. 1991. "Bacteriologic Studies of Food and Water Consumed by Children in Myanmar: 1. the Nature of Contamination." J. Diarrhoeal Dis. Res. Jun. Volume 9, Issue 2, Pages 87-90. Descriptors: Food Microbiology; Water Microbiology; Bacterial Toxins- biosynthesis; Child, Preschool; Escherichia coli- growth & development; Humans; India; Infant; Salmonella- growth & development; Vibrio cholerae- growth &

development; Water Supply. Abstract: To isolate major bacterial pathogens from children's food and drinking water, a 3-month study was conducted in a suburban community in Yangon, Myanmar. From the morning meals and stored drinking water of 208 randomly selected children, 775 food and 113 water samples were collected and were cultured using standard methods. *Escherichia coli*, *Vibrio cholerae* non-01, and *Salmonella* were isolated from 505, 28 and 6 food samples respectively, and *E. coli* and *V. cholerae* non-01 were isolated from 29 and 5 water samples respectively. Among the *E. coli* isolates, 8 produced heat-stable toxin (ST) and 3 were enteroinvasive. Nine *V. cholerae* non-01 produced cholera-like toxin. Of the 29 *E. coli* isolates from the samples of drinking water, 3 produced ST. All water samples were negative for *Salmonella*. The study underscores the importance of bacterial contamination of children's food and drinking water and stresses the need to improve environmental sanitation. ISSN: 0253-8768.

Oo, K. N., Myint, T., Nwe, Y. Y. and Aye, T. 1993. "Vibrio Spp. Isolated from Natural Waters of the City of Yangon, Myanmar." *J. Diarrhoeal Dis. Res. Jun.* Volume 11, Issue 2, Pages 105-7. Descriptors: Water Microbiology; Cholera- transmission; Disease Reservoirs; Humans; Myanmar; Vibrio- classification; Vibrio- isolation & purification; Vibrio-pathogenicity; Virulence. Abstract: Virulence properties of the environmental isolate of vibrios from natural waters of Yangon, Myanmar were studied. *Vibrio* spp. were isolated for identification by the membrane filtration method and cultured on thio-sulphate-bile-sucrose media. No *Vibrio cholerae* O1 were isolated. *V. cholerae* non-O1 were the major vibrio species isolated from the samples. None of them were detected for cholera-toxin-like toxin, thermostable direct haemolysin, or heat-stable enterotoxin. Sixty-one isolates gave haemolytic activity; 27 *V. cholerae* non-O1 and 6 *V. fluvialis* isolates produced protease. ISSN: 0253-8768.

Oo, Nay Win, Robinson, Ruth A. J., Bird, Michael Ian, et al. 2007. "Re-Analysis of the Nineteenth Century Hydrology and Sediment Load Data for the Ayeyarwady River, Myanmar; Geographical Reports of Tokyo Metropolitan University; Special Issue in Honor of Professor Nobuyuki

Hori." Geographical Reports of Tokyo Metropolitan University. Tokyo Metropolitan University, Faculty of Science, Department of Geography, Tokyo, Japan. Volume 42, Pages 71-84. Descriptors: Asia; Ayeyarwady River; bedload; Burma; concentration; denudation; discharge; drainage basins; errors; Far East; filters; flows; Gulf of Martaban; hydrographs; hydrology; Indian Ocean; land use; measurement; monsoons; regression analysis; statistical analysis; suspended materials; Thanlwin River; velocity. Abstract: The Ayeyarwady (Irrawaddy) River of Myanmar (formerly Burma) is generally thought to have the 5th largest suspended load of any world river, and the 4th highest total dissolved load. From these flux estimates, the combined systems of the Ayeyarwady and Thanlwin (Salween) rivers are regarded as contributing 20% of the total flux of material from the Himalayan-Tibetan orogen and deliver it over a short length of coastline into the Gulf of Martaban in the eastern Indian Ocean. The estimates for the Ayeyarwady are taken from published quotes of a 19th Century dataset (Gordon 1885) and there are no available published data for the Thanlwin. We present a reanalysis of the Ayeyarwady data from the original 550 page report of Gordon (1879) covering ten years of discharge (1869-1879) and one year of sediment concentration measurements (1877) and demonstrate that the commonly cited values of sediment loads (and therefore chemical fluxes) are in error. Taken at face value, the sediment flux estimates are conservatively assessed as being underestimated by 18%, and possibly as much as 38%, due to omission of the fine particulate load. However, an early 20th Century Ayeyarwady River engineer criticised Gordon's discharge measuring methods, suggesting they lead to over-estimation of both water and sediment fluxes. These two opposing uncertainties require careful review. We describe the approaches employed, evaluate Gordon's measurements, calculations, and subsequent adjustments and present our revised interpretation of daily and annual discharges and sediment fluxes along with an estimate of uncertainty. Our re-evaluation suggests that the annual sediment flux from the Ayeyarwady-Thanlwin system may be significant for ocean geochemistry and estimation of denudation rates. The new values suggest that the Ayeyarwady and Thanlwin rivers contribute half the

present day Ganges-Brahmaputra flux to the Indian Ocean. ISSN: 0386-8710.

Oo, T. T., Storch, V. and Becker, N. Affiliation: Zoological Institute, University of Heidelberg, Germany. 2002. "Studies on the Bionomics of *Anopheles Dirus* (Culicidae: Diptera) in Mudon, Mon State, Myanmar." *Journal of Vector Ecology*. Jun. Volume 27, Issue 1, Pages 44-54  
Additional Info: United States. Descriptors: *Anopheles*; Environment; Animals; Fishes; Insects; Larva- growth & development; Myanmar; Plants; Population Dynamics; Predatory Behavior; Water; Well water *Anopheles dirus*; Larvae; Pupae; Population density; Population ecology; Breeding places; Wells; Water quality; Environmental factors; Rain; Shade; Vegetation; Salinity; Predatory insects; Insectivorous fishes; Myanmar. Notes: Chemical Subst: Water [7732-18-5].  
Abstract: This study examined some environmental factors influencing the larval habitats of *Anopheles dirus* (breeding in wells) in Mudon, Myanmar, from May 1998 to March 2000. The larval/pupal density was found to be directly proportional to rainfall and indirectly proportional to the well water level. Shade, vegetation and debris on the surface of well water were important factors influencing the abundance of the aquatic stages of *An. dirus*. Salinity had an inverse correlation with the larval and pupal density. Other mosquito species associated with *An. dirus* were identified. Important predators of the mosquito larvae were larvivorous fish, damselfly and dragonfly nymphs. All wells examined were lined with lateritic rocks. Chemical analysis of water samples from wells was conducted. ISSN: 1081-1710.

## **P**

Pal, S. C. 1986. "Dysentery: An Overview. Still Problems to Resolve." Descriptors: Communicable Disease Control; Communicable Diseases; Developing Countries; Diarrhea; Digestive System; Disease; Disease Outbreaks; Education; Health; Health Education; Information Services; Public Health; Asia; Biology; Delivery of Health Care; Health Planning; Health Services; India; Infection; Knowledge; Organization and Administration; Physiology; Preventive Medicine; Vaccination; Diseases; Epidemics; Gastrointestinal Effects; Iec; Southern Asia Asia;

Infections; Program Activities; Programs. Source: Dialogue on diarrhoea (Dialogue Diarrhoea) 1986 June (25): Abstract: This article reviews the global situation with regard to bacillary dysentery, with particular emphasis on findings from the recent epidemic in West Bengal. Infection is by the fecal-oral route and generally spread by person-to-person transmission. Serious epidemics caused by the multiple-drug-resistant *Shigella shigae* have occurred recently in Bangladesh, Somalia, South India, Burma, Sri Lanka, Nepal, Bhutan, Rwanda, and Zaire. In each situation, dysentery attacked over 10% of the population and killed 2-10% of hospitalized cases. In 1984, a dysentery epidemic spread rapidly throughout West Bengal, especially among young children, and was resistant to most commonly available drugs and antibiotics. A mass media campaign was initiated which emphasized boiling or chlorination of drinking water, covering feces with soil, protecting food from flies, avoiding exposed raw vegetables and cut fruits, and hand washing. However, these measures were difficult to implement and the epidemic subsided only gradually. Scientific knowledge about the exact mode of transmission of the pathogen, the mechanisms of pathogenicity, and the actual cause of death in dysentery cases could contribute to the development of practical public health interventions and an effective vaccine. ISSN: 0950-0235.

Paoletto, G. and Uitto, J.I. Affiliation: G. Paoletto, Academic Division, The United Nations University, 5-53-70 Jingumae, Shibuya-ku, Tokyo 150 Country: Japan. 1996. "The Salween River: Is International Development Possible?" Asia Pacific Viewpoint. Volume 37, Issue 3, Pages 269-282. Descriptors: Water Resources: Economic; Water resources development - general; water resources; developing region; regional cooperation; river basin development; regional development; international water resources; water resources management. Notes: Geographic: Asia- Salween River. Abstract: Running through China, Myanmar and Thailand, the Salween River is rich in water resources with the potential to play a major role in regional development strategy. Issues related to its development are complex, but recent trends call for a closer examination of the types of possibilities available. This paper examines issues surrounding the Salween,



considers governance systems for international waters, and draws some preliminary conclusions on the options that may be available to the riparians. There is a clear need for further scientific, technical and analytical work in identifying the alternative scenarios for the development of the river system, and their environmental and social impacts, as well as moving towards an international governance system for joint management and conflict resolution along the river. ISSN: 1360-7456.

Penney, D. 2003. "Afrarchaea Grimaldii, A New Species of Archaeidae (Araneae) In Cretaceous Burmese Amber." J. Arachnol. American Arachnological Society: Apr. Volume 31, Issue 1, Pages 122-130. Descriptors: New species; Geographical distribution; Fossils; Amber; Afrarchaeagrimaldii; Archaeidae; Burma; Araneae. Abstract: Afrarchaea grimaldii new species (Archaeidae, Archaeinae) from 88-95 Ma (Cenomanian-Turonian) Upper Cretaceous amber (Burmite) from Myanmar (Burma) is described. This is the first spider to be described from this deposit and is the oldest known Archaeidaesensu stricto extending the known range of the family by approximately 50 Ma from the previously oldest recorded specimens in Baltic and Bitterfeld ambers, and provides further evidence that spiders were not severely affected by the end-Cretaceous mass extinction event. It represents the oldest fossil record of an araneophagous spider. This species could be used to argue for both the theory of vicariant biogeography and vicariant relicts to explain the zoogeography of the genus, but until new data become available, supports neither reliably. ISSN: 0161-8202.

Penney, David, Ross, Andrew J. (prefacer) and York, Peter V. (prefacer). 2004. "A New Genus and Species of Pisauridae (Araneae) in Cretaceous Burmese Amber; the Lower Cretaceous (Albian) Arthropod Fauna of Burmese Amber, Myanmar." Journal of Systematic Palaeontology. Cambridge University Press, Cambridge, United Kingdom. Jun. Volume 2, Issue 2, Pages 141-145. Descriptors: Albian; amber; Arachnida; Araneae; Arthropoda; Asia; Burma; Chelicerata; Cretaceous; Far East; fresh-water environment; Invertebrata; Lower Cretaceous; Mesozoic; morphology; new taxa; organic minerals;

Palaeohydropoda myanmarensis; paleoenvironment; Pisauridae; taxonomy. Notes: FE: References: 47; illus. ISSN: 1477-2019.

Peretti, Adolf and Mullis, Joseph. 1997. "Distinction of Natural and Synthetic Rubies by Fluid Inclusion Analyses; Proceedings of the XIVth European Current Research on Fluid Inclusions." Proceedings of the ...European Current Research on Fluid Inclusions (ECROFI). International (III). Volume 14, Pages 264-265. Descriptors: Asia; Burma; calcium carbonate; carbon dioxide; Commonwealth of Independent States; Far East; fluid inclusions; gems; hydrogen sulfide; inclusions; natural materials; nitrogen; Novosibirsk Russian Federation; paleosalinity; potassium chloride; ruby; Russian Federation; synthetic materials; temperature; water. OCLC: 38445608.

Permanent Crops and Arable Land. 2008. Derived by CGIAR from the USGS Earth Resources Observation System (EROS) Data Centre (EDC) 1998, 1 km resolution, global land cover characteristics database, version 1.2 which is based on monthly NDVI data from April 1992 to March 1993. Agricultural land includes irrigated and rainfed cropland, managed pastures, orchards vineyards and plantations. Sparsely vegetated includes desert, semi-desert and tundra. Raster data-set has been exported as ASCII raster file type. See: <http://www.fao.org/countryprofiles/Maps/MMR/12/al/index.html>

Perret, J.L. Affiliation: Service de Pathologie Infectieuse et Tropicale, l'Hopital d'Instruction des Armées Laveran, Marseille, France. 1997. "La Mélioïdose: Une "Bombe à Retardement Tropicale" En Voie De Dissémination? Translated Title: [Meliodosis: A Tropical Time Bomb that is Spreading]." Mars. Volume 57, Issue 2, Pages 195-201 Descriptors: Endemic Diseases; Tropical Medicine; World Health; Anti-Bacterial Agents- therapeutic use; Humans; Incidence; Melioidosis- drug therapy; Melioidosis- epidemiology; Melioidosis- microbiology; Melioidosis- transmission; Microbial Sensitivity Tests; Tropical Climate. Notes: References: Number: 64. Abstract: Melioidosis, an infectious disease that affects many mammals, was first identified in Burma by Whitmore in 1912. It is caused by Burkholderia pseudomallei, a gram negative bacillus of the Pseudomonas family, which is found in soil and water. Long present in Southeast Asia and numerous tropical areas,

melioidosis has recently appeared in temperate zones including mainland France. The incidence in endemic areas is between 6% and 20% of the population and short period of exposure is sufficient to be contaminated. In man the contamination occurs mainly through skin wounds and the disease can be clinically inapparent. Diabetes, renal disease, and various forms of immunodepression are triggering factors for the onset of a variety of symptoms ranging from acute septicemia to abscesses involving almost any organ in the body. Ceftazidime alone or a combination of clavulanate and amoxicilline is the treatment of choice but the mortality rate in patients with acute forms is still 40% and relapse can occur if treatment is stopped too soon.

Bacteriologic and serologic tests can fail and awareness of a history of geographic exposure is an important diagnostic criteria for this disease which has been expanded with the growth of international travel.

ISSN: 0025-682X.

Perret, J. L., Vidal, D. and Thibault F Affiliation: HIA Laveran, Service de Pathologie Infectieuse et Tropicale,,Marseille. 1998. "La Mélioïdose Pulmonaire. Translated Title: [Pulmonary Melioidosis]." Rev. Pneumol. Clin. Dec. Volume 54, Issue 6, Pages 365-72. Descriptors: Melioidosis- diagnosis; Melioidosis- drug therapy; Pneumonia, Bacterial- diagnosis; Pneumonia, Bacterial- drug therapy; Amoxicillin- therapeutic use; Anti-Bacterial Agents- therapeutic use; Anti-Infective Agents- therapeutic use; Ceftazidime- therapeutic use; Cephalosporins- therapeutic use; Chloramphenicol- therapeutic use; Clavulanic Acid- therapeutic use; Diagnosis, Differential; Doxycycline- therapeutic use; Drug Therapy, Combination- therapeutic use; Humans; Penicillins- therapeutic use; Radiography, Thoracic; Trimethoprim-Sulfamethoxazole Combination-therapeutic use. References: Number: 65; Chemical Substances: Anti-Bacterial Agents [0] Anti-Infective Agents [0] Cephalosporins [0] Penicillins [0] Amoxicillin [26787-78-0] Chloramphenicol [56-75-7] Doxycycline [564-25-0] Clavulanic Acid [58001-44-8] Ceftazidime [78439-06-2] Trimethoprim-Sulfamethoxazole Combination [8064-90-2]. Abstract: Melioidosis is most frequently encountered in pulmonary localization. Melioidosis is an infectious disease caused by *Burkholderia pseudomallei* first described by Whitmore in 1912 in Burma. *B. pseudomallei* is a Gram negative rod belonging to the

Pseudomonadaceae family. Soil and water are the natural reservoirs for the germ which is a specific pathogen for several mammal species. Long endemic in Southeast Asia and several tropical zones, *B. pseudomallei* has recently been found in temperate zones, including France. Human contamination occurs via the transcutaneous route and often leads to dormant inapparent infection. Many conditions, such as diabetes, renal lithiasis, various circumstances of immunodepression or stress, facilitate clinical manifestations which vary greatly. Pulmonary manifestations may be acute and extensive, producing a torpid pseudo-tuberculous condition or a variety of clinical and radiological features mimicking other diseases. Bacteriological and serological tests may be negative. Exposure in an endemic zone, the notion of a favorable context, weight loss, cavitary images on successive chest x-rays and the presence of extra-pulmonary localizations may be suggestive. Ceftazidime or the amoxicillin-clavulanic acid combinations are indicated, but mortality in acute forms still reaches 40%. Relapse can be expected if the treatment duration is too short. ISSN: 0761-8417.

Peters, Charles M., Henderson, Andrew, Maung, U. Myint, et al. 2007. "The Rattan Trade of Northern Myanmar: Species, Supplies, and Sustainability." *Econ. Bot.* Thomson 2007: SPR 2007. Volume 61, Issue 1, Pages 3-13. Notes: Social biology and human ecology, Ecology: environmental biology - General and methods, Ecology: environmental biology - Plant, Botany: general and systematic - Monocotyledones, Botany: general and systematic - Floristics and distribution, Forestry and forest products; Major Concepts: Biogeography; Forestry Broader Terms: Population Studies; Super Taxa: Primates Mammalia Vertebrata Chordata; Geographic: Myanmar; Geopolitical Location(s): Asia; Zoogeographical Region: Oriental region; Misc Descript: species management rattan supply rattan sustainability rattan trade. Abstract: Although Myanmar exports millions of dollars of rattan cane each year, the last systematic treatment of rattans in this country was done over 100 years ago, and virtually nothing has been written about the collection and trade of this important forest resource. Here we report the results from a study of rattans in the Hukaung Valley Tiger Reserve in northern Myanmar. A

total of 15 species of rattan were encountered; seven species are new records for Myanmar and two species are new to science. Inventory transects revealed that the density of commercial rattans in local forests averages 40.5 canes  $\geq$  4m long/hectare. Populations of all species appear to be actively regenerating. The current pattern of rattan exploitation, however, is largely uncontrolled and will eventually lead to resource depletion unless some form of management is implemented. ISSN: 0013-0001.

Phien, H. N. and Lee, S. T. 1986. "Forecasting of Daily Discharges of Burmese Rivers." *International Journal for Development Technology*. Sept. Volume 4, Issue 3, Pages 173-188. maps. Geographic: Burma. ISSN: 0263-418X.

Phien, H. N. and Lee, Shyh-Tsai. 1986. "Forecasting Of Daily Discharges Of Burmese Rivers." *International Journal for Development Technology*. Volume 4, Issue 3, Pages 173-188. Descriptors: Rivers-Discharge; Hydrology - Mathematical Models; Meteorology - Weather Forecasting. Additional Info: Beirut: International Centre for Technical Research. Publishing Agencies: Non-US Imprint, not FAO. Descriptors: River basins; River water; Rain; Forecasting; Discharges; Hydrological models; Hybrid model. Abstract: The forecasting of daily river discharges plays a very important part in the national development of Burma. In this study a model for forecasting daily discharges with a lead-time of one day, as adopted by the Department of Meteorology and Hydrology of Burma, is developed. This model is essentially an extension of the Hybrid Model, also known as the Linear Perturbation Model, in which old (past) values of both rainfall and discharge departures from their corresponding means are used. Application of the model to actual data from the Chindwin River Basin of Burma shows that it is capable of excellent forecasts that are much more accurate than those obtained from the original Hybrid Model. Results also show that for all the stations considered in this study, old values of discharge contribute more significantly to forecasts than do values of rainfall. ISSN/ISBN: 0263-418X.

Phone, Hla and Suzuki, Hiroshi. 2004. "Macrobrachium Patheinense, a New Species of Freshwater Prawn (Crustacea: Decapoda: Palaemonidae) from Myanmar." *Proc. Biol. Soc. Wash. Biological Society of Washington*: Volume 117, Issue 4, Pages 523-528. Descriptors: Animal appendages; Animal morphology; Inland water environment; New species; Taxonomy; Telson; Article Taxonomic Terms: Chela; Macrobrachium patheinense; Palaemonidae; Article Geographic Terms: Myanmar; Freshwater. Notes: TR: CS0523798. Abstract: A new species of freshwater palaemonid prawn, *Macrobrachium patheinense*, is described from Mayan Creek near Pathein City, Ayeyawaddy Division, Myanmar. The new species is most closely related to *M. mirabile* (Kemp, 1917), *M. palaemonoides* Holthuis, 1950, *M. superbum* (Heller, 1862) and *M. inflatum* Liang & Yan, 1985, but can be differentiated by the rostrum shape and dentition, telson shape, and the second pereopod chela proportions. ISSN: 0006-324X.

Phyu, S., Lwin, T., Ti, T., et al. 2005. "Drug-Resistant Tuberculosis in Yangon, Myanmar." *Scand. J. Infect. Dis.* Volume 37, Issue 11-12, Pages 846-851. Descriptors: Article Subject Terms: Drug resistance; Isoniazid; Sputum; Tuberculosis; Article Taxonomic Terms: *Mycobacterium tuberculosis*. Geographic Terms: Myanmar. Abstract: The extent of drug resistant tuberculosis (TB) in the capital city of Myanmar, Yangon has not yet been reported. This study aimed to determine the proportion and pattern of drug resistance to first-line anti-TB drugs, among *Mycobacterium tuberculosis* complex isolates from sputum smear positive TB patients who attended National TB Programme Yangon centres in April-August and October-December 2002. Drug susceptibility was determined by the *Mycobacteria* Growth Indicator Tube manual system (Becton Dickinson, MD, USA). Of the 567 patients, sputum specimens from 447 (79%) had a positive culture. Of these, 357 isolates (80%) had a susceptibility test result. Isolates from 76 of 259 (29.3%) new patients and from 45 of 98 (45.9%) previously treated patients were resistant to at least 1 of the anti-TB drugs. Resistance to isoniazid (INH) (22.0% vs 40.8%: new vs previously treated patients) and to greater than or equal to 2 drugs (17.8% vs 29.6%: new vs previously treated patients) was common.

Multidrug- resistant TB (MDR-TB) among new and previously treated patients was 4.2% and 18.4%, respectively. INH-resistant (adjusted OR: 2.0, 95% CI 1.1-3.6) and MDR-TB (adjusted OR: 3.4, 95% CI 1.4-8.3) cases were more likely to have taken anti-TB drugs greater than or equal to 1 month previously. Collectively, prevalence of MDR-TB and TB resistance to greater than or equal to 2 drugs are not rare in Yangon. ISSN: 0036-5548.

Piper-Jenks, N., Horowitz, H. W. and Schwartz E Affiliation: Hudson River Health Care, Peekskill, New York. 2000. "Risk of Hepatitis E Infection to Travelers." J. Travel Med. Jul-Aug. Volume 7, Issue 4, Pages 194-9. Descriptors: Adolescent; Adult; Africa- epidemiology; Age Factors; Aged; Asia- epidemiology; Child; Female; Hepatitis E- epidemiology; Humans; Male; Middle Aged; Risk Factors; Travel- statistics & numerical data; Tropical Climate. References: Number: 73; Comment In: J Travel Med. 2000 Jul-Aug; 7 (4): 167-9. Abstract: Hepatitis E virus (HEV), previously referred to as enterically transmitted non-A, non-B hepatitis, is a major cause of epidemic hepatitis and acute, sporadic hepatitis in endemic areas of the world. The existence of HEV was suspected based upon epidemiological grounds for many years. However, it was only in the early 1990s that confirmation occurred when two prototype strains of HEV from Burma and Mexico were sequenced. Outbreaks of HEV infection as well as sporadic transmission commonly occur in Asia, Africa, Central and South America, the Middle East, and the Republics of the former USSR. Southeast Asia seems to be a particularly high HEV endemic region. HEV is transmitted via the fecal-oral route, and contaminated drinking water is a common source of infection. Many of the large outbreaks have occurred after heavy rains and flooding.<sup>4</sup> During interepidemic periods sporadic infections occur frequently. This suggests a constant environmental reservoir, allowing for transmission between epidemics. The existence of a zoonotic reservoir for the virus is likely. HEV has been detected in a number of species, including swine, rats, and chicken. ISSN: 1195-1982 (Print); 1708-8305 (Electronic).

Pivnik, D. A., Nahm, J. and Tucker, R. S. 1998. "Polyphase Deformation in a Fore-arc/back-Arc Basin, Salin Subbasin, Myanmar

(Burma)." AAPG Bull. October. Volume 82, Issue 10, Pages 1837-1856. Descriptors: Petroleum geology/Myanmar; Plate tectonics/Myanmar; Rocks/Deformation. Notes: Physical Description: Bibliography; Illustration; Map. Abstract: The deformation history of the Salin subbasin, Myanmar, Burma, was studied. In the study, field-based geological observations and interpretations of geophysical data were integrated with regional tectonics. Exploration of the mechanisms of creation and deformation can be carried out in this region due to the configuration of the basin being preserved as a result of intense structural shortening due to continental collision. An insight into the structural and tectonic processes at work is provided. ISSN: 0149-1423.

Pocha, Jehangir. 2004. Water Crisis Looming for China, Officials Warn. BOST. Jan 2. Pages: A.8. Descriptors: Water resources; Industrial development; Environmental protection; Water supply; Drought. Abstract: Picturesque Hubei Province, home to Beijing, is known as the "Province of a Thousand Lakes." But industrialization has turned more than three-fourths of its once pristine lakes into sandpits. Beijing responded this year by finalizing a massive project that will transfer 50 billion cubic meters of water each year from the Yangtze River in the south to the Yellow, Huai, and Hai rivers in the north. Western diplomatic officials in Beijing say they are also troubled by China's damming of the Mekong River and its diversion of water from Cambodia, Thailand, Laos, and Vietnam. Some officials also are concerned that China could divert rivers that originate in Tibet, such as the Indus and Sutlej, which are also critical to India and Pakistan, and the Brahmaputra, which is critical to India and Burma. Notes: Named Corp: International Bank for Reconstruction & Development. Geographic: China. ISSN: 0743-1791.

Polhemus, D. A. 2001. "A Review of the Genus *Ptilomera* (Heteroptera: Gerridae) in Indochina, with Descriptions of Two New Species." J. N. Y. Entomol. Soc. New York Entomological Society. August. Volume 109, Issue 2, Pages 214-234. Descriptors: Taxonomic revision; New species; *Ptilomera*; Gerridae; Asia,Southeast; Burma; Thailand; Hemiptera; Water striders. Abstract: The water strider species of the



genus *Ptilomera* occurring in Indochina are reviewed, and two new species are described and figured: *P. fang* from northern Thailand, and *P. burmana* from northern Burma. Keys to species for both males and females are provided for all taxa found in the region, accompanied by detailed distributional records and range maps. ISSN: 0028-7199.

Postlewaite, Susan. 2000. *Wrath of the Monsoons*. Chronicle Publishing Company Oct 31, 2000. SF. Oct 31. Pages: A.12. Descriptors: Series & special reports; Rain; Foreign aid; Floods. Abstract: According to the Mekong River Commission, Cambodia and Vietnam are the nations most vulnerable because of their location toward the mouth of the 2,600-mile Mekong River that begins high up in the Tibetan Plateau and doubles in volume as it passes through China, Burma and Laos before reaching Cambodia and Vietnam. Some economists say Cambodia's economic growth will suffer in the next two years because of severe damage to agriculture and infrastructure. The Asian Development Bank, which is carrying development loans of \$400 million in Cambodia, recently revised its estimate for the nation's annual economic growth rate in 2000 from 5 percent to 4 percent. The situation is much the same in Vietnam, where more than 300 people have died, entire villages are submerged and agriculture has been severely damaged. "People can live with flooding, but not of this magnitude," said Sok Saing Im, a senior hydrologist with the Phnom Penh-based Mekong River Commission, which includes representatives of Laos, Vietnam, Thailand and Cambodia. "There is too much damage." Geographic: Cambodia Mekong River.

Praññ` tvaṇ`" re kron" say` yu pui' chon` re" ko` ma rhan`. 1952. Praññ` Tvaṇ`" Re Kron" Say` Yu Pui' Chon` Re" Ko` Ma Rhan` e\* a Ci Ran` Kham Ca. Ran` kun` : Praññ` thon` cu Mran` ma nuin` nam to` a cui" ra ca pum nhip` tuik`. Descriptors: Inland water transportation-Burma; Praññ` tvaṇ`" re kron" say` yu pui' chon` re" ko` ma rhan`. Notes: 102 p. 34 cm. Notes: Burmese and English. Responsibility: [Praññ` tvaṇ`" re kron" say` yu pui' chon` re" ko` ma rhan`]. LCCN: 77-986057. OCLC: 39101626.

Prasada Rao, R. D. V. J. and Chakrabarty, S. K. 1990. "Interception of Peanut Stripe Virus in Groundnut Seeds Imported from Myanmar." *FAO Plant Prot. Bull.* Volume 38, Issue 1, Pages 48-49. Descriptors: Article Subject Terms: seed-borne diseases; transmission (seed); Article Taxonomic Terms: *Arachis hypogaea*; Article Geographic Terms: Myanmar; peanut stripe virus; quarantine; seeds. Abstract: Groundnut (*Arachis hypogaea* L.) germplasm introduced into India is rigorously tested for seedborne viruses of quarantine significance by testing individual seed using the enzyme-linked immunosorbent assay method (ELISA), followed by a growing-out test in the screenhouse. During 1988, when groundnut seeds imported from Myanmar were tested by ELISA, one seed out of 410 was found to contain peanut stripe virus (PSTv). ISSN: 0254-9727.

Precipitation. 2008. Derived from the Global Agro-Ecological Zones Study, Food and Agriculture Organization of the United Nations (FAO), Land and Water Development Division (AGL) with the collaboration of the International Institute for Applied Systems Analysis (IIASA), 2000. Data averaged over a period of 37 years. Raster data-set has been exported as ASCII raster file type.  
<http://www.iiasa.ac.at/Research/LUC/GAEZ/index.htm> ;  
<http://www.fao.org/countryprofiles/Maps/MMR/06/pp/index.html>

Proceedings of the 3rd Regional Symposium on the Development of Deltaic Areas (Held at Bangkok, Thailand, 22-28 November 1977). 1978. New York: UN. Pages: 274. Descriptors: Asia And The Pacific; Bangladesh; Myanmar; Deltas; Flood Control; India; Indonesia; Malaysia; Philippines; Sri Lanka; Thailand; Water Management; Water Resources; Conference publication; Government publication; International government publication. Notes: ix; figures, maps, tables. Notes: UN sales no.: 78.II.F.10. Conferences, etc. (proceedings/final reports). Distribution: General. Other Titles: Regional Symposium on the Development of Deltaic Areas (3rd: 1979: Bangkok). Proceedings. Stock no: 78.II.F.10. OCLC: 84200262.

Puckridge, D. W., Catling, H. D., Vongsaroj, Prasan, Boonyawivatana, Samlee, Niyomwit, Lavan and Thongbai, Pongmanee. 1989. "Factors Affecting Deepwater Rice in the Central Plain of Thailand." *Field Crops Research*. 1. Volume 19, Issue 4, Pages 263-283. Abstract: Deepwater

rices from Thailand have been among the most promising lines tested in the deep-water areas of Africa, Burma, Indonesia, and Vietnam, and the effect of environmental factors and cultural practices on production in Thailand is relevant to those countries. In Thailand, approximately 800 000 ha of deepwater rice is grown in fields which are flooded to depths of 50 cm or more for over a month during the growing season. Most of this specially adapted rice is grown in three regions of the central plain. Dry seeds are broadcast on ploughed fields at the beginning of the wet season, and the crop grows under rainfed dryland conditions for about 3 months before floods arrive in July–August. The plants elongate to maintain foliage above the floodwater, which may be as deep as four m. The crop is harvested after the fields drain in December–January. Investigations were made to assess yields in farmers' fields, and to determine yield-limiting factors and crop responses to inputs. Farmers were interviewed to determine production practices, and fields were sampled to estimate yields. Samples from 30 fields gave an average yield of 2.18 t ha<sup>-1</sup> (0.7–3.5 t ha<sup>-1</sup>) for the 1981/1982 season, and from 63 fields in 1982/1983 gave an average of 1.83 t ha<sup>-1</sup> (0.1–2.9 t ha<sup>-1</sup>). There were 32 different varieties. Maximum water depths ranged from 60 cm to 200 cm. Major pests were yellow stem-borers and rats. A multi-location factorial experiment with 13 sites tested the possibility of improving yields by nitrogen and phosphorus fertilizer, or by use of a herbicide spray to control broadleaved weeds. However, grain yields were increased by N only at four sites, by P at one site, and by herbicide spraying at one site. Major yield-limiting factors were drought and poor plant stands in the pre-flood period, and some flood damage. Better characterisation of the environment and of its interaction with genotypes is necessary before adequate prediction of performance and improvements in production will be obtained. OCLC: 38873178.

## Q

Quantity with Quality: A Report on Expert Group Meeting on Drinking Water Quality Surveillance and Monitoring: 23 June 2000. 2001. Yangon: Pages: 7. Descriptors: Drinking water- Burma- Quality

control- Congresses; Conference publication. Notes: 24, 8; col. ill. 30 cm. Notes: Cover title. OCLC: 56416518.

Quang, Nguyen Nhan. 2002. "Vietnam and the Sustainable Development of the Mekong River Basis." *Water Science and Technology*. Volume 45, Issue 11, Pages 261-266. Descriptors: Hydrology; Rivers; Sustainable development; Water power. Abstract: Vietnam is a riparian country located in most downstream area of the Mekong river basin which is also shared by other states namely China, Myanmar, Laos, Thailand and Cambodia. While the Central Highlands of Vietnam has a great potential for hydropower development in tributaries of Mekong river, the Mekong delta in Vietnam territory is rich in natural resources which are favorable for agricultural development. However, besides local constraints which being gradually remedied by Vietnam, the development of the Mekong delta is subject to, in both terms of quantity and quality, availability of water resources which relates to the water use of or discharge into the river of upper riparians. With a view to co-developing these resources in a sustainable and mutually beneficial manner, Vietnam has cooperated with other states through framework of the Mekong River Commission set up by the 1995 Mekong Agreement. This paper describes the strategy and action plan applied by Viet Nam National Mekong Committee to reach the sustainable development of the Mekong river basin in general and of Vietnam parts located in the Mekong basin in particular. ISSN: 0273-1223.

Quin-Harkin, A. J. 1996. *Imperial Airways, 1924-1940*. In: *Air Transport*. Ashgate Publishing Company. *Studies in Transport History*. Pages: p. 27-45. Descriptors: Air transportation; Airlines; Cargo handling; England; Technological innovations; Tourists; Traffic. Abstract: The story of Imperial Airways is sixteen years of pioneering and development--sixteen years of glorious achievement. From its birth as a public company in 1924 to its absorption within the state-owned British Overseas Airways Corporation, this virile airline, begotten of the first generation of a new form of transport, had by the outbreak of war in September 1939 surveyed, opened, and put into regular operation air services between the United Kingdom and the

Dominions and Colonies of the British Commonwealth. In the beginning Imperial Airways operated a heterogeneous fleet of thirteen single and twin-engine serviceable aircraft, and its' only service was to the nearby capitals of Western Europe, with the tourist traffic to Paris featured as its most popular and lucrative service. At the outbreak of war, fifteen years later, its four-engined fleet of over thirty flying boats and twenty landplanes was carrying passengers, mail, and cargo to South Africa, India, Burma, Malaya, and the territories between, and was also flying to Australia and New Zealand, in association with Queensland and Northern Territories Air Service (QANTAS) and Tasman Empire Airways (TEA). It had, further, inaugurated a service between the USA and Bermuda, joined Bangkok to Hong Kong, and Khartoum with Kano, and had moreover operated in the summers and early autumns of 1937, 1938, and 1939 a series of experimental transatlantic flights. Notes: Originally published in *Journal of Transport History*, 1st series, vol. I, no. 4 (1954) pp. 197-215. ISBN: 1859283004. OCLC: 00794173.

## **R**

Rajendran, K. and Gupta, H. K. 1989. "Seismicity and Tectonic Stress Field of a Part of the Burma-Andaman-Nicobar Arc." *Bulletin of the Seismological Society of America*. Seismological Society of America. Aug. Volume 79, Issue 4, Pages 989-1005. Descriptors: Seismicity; Burma-Andaman-Nicobar arc; Tectonics; Seismology; Earthquake Risk. Abstract: The nature of instrumentally recorded seismicity for a part of the Burma-Andaman-Nicobar arc bounded by latitudes 2 degrees and 24 degrees N and longitudes 91 degrees and 99 degrees E was investigated. Based on the spatial distribution of the earthquakes and their focal mechanism solutions, four tectonic units were identified: the Sumatra trench region, the Andaman spreading ridge, the Andaman-Nicobar ranges, and the Indo-Burman ranges region. The stress orientations in these segments and their changes with depth were studied in relation to the tectonics of the region. Notes: Bibliography; Map; Diagram. ISSN: 0037-1106.

Ramalingaswami, V. and Purcell, R.H. Affiliation: Fogarty International Center, National Institutes of Health, Bethesda, Maryland. 1988. "Waterborne Non-A, Non-B Hepatitis." *Lancet*. Mar 12. Volume 1, Issue 8585, Pages 571-3. Descriptors: Adolescent; Adult; Africa; Asia, Central; Disease Outbreaks- epidemiology; Feces- microbiology; Female; Hepatitis C- epidemiology; Hepatitis C- prevention & control; Hepatitis C- transmission; Hepatitis Viruses- isolation & purification; Hepatitis, Viral, Human- epidemiology; Humans; Hygiene; Immunization, Passive; India; Indonesia; Male; Myanmar; Nepal; Pregnancy; Thailand; Water Pollution; Water Supply. Abstract: Waterborne non-A, non-B hepatitis (NANB) is responsible for outbreaks of hepatitis with a predilection for young adults. The disease is usually mild, except in pregnant women, who have a high case-fatality rate from fulminant hepatic failure. Diagnosis is largely based on the epidemiological findings of faecal contamination of drinking water and serological exclusion of hepatitis A and B virus infection. Histological features of liver biopsy specimens are characteristic and virus-like particles in the stool are aggregated by antibody present in acute and convalescent phase sera of the test subject. NANB is widespread in India and several countries of South-East Asia; it is increasingly recognised in Africa and may occur in Latin America. Control measures include provision of clean water supplies, safe disposal of human excreta, and sound personal and food hygiene practices. Passive immunisation with immunoglobulin derived from healthy donors resident in the countries affected by the disease may protect vulnerable groups. ISSN: 0140-6736 (Print); 1474-547X (Electronic).

Rastogi, B. K., Singh, J. and Verma, R. K. 1973. "Earthquake Mechanisms and Tectonics in the Assam-Burma Region." *Tectonophysics*. July. Volume 18, Issue 3/4, Pages 355-366. Descriptors: Plate tectonics; Assam-Burma; Himalayas; Focal mechanisms; Burma; Assam-Burma region; Seismology. Abstract: Eleven new focal mechanisms from earthquakes in the Assam-Burma region have been determined using P-wave first-motion directions reported in the *Bulletin of the International Seismological Centre* (Edinburgh). Out of them, eight mechanisms indicate thrust faulting,

two normal faultings and one strike-slip faulting. In the thrust type of mechanism solutions, sense of motion on the shallow dipping of the two nodal planes is consistent with underthrusting beneath the arc-like mountain ranges. Seismic slip vectors strike in almost a northerly direction along the eastern Himalayas and in almost an easterly direction along the Burmese arc. A predominance of thrust faulting is consistent with geological evidences of thrusting and uplift in the Himalayas and the Assam-Burma region. ISSN: 0040-1951.

Ratterman, Walt and Garwood, Anna. 2005. "Solar Power in the War Zone: Burma's Clinics Light Up." *Refocus*. Volume 6, Issue 1, Pages 46-48. Descriptors: Solar energy; Photovoltaic cells; Electricity; Renewable energy resources; Project management; Patient monitoring; Diseases; Societies and institutions; Hospitals; Personnel training; Lighting; Rural areas; Fossil fuels; Social aspects; Finance; Potable water; Health care. Abstract: The efforts of the Karen Health and Welfare Department, Burma, Palang Thai (Thailand-based non-profit organization), and Portland-based Green Empowerment (non-profit organization), in assisting various clinics in Burma with solar photovoltaic power, are discussed. The Karen Health and Welfare Department manages 26 remote clinics, scattered 600 miles, to serve the needs of internally displaced people (IDP). Most of the clinics are deprived of electricity due to their remote location. The role of Green Empowerment is to catalyze the use of renewable energy for community needs by providing organizational support, fundraising assistance and technical expertise to local groups. ISSN: 1471-0846.

"RCC Dams in Asia." 2007. *Int. J. Hydro. Dams*. Volume 14, Issue 4, Pages 84-88. Descriptors: Article Subject Terms: Dam Construction; Dams; Hydroelectric Plants; Article Geographic Terms: China, People's Rep. Myanmar; Vietnam. Abstract: The world's largest RCC dam schemes currently under construction are in Asia, with Longtan setting the record in terms of scale, and RCC placement. This feature brings updates on progress from the sites of some of the most important schemes currently under way in China, Vietnam, Laos and Myanmar. ISSN: 1352-2523.

Reddy Keshav, Tirupati and Basu, S. 2007. "Gas-to-Liquid Technologies: India's Perspective." *Fuel Processing Technology*. 5. Volume 88, Issue 5, Pages 493-500. Descriptors: GTL; Syngas technology; Direct conversion of methane; Oxygenates. Abstract: Gas-to-liquid (GTL) technologies are capable of converting gas to clean, useful liquid hydrocarbons and thus suitable for addressing problems of remote gas utilization, increase in crude oil price, depletion of fossil fuel and environmental pollution. The Indian state of Tripura is considered to be the richest province with 26 billion cubic meters of gas reserves. Neighboring country Myanmar has huge gas reserves but these reserves remain unutilized mainly because of land-locked situation. GTL is a well developed and proven technology and it is an important option for moving natural gas to the market place. GTL options include not only the well-known production of Fischer-Tropsch synthesis liquids but also the production of oxygen containing fuels, fuel additives and chemicals, such as methanol and DME. An alternative, promising option to convert surplus gas is the direct route of methane conversion, which is more energy efficient than the indirect route since it bypasses the energy intensive endothermic steam reforming step of syngas formation. On-site conversion to liquid products of commercial importance using direct route would make transportation of these natural deposits much more economical and practical. In this paper an attempt has been made to review recent developments in syngas technologies, direct routes of methane conversion into useful liquids, and status of both existing and future developments in GTL industry around the world. Finally challenges in GTL technology are discussed. OCLC: 38877066.

"Report of the Chemical Examiner and Bacteriologist to the Government of Burma for the Year..." 1900s-1915. Office of the Supt., Govt. Print., Burma: Rangoon. Descriptors: Bacteria- Burma- Tables; Blood Chemical Analysis- Burma- Tables; Poisons- analysis- Burma- Tables; Water- analysis- Burma- Tables; Forensic Medicine- Burma- Tables; National Library of Medicine: W2 JB8. Succeeding Title: Report of the chemical examiner to the government of Burma for the year ... Notes: Frequency: Annual; -1915. v; Genre/Form: Statistics. Notes:



Description based on: 1911, published in 1912. British National Library: 9516289; SR0085966.

Report on Rivers and Lakes of Burma. 1943. New Delhi: General Headquarters, 1943. Notes: 25th March, 1943, amended 15th July, 1943. Cover title. Description: ii, 83 pages; 22 cm. Burma -- Description and travel. Burma -- Rivers. OCLC: 23742448.

Reyes, G. R., Yarbough, P. O., Tam, A. W., et al. 1991. "Hepatitis E Virus (HEV): The Novel Agent Responsible for Enterically Transmitted Non-A, Non-B Hepatitis." *Gastroenterol. Jpn.* Jul. Volume 26 Suppl 3: 142-7. Descriptors: Cloning, Molecular; Genes, Viral; Hepatitis E-microbiology; Hepatitis Viruses- genetics; Humans; Open Reading Frames; RNA, Viral- genetics. Abstract: A normally endemic form of viral hepatitis is the cause of major epidemic outbreaks in developing countries. This disease has a global distribution and has been referred to as water-borne, epidemic or enterically transmitted non-A, non-B hepatitis (ET-NANBH). Although the fecal-oral route of transmission predominates, person-to-person routes of exposure were also suggested in some epidemiologic studies. The disease has been documented as having an extremely high mortality in pregnant women (approximately 20%). Sporadic cases of ET-NANBH, as well as imported travel exposures, have been reported in developed countries. Molecular cloning was hampered by the lack of a tissue culture system for virus propagation, however, an available animal model and a newly developed non-specific amplification procedure were used to clone and identify an exogenous cDNA (ET1.1) from a Burma-isolate infected animal. Molecular clones were also identified by immunoscreening of a cDNA library made from a fecal specimen collected from a Mexican outbreak of ET-NANBH. The isolation and sequencing of a set of overlapping cDNA clones had led to the recognition that this form of hepatitis is caused by a virus unlike any of the other viral hepatitis agents. The molecular characterization of HEV will lead to important pathobiologic insights and hasten the development of potentially useful diagnostic and therapeutic products for ET-NANBH. ISSN: 0435-1339 (Print).

Rice, Edward B. 1997. Paddy Irrigation and Water Management in Southeast Asia. Washington, D.C.: World Bank. Descriptors: Land Ownership and Tenure; Land Reform; Land Use; Irrigation- Q150; Irrigation; Water. Abstract: Assesses the agro-economic impacts of investments in gravity-fed irrigation schemes in the paddylands of Southeast Asia, and determines whether and how the quality of operation and maintenance services influence the sustainability of those impacts. Based on a study of six gravity-fed irrigation schemes with reservoirs for water storage in Thailand, Myanmar, and Vietnam and on an audit of a flood control and drainage project at three sites in Bangladesh. No index. Notes: xix, 63. ISBN: 0-8213-3914-1. OCLC: 0425610.

Ripley, S. D. and Beehler, B. M. 1989. "Ornithogeographic Affinities of the Andaman and Nicobar Islands." J. Biogeogr. Volume 16, Issue 4, Pages 323-332. Descriptors: General Microbial Ecology; island; avifauna; colonization. Geographic: Burma India- Andaman Islands India- Nicobar Islands. Abstract: Despite an intervening deep water barrier, the 2 island groups share a single insular avifauna, the Nicobarese species list comprising a subset of that of the Andaman Islands. As measured by shared breeding species, the Andaman and Nicobar avifauna is closest to that of SW Burma (78% shared species) and should be considered Indochinese. Colonization apparently occurred primarily by island-hopping from SW Burma. The Andamanese and Nicobarese avifauna is an assemblage of species that have crossed permanent water barriers to colonize the archipelago. The breeding avifauna is notably poor in passerines and disproportionately rich in herons (11 species), hawks (9), pigeons (8) and kingfishers (8). Nearly all sister-groups of endemic insular species are widespread forms that range from SE Asia to India. ISSN: 0305-0270.

Roberge, Daniel. 2005. "Apres Le Tsunami." Translated title: "After the Tsunami." Geomatica. Canadian Institute of Geomatics, Ottawa, Ontario, Canada: Volume 59, Issue 4, Pages 445-450. Descriptors: Disasters; Tsunamis; Earthquake effects; Reconstruction (structural); Laws and legislation; Public policy. Abstract: In the early hours of the

day after Christmas 2004, a major earthquake measuring 9.0 on the Richter scale struck the coast of many South-East Asian countries. The quake triggered a powerful tsunami, reaching ten to twenty metres in height moving through the Indian Ocean at over 500 kilometres an hour. The tsunami flooded coastal areas in India, Indonesia, Sri Lanka, Thailand, Maldives, Myanmar, Seychelles, and Somalia, wiping away homes and lives. This cataclysm made us realize how vulnerable humanity is in the face of nature's strength. The weeks that followed the tragedy were focused on rescue efforts and tending to the survivors; trying to meet the latter's primary needs by providing them care, food and water, and emergency shelters were obvious priorities. Reconstruction of infrastructures such as roads, bridges, sanitary networks, etc. would have to follow. How can we resettle communities while respecting land rights that prevailed before the deadly wave that wiped out all landmarks? During the reconstruction phase, the international community of land surveyors will have to be present in order to promote the importance of land rights issues and tenure. If the land related issues are well managed in the resettlement plan, it can translate into an opportunity to improve the land rights situation. If not, it can aggravate an already problematic situation. The International Federation of Surveyors (FIG) must take the lead along with the United Nations (UN) agencies to promote land tenure issues and ensure that they are taken into consideration in the reconstruction and resettlement plans for the communities affected by such natural disasters. ISSN: 1195-1036.

Robertson Research International. 1977. "S. E. Asia map series. Geology-Burma." Compiled, drawn, and printed by Robertson Research Int. Ltd. Llandudno, Gwynedd: Robertson Research, [1977]. 3 maps: color; 33 x 51 cm. or smaller. Series: South-east Asia geological map series. Robertson Research International. Relief shown by spot heights. "June 1977." Map sheets and overlays separately designated: North- Central- South. Accompanied by text: Burma, 1:2,000,000, explanatory notes. 13 p.: tables, maps; 30 cm. Also accompanied by transparent overlays: S. E. Asia map series. Landsat-1 interpretation-Burma. 3 sheets ; 43 cm. Includes index map. Map Data: Scale 1:2,000,000; Lambert conic conformal projection, standard parallels. Subjects: Geology- Burma- Maps. Other authors: Robertson Research International. S. E. Asia map series. Landsat-1 interpretation- Burma.

1977. Other titles: South East Asia map series. Geology-Burma. South East Asia map series. Landsat-1 interpretation-Burma. Series Entry: Robertson Research International. South-east Asia geological map series. OCLC: 5519983.

Robinson, R. A. J., Bird, M. I., Oo, Nay Win, et al. 2007. "The Irrawaddy River Sediment Flux to the Indian Ocean; the Original Nineteenth-Century Data Revisited." *J. Geol. University of Chicago Press, Chicago, IL. Nov. Volume 115, Issue 6, Pages 629-640.*  
Descriptors: annual variations; Asia; bedload; Burma; Cenozoic; discharge; Far East; fluvial sedimentation; geomorphology; historical records; history; Holocene; hydrology; Indian Ocean; Irrawaddy River; modern; Quaternary; rivers and streams; sediment transport; sedimentation; sedimentation rates; stream transport; suspended materials; upper Holocene. References: 26; illus. incl. 1 table, sketch map. Abstract: The Irrawaddy (Ayeyarwady) River of Myanmar is ranked as having the fifth-largest suspended load and the fourth-highest total dissolved load of the world's rivers, and the combined Irrawaddy and Salween (Thanlwin) system is regarded as contributing 20% of the total flux of material from the Himalayan-Tibetan orogen. The estimates for the Irrawaddy are taken from published quotations of a nineteenth-century data set, and there are no available published data for the Myanmar reaches of the Salween. Apart from our own field studies in 2005 and 2006, no recent research documenting the sediment load of these important large rivers has been conducted, although their contribution to biogeochemical cycles and ocean geochemistry is clearly significant. We present a reanalysis of the Irrawaddy data from the original 550-page report of Gordon covering 10 yr of discharge (1869-1879) and 1 yr of sediment concentration measurements (1877-1878). We describe Gordon's methodologies, evaluate his measurements and calculations and the adjustments he made to his data set, and present our revised interpretation of nineteenth-century discharge and sediment load with an estimate of uncertainty. The 10-yr average of annual suspended sediment load currently cited in the literature is assessed as being underestimated by 27% on the basis of our sediment rating curve of the nineteenth-century data. On the basis of our sampling of suspended load, the nineteenth-century concentrations are interpreted to be missing about

18% of their total mass, which is the proportion of sediment recovered by a 0.45- $\mu$ m filter. The new annual Irrawaddy suspended sediment load is 364+ or -60 MT. Our revised estimate of the annual sediment load from the Irrawaddy-Salween system for the nineteenth century (600 MT) represents more than half the present-day Ganges-Brahmaputra flux to the Indian Ocean. Since major Chinese rivers have reduced their load due to damming, the Irrawaddy is likely the third-largest contributor of sediment load in the world. ISSN: 0022-1376.

Robinson, Ruth. 2006. Reanalysis of the 19th Century Hydrology and Sediment Load Dataset for the Irrawaddy, Myanmar. Descriptors: Article Subject Terms: Myanmar; Hydrology; Sediment pollution; Sediments; Sediment load. Notes: 2006 BGRG international conference on geomorphology and earth system science (GESS 2006), Loughborough University, Loughborough (UK), 28-30 June 2006. Database: Conference Papers Index. OCLC: 4262491.

Rodger, Alex and National Library of Australia. Forest Reservation in Burma in the Interests of an Endangered Water-Supply. Canberra: National Library of Australia. Descriptors: Water-supply- Burma; Forest influences- Burma; Forest reserves- Burma; Government publication; National government publication; Microfiche. Notes: 1 microfiche (36 fr.): negative, ill. Notes: Reproduction of: Calcutta: Supt. Govt. Printing, India, 1909. OCLC: 38324479.

Rosati, Ilaria. 2008. "Maps of Mangrove and Flooded Area." Maps of mangrove and flooded area in Myanmar. Maps created by FAO/NRCE. Flooded areas from UNOSAT. Mangrove map from Landsat (2000-2002 World Atlas of Mangroves). Mangrove only (762KB): [http://www.fao.org/nr/myanmar/Myanmar\\_flood1\\_red.jpg](http://www.fao.org/nr/myanmar/Myanmar_flood1_red.jpg) ; Flooded area (898KB): [http://www.fao.org/nr/myanmar/Myanmar\\_flood2\\_red.jpg](http://www.fao.org/nr/myanmar/Myanmar_flood2_red.jpg) ; Flooded area; zoom (1.4MB): [http://www.fao.org/nr/myanmar/Myanmar\\_flood3c\\_red.jpg](http://www.fao.org/nr/myanmar/Myanmar_flood3c_red.jpg)

Rose, C. J. 1973. "Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility." *Management Science*, Vol 20, no 4. Pages 423-438, December. Volume PART I, Pages 5 REF.

Descriptors: Irrigation; Feasibility Studies; Operations Research; Management; Agriculture; Economics; Rivers; Decision Making; Constraints; Methodology; Crops; Natural Resources; Mathematical Models; Developing Countries; Burma; Mixed Integer Programming; Water Availability; Mu River (Burma). Abstract: an irrigation feasibility study is described in which systems analysis methods were used to select for a well-defined geographical area an irrigation system best suited to both local and national needs. The problem was to decide what major works to build and crops to grow to make optimal use of the available natural and human resources, the availability of water being a prime consideration. The area examined comprises some one million acres of land in Burma, and the study was undertaken for the burmese government under the auspices of the united nations. The solution technique used was mixed integer programming in order to be able to handle some 750 continuous variables, 50 integer variables, and 250 constraints. This paper reports on a specific project, the mu river valley multipurpose scheme, and is divided into three sections: the real problem description, adoption of solution approach, and study results. The problem was solved using both conventional and operations research methods independently; a complete comparison of the relative merits of both approaches is considered in detail. The advantages arising from the use of a mathematical model are considerable. ISSN: 0025-1909.

Rose, E. P. F. and Clatworthy J.C. Affiliation: E.P.F. Rose, Department of Geology, Royal Holloway, University of London, Egham, Surrey, UK. E-mail: [ted.rose@virgin.net](mailto:ted.rose@virgin.net). 2007. "Specialist Maps of the Geological Section, Inter-Service Topographical Department: Aids to British Military Planning during World War II." *Cartographic Journal*. 2007. Volume 44, Issue 1, Pages 13-43 Additional Info: United Kingdom. Descriptors: Applications: human; GIS, Remote Sensing; geological mapping; military application; permeability; planning method; terrain; thematic mapping; topographic mapping. Notes: References: Number: 34. Abstract: Between November 1943 and May 1946, geologists assisted the Inter-Service Topographical Department (ISTD) to prepare reports and maps to guide planning of British military operations in Europe and the Far East. Early reports were illustrated by

pre-war geological maps reprinted by the Geographical Section, General Staff, (GSGS), later reports by new simplified geological maps, usually accompanied by one or more thematic maps. An airfield suitability map for Bulgaria and soils maps for both the Middle Danube region (Hungary) and Austria were printed as part of the GSGS Miscellaneous map series, and groundwater and soils maps prepared as tracing overlays for use with topographical maps for parts of Germany. Simplified geological maps were prepared by ISTD and printed by GSGS for Sumatra, Borneo, Formosa, the Kra Isthmus region of the Burma/Thailand peninsula, Siam (Thailand) and Indo-China, Java, Hainan, and the Hong Kong to Canton region of China. These were mostly at a scale of 1:1000 000 but in varying styles, to innovatively indicate terrain features of specific military significance. Airfield suitability maps were printed at scales between 1:250 000 and 1:1000 000 for many of these regions, based on ground features and predicted soil permeability. All these specialist maps were printed in small numbers, and few copies have survived the war - notably in the British Library, the National Archives, or the library of the Royal Geographical Society. The ISTD Geological Section constituted the larger of only two teams of British military geologists to be established in either World War, exercising a role in military intelligence that is seldom acknowledged. ISSN: 0008-7041.

Rosegrant, M. W. and Meinzen-Dick, R. S. 1996. "Water Resources in the Asia-Pacific Region: Managing Scarcity." *Asian-Pacific Economic Literature*. 2005. Volume 10, Issue 2, Pages 32-53. Descriptors: Water Resources: Planning; Irrigated agriculture; resources management; developing region; water resources; water scarcity; irrigation demand; agricultural growth; water resources management; irrigated agriculture. Geographic: Asia. Abstract: Irrigation, together with improved crop varieties and substantial growth in fertiliser use in the late 1960s through the early 1980s, was a key factor in stimulating strong agricultural growth in much of the Asia-Pacific region. New sources of water are increasingly expensive to exploit, but irrigation continues to be a major catalyst for agricultural growth. In the face of increasing degradation, the maintenance of the water resource base must be a high priority policy objective. This paper reviews the

management of water resources in the Asia-Pacific region, for countries with significant irrigated area: Cambodia, China, Indonesia, Korea-DPR, Republic of Korea, Laos, Malaysia, Mongolia, Myanmar (Burma), Philippines, Thailand and Vietnam. ISSN: 0818-9935.

Rothwell, Eric L. and Wood, Spencer H. 2004. "Characterization of Gravel Bars of the Mekong River Near the Golden Triangle of Northern Thailand; Geological Society of America, Rocky Mountain Section, 56th Annual Meeting; Geological Society of America, Cordilleran Section, 100th Annual Meeting." Abstracts with Programs - Geological Society of America. Geological Society of America, Boulder, CO. April. Volume 36, Issue 4, Pages 31. Descriptors: Asia; bars; Burma; Cambodia; characterization; China; Chordata; clastic sediments; exploitation; Far East; geomorphology; gravel; human activity; hydroelectric energy; hydrology; land use; Laos; Mekong River; natural resources; North Pacific; Northwest Pacific; Pacific Ocean; Pisces; sedimentation; sediments; South China Sea; Thailand; vegetation; Vertebrata; water resources; West Pacific. Abstract: The Mekong River starts in the Qinghai Province, China near Tibet; the river flows as a border between Laos and Burma and between Thailand and Laos before flowing through Cambodia and finally to the South China Sea through Vietnam. Each of these countries has industrial and agricultural interests for the river; for the people living near the Mekong, the river is a source of subsistence fishing and is widely used for transport and tourism. The Mekong River is also a unique ecological and hydrologic system. With multiple hydroelectric dams and two reservoirs (Xiaowan and Dachaoshan) on the Mekong River in China and continued interest in dam development in Laos for hydropower production, flow changes to the river are inevitable. This study focuses on characterizing gravel bars near Chiang Saen, Thailand, with the purpose of documenting the current size distribution of bed-load gravels and the bed form or texture. The study site consists of two lateral bars on the Laotian side. During bank full flow the river is approximately 0.6km wide and has an approximate depth of 10m over the gravel bars. Annual peak flows are around 10,000 cubic meters/second, and the maximum flow of record is 23,600 cubic meters/second, occurring on September 3, 1966. The pebble counts yield a D (sub 50) of 75mm, and outsized clasts of 250



mm (maximum diameters) conducted on exposed bars during low flows of January, 2004. The gravel bars also exhibit large ripples spaced approximately 4m with amplitude of 0.5m. Most of the bars and islands in this reach of the Mekong are of fine to medium sand, but these gravel bars are important to local people for harvesting algae and may be an important bed form for fish habitat. ISSN: 0016-7592.

Rowland, H. A. K. And Ohn Kyi, D. A. W. 1969. "The Effects of Climatic and Environmental Factors on the Incidence of Diarrhoeic Disorders in Burma: I. Data from Rangoon Dispensaries." Descriptors: Burma; Climatic; Diarrheic; Disorders; Dispensaries; Dysentery; Environmental; Human; Incidence; Living; Mangoes-D; Rangoon; Space. SO: Union Burma J Life Sci. 2(1): 67-74. Illustrations. 1969. Abstract: the incidence of diarrhea and of dysentery was calculated for the populations attending 25 Rangoon dispensaries for each of the 12 mo. In 1967. The effect of 14 climatic and environmental factors was investigated by means of multiple regression analysis. Climatic factors had no effect, but the prevalence of mangoes was an important cause of variation in diarrhea incidence between months. Water supply had a profound effect on the incidence of both diarrhea and dysentery and population per medical officer and the attendance of patients suffering from non-diarrheic illness greatly influenced the record attendance of those with diarrheic disorders. The floor space per person in their homes was thought to exert its effect through its relationship with some other unidentified factor and was perhaps related to the attending habits of the dispensary populations which were themselves thought to influence the incidence of both diarrhea and dysentery attendances. Other measures of congestion, sewage disposal and income had no effect on the incidence of either diarrhea or dysentery. ISSN: 0503-2377.

Rozanov, A.G. 1967. Distribution of Phosphates and Silicic Acid in the Water of the Northern Part of the Indian Ocean. Corporate Author: Naval Oceanographic Office Washington DC. Report Date: Jan 1967. Abstract: The distribution of the dissolved mineral phosphates and silicates in water of the northern part of the Indian Ocean is discussed. The content of phosphates in surface water oscillates from 0.1

microgram-at P/1 (Bay of Bengal and Andaman Sea) to 0.4 microgram-at P/1 (Arabian Sea and to southeast of Ceylon) and depends on seasons. The maximum content of phosphates in the Arabian Sea and the Bay of Bengal is 2.9 micrograms-at P/1 and to the south of 10 degrees S in the open part of the Indian Ocean the maximum content of phosphates is 2.4 micrograms-at P/1. The content of total organic phosphorus is not more than 0.5 micrograms-at P/1. The distribution of dissolved silicates is characterized by constant increase from the thermocline layer to the bottom. The maximum content of silicates is 150-160 micrograms-at Si/1 in the Arabian Sea, 140 micrograms-at Si/1 in the Bay of Bengal and 130-140 micrograms-at Si/1 in the open northern part of the Indian Ocean. The content of dissolved mineral phosphates and silicates is compared with water circulation, plankton and seasons. (Author). Distribution Limitation(s): approved for public release. Report Classification: Unclassified. Accession Number: AD0659561. Url: <http://handle.dtic.mil/100.2/AD659561>

Rozanov, A. G. and Bykova, V.S. 1967. Distribution of Nitrates and Nitrites in the Water of North Indian Ocean. Corporate Author: Naval Oceanographic Office Washington, DC. Report Date: Jan 1967. Abstract: The general distribution of dissolved mineral nitrates and nitrites in the Arabian Sea, Bay of Bengal, Andaman Sea and in the open northern part of the Indian Ocean is given. Mean value of nitrates: 1 micrograms-at N/1 in surface water, sharply increasing to 22-26 micrograms-at N/1 with depth. After achieving these concentrations the content of nitrate changes little. Nitrites as a thin layer were dissolved in the thermocline layer and under it in quantities depending on zooplankton (up to 2 micrograms-at N/1). In the Arabian Sea the second maximum of nitrites was discovered (up to 5 micrograms-at N/1 in 150-1500); it can be explained by the reduction conditions of these water. (Author). Report Classification: Unclassified. Distribution Limitation(s): Approved for Public Release. Accession Number: AD0651200. Url: <http://handle.dtic.mil/100.2/AD651200>

Rubeykin, V. Z. Marinov, N. A. Vostokova, Ye A. Abrosimov, I. K. and Samylin, A. I. 1974. "Gidrogeologicheskaya Oblast' Basseyna Stoka Indiysskogo Okeana." Translated title: "The Hydrogeological Province of the Drainage Basin of the Indian Ocean." Izd. Nedra, Moscow, USSR. Descriptors: Arabian Peninsula; Arabian Sea; artesian basins; artesian waters; Asia; Burma; Commonwealth of Independent States; east; Far East; ground water; Gulf of Aden; hydrogeology; India; Indian Ocean;

Indian Peninsula; Iraq; Koryak; Middle East; Oman; Red Sea region; Sri Lanka; surveys; USSR. Notes: illus. incl. tables, sketch maps. OCLC: 1977-001379.

de la Rue, Warren and Mueller, Hugo. 1857. "Chemical Examination of Burmese Naphtha, Or Rangoon Tar." *Proceedings of the Royal Society of London*. Royal Society of London, United Kingdom. Volume 8, Issue 51-75, Pages 221-228. Descriptors: Asia; Burma; chemical composition; Far East; hydrocarbons; organic compounds; petroleum; properties. ISSN: 0370-1662.

Ryder, Grainne. 1997. "Stauen Des Mekong; Regionale Energiepolitik." Federal Republic of Germany: Secolo-Verl., Osnabruck, Federal Republic of Germany. Descriptors: Asia; Burma; Cambodia; China; dams; ecology; Far East; fluvial features; hydroelectric energy; Laos; planning; policy; power plants; rivers; spatial distribution; streams; Thailand; Vietnam; water management; water supply. ISBN: 3929979373. OCLC: 296709-10.

## **S**

San Pe, U. and Aung Than, V. 1972. "Earthquake Resistant Design of Reinforced Concrete Buildings for Burma." *Individual Studies by Participants at the International Institute of Seismology and Earthquake Engineering*. Volume 8, Pages 207-248. Descriptors: Reinforced concrete structures; design; Burma; building standards; Earthquake-Resistant Design. Abstract: In this paper an attempt is made to introduce simple and practical earthquake resistant design procedures for reinforced concrete buildings, which hopefully can be adopted in Burma until such time when a more detailed and proper Design Code is compiled. The paper is divided into five chapters: (1) general philosophy, (2) detail design procedures by seismic coefficient method, (3) new proposal method of Japan, (4) seismicresistant design of reinforced concrete members by ultimate strength design method, and (5) a discussion of the proposed values of earthquake resistant design procedure. There are also a number of useful graphs,

maps of Burma and tabulated results of design examples of 5-story and 12-story buildings included in the appendix. ISSN: 0074-6606.

Sanderson, W. C. and Jee-Peng, Tan. 1995. "Population in Asia." World Bank; Regional and Sectoral Studies. Pages: 243p. Descriptors: Fertility; Water; population growth; family planning; policy approach; fertility control; social policy; fertility; demography. Abstract: Building on the existing literature, this study attempts to draw together quantitative information on the countries of East and South Asia to inform policy dialogue on a broad range of issues relating to fertility and population growth. (Bangladesh, Bhutan, Cambodia, China, India, Indonesia, The Republic of Korea, the People's Democratic Republic of Korea, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, the Philippines, Sri Lanka, Thailand, and VietNam, occasionally data on Mongolia). Data for these countries are also used to highlight the nature of the population issues in the region and the options potentially available to address them. The study addresses three separate aspects of population issues, with countries as the units of observation; the demography of Asian populations and the power of policies to affect fertility and future population size; the design of current interventions to lower fertility through family planning programs; and population prospects and their implications in selected sectors. Geographic: Asia- (East) Asia- (South) Asia. ISBN: 0821331310. OCLC: 1162706.

Sann-Myint, K., Tu, M. and Chen, H. 1970. "The Bacteriology of the Water Supplies of Rangoon: II. Cool Dry and Hot Dry Seasons." Union Burma J Life Sci. Vol 3, no 2, P 181-190. 1970. ILLUS. Descriptors: *Alcaligenes-Faecalis*; Bacteriology; Burma(Rangoon); *Citrobacter-Freundii*; Coliform Count; *Clostridium-Perfringens*; *Enterobacter*; *E. Coli*; Hot; *Klebsiella-Aerogenes*; *Proteus-Mirabilis*; *Proteus-Vulgaris*; *Pseudomonas-Aeruginosa*; *Pseudomonas-Fluorescens*; Seasons; *Staphylococcus-Epidermidis*; *Streptococcus-Fecalis*; Water Supply. Abstract: water samples from 19 piped and natural sources in Rangoon were examined bacteriologically during the cool dry season of 1966-67 and the hot dry season of 1967 for the presumptive coliform count, the presumptive enterococcus count and the presence of presumptive

clostridium perfringens. Bacteria isolated from macconkey bile salt lactose peptone water and sodium azide medium primary cultures were identified. Using as criteria the presumptive coliform count and the isolation of escherichia coli and/or klebsiella aerogens and/or streptococcus faecalis, for the cool dry season, all of the 15 samples tested were found unsatisfactory for drinking purposes. Again, for the cool dry season, all of the 16 samples tested were found unsatisfactory. The bacteria isolated were e. Coli, k. Aerogenes, citrobacter freundii, enterobacter spp., alcaligenes faecalis, proteus mirabilis, p. Morganii, p. Vulgaris, pseudomonas aeruginosa, p. Fluorescens, staphylococcus epidermis and s. Faecalis. At room temperature, in the coliforms, e. Coli and k. Aerogenes were viable up to 140, and c. Freundii (1 strain) up to 14 days. At 4 c, k. Aerogenes, c. Freundii (1 strain) and/or enterobacter sp. (1 strain) were viable for 56, 14, and 7 days, respectively, and in the noncoliforms, p. Mirabilis and p. Morganii for 14, p. Vulgaris (1 strain) for 28, and p. Fluorescens for 56 days. ISSN: 0503-2377.

Saravanapavananthan, N. 1986. "Water Supply and Sanitation in the Southeast-Asia Region." World Health Statistics Quarterly Vol. 39. No. 1, p 58-70. Pages 1 ref. Descriptors: Community development; Regional development; Southeast Asia; Water supply development; Sanitation; Human population; Bangladesh; Burma; India; Indonesia; Maldives; Nepal; Sri Lanka; Thailand; Statistical analysis. Abstract: The progress of community water supply and sewage disposal services development in the member states of the World Health Organization, South-East Asia Region, since the beginning of the International Drinking Water Supply and Sanitation Decade is reviewed. Countries participating in the Decade progress monitoring activities were: Bangladesh, Burma, India, Indonesia, Maldives, Nepal, Sri Lanka, and Thailand. Two sets of aggregated analyses were carried out: one without India and one including India. In urban areas, water supply coverage did not keep pace with increasing populations, whereas in rural areas it appears that mid-decade targets will be achieved overall, but on a country by country basis, only Bangladesh, India, Indonesia, and Sri Lanka are likely to meet or exceed their mid-decade targets. In the area of sanitation, coverage increased in urban areas in the 1981-

83 period, but in rural areas improvements in sanitation coverage did not keep pace with population. Major constraints identified by the countries in the 1983 sector update were as follows: lack of adequate financial resources, lack of community participation, logistics, insufficient health education, and import restrictions. ISSN: 0379-8070.

Saw, H. 2001. "Seismological Monitoring System of Myanmar." Bulletin of the International Institute of Seismology and Earthquake Engineering. 2005. Volume 35, Pages 165-174. Descriptors: Earthquakes; Earthquake mechanisms and effects; earthquake; monitoring; seismology. Notes: Geographic: Myanmar. Abstract: Myanmar lies in one of the earthquake belts of the world namely the Alpide-Himalayan Belt. The Department of Meteorology and Hydrology realizing the importance of maintaining earthquake records had prepared the publication of earthquake for 1950 to 1999, making use of the information on felt earthquakes reported by observers in the meteorological observations scattered over the country. At present there are 4 seismological stations operating the Japanese Katsujima seismographs in Yangon, Mandalay, Sittway and Dawei. The Department of Meteorology and Hydrology now takes pride in publishing the seismological data and technical notes for the needs of various national projects. ISSN: 0074-655X.

Saw, Naw Tha. 1988. Crop-Climate Relationships in the Dry Season on the Irrawaddy Delta (Burma). University of California, Riverside, CA. Advisor: Robert W. Pease. DAI. Volume: 49, 08B, Pages: 241-3075. Descriptors: Physical Geography; Agriculture, Agronomy. Abstract: The geography of the Irrawaddy Delta (Burma) and the necessity to grow more rice, soybeans and maize are briefly discussed. Empirical methods for estimating potential evapotranspiration for the Irrawaddy Delta during the dry season are evaluated to determine water use for soybeans, maize and rice. According to the statistical methods applied, the Penman method as modified by Frere and Popov appears most suitable. Two methodologies, the Equivalent Hours of Maximum Net Photosynthesis (EHMNP) and the growing degree days (GDD) are used to evaluate the possibility of the growing of rice, maize and soybeans on the delta during the dry season. The EHMNP unit is the net

photosynthetic response of a plant for one hour at optimum condition of temperature and light where hours with partial responses can add together to make full hours. EHMNP totals regressed against yields of rice, soybeans and maize grown in the United States result in a positive linear relationship. Application of EHMNP totals to the Irrawaddy Delta in the dry season suggest relatively low yields of rice, soybeans and maize. The GDD used here is obtained by the summation of mean temperature above a threshold temperatures for the corresponding crops. Regression analysis of GDD versus crop yields suggest that within the domain of the data used, rice yields decrease as GDD increase. There is a curvilinear relationship between GDD and yields of soybeans and maize, where yields increase as GDD increase to a certain degree beyond which yields decline. The GDD indicated lower than optimum yields of soybeans, maize and rice during the dry season. Degree: PH.D. Dissertation Abstracts: AAG8822063. OCLC: 20399501.

Schmidt, Michael J. 1996. "Working Elephants." Scientific American. January. Volume 274, Pages 82-87. Descriptors: Elephants; Lumber industry/Myanmar; Lumbering. Notes: Physical Description: Illustration. Abstract: In Myanmar, formerly Burma, the use of elephants for logging provides benefits for both the country's forests and an endangered species. Myanmar has some of the largest tracts of unspoilt forest on the earth, thanks to a century-old policy of harvesting selected trees and transporting the logs by teams of men and elephants. The traditional practice keeps vast sections of forest robust and highly productive. The environmental benefits of using elephants over machines for logging; the importance of the numbers of logging elephants to the overall population of Asian elephants; and attempts to inseminate female elephants as part of a breeding program are discussed. ISSN: 0036-8733.

Schmidt-Vogt D. Affiliation: Dr. D. Schmidt-Vogt, School of Environment Rsrc./Devt., Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani, Thailand. E-mail: [Schmidt@ait.ac.th](mailto:Schmidt@ait.ac.th). 2004. "Staudämme Am Mekong." Translated Title: "Dams Along the Mekong River." Geographische Rundschau. Volume 56, Issue 12, Pages 22-27.

Descriptors: Agriculture, resource development and the environment; National and Land-Use Planning; dam construction; land use planning; international cooperation; hydroelectric power. References: Number: 13; Geographic: Mekong River Asia Eurasia Eastern Hemisphere World. Abstract: The Mekong river is the largest river of Southeast Asia and provides a linkage between six countries: Vietnam, Cambodia, Laos, Thailand, Myanmar and Yunnan Province of the People's Republic of China. After decades of retarded economic development, the Mekong river is of being converted into a highway of hydro-development through a total of about 50 large dam projects. The project goals include irrigation, flood control, and improving navigation, but the most important goal is hydropower development. China has embarked in the 1980s on a scheme to build eight dams on the upper Mekong mainly to generate power for Yunnan Province and for export to Thailand. Export of energy is also the main rationale for plans of the Lao government to construct a string of dams along tributaries of the Mekong. Dam projects in Thailand, Cambodia and Vietnam are on a smaller scale, and Thailand has actually abandoned plans to further develop hydropower on its own territory in the face of massive protests and the availability of power from Laos. Potential negative effects of theses dams on the hydrology and ecology of the Mekong are causing concern. The most prominent concern is with the effect of dams on fisheries. Despite the existence of international institutions for integrated development in the Mekong-region - the Mekong River Commission (MRC) and the Greater Mekong Subregion (GMS) Programme of the Asian Development Bank - communication between countries, and coordination of the various national dam projects is relatively poor, and likely to cause ecological disruptions and regional conflicts in the future. ISSN: 0016-7460.

Schomaker, N. B. and Aufmuth, R. E. 1971. Burma Soils: A Study of the Effects of Lime and Cement on Paddy and Laterite Material. Construction Engineering Research Laboratory. Descriptors: Calcium oxide; Cement; Compressive strength; Laterites; Lime; Paddy field soil; Soil stabilization; Strength; Strength of materials. Abstract: laboratory tests were performed on samples of paddy and laterite soils obtained from the proposed right-of-way of the Rangoon-Mandalay



highway, Burma. These tests were conducted to determine the basic engineering properties of the soils and to evaluate the feasibility of stabilizing these soils with lime and cement. The addition of lime had little beneficial effect on either soil, due to the non- reactive nature of the soils and the poor stabilizing quality of lime available in Burma. Special tests using American lime indicated a strength increase of about 300% over the natural soil strength, compared to an increase of less than 100% with burma lime. Addition of cement, on the order of 6% by dry weight of soil, effectively stabilizes both soils. Unconfined compressive strengths of both are increased on the order of 300%. Notes: Tech Rept M-6, 12 PP. OCLC: 00233085.

Schwendinger, Peter Josef. 1990. Zur Taxonomie, Biologie Und Okologie Einiger Orthognather Spinnenfamilien Von Thailand (Araneae: Liphistiidae, Atypidae, Idiopidae, Dipluridae) Translated Title: On Taxonomy, Biology And Ecology Of Some Families Of Orthognathous Spiders From Thailand (Araneae: Liphistiidae, Atypidae, Idiopidae, Dipluridae). Innsbruck University (Austria). DAI. Volume: 53, 03C, Pages: 162-443. Abstract: Data obtained in the course of a  $2\frac{1}{2}$ -year research project at the University of Chiang Mai, Thailand, are presented in 8 separate parts, as manuscripts and published papers\*. Ground-dwelling spiders of the families Liphistiidae, Atypidae, Idiopidae and Dipluridae in Thailand are treated taxonomically. A new genus, Prothemenops, several new species, Liphistius ornatus, L. lannaianus, L. marginatus, L. thaleban, Atypus suthepicus, A. lannaianus, Prothemenops siamensis, Idiops pylorus, and hitherto unknown males of L. trang, L. lordae Platnick & Sedgwick, L. niphanae Ono, A. dorsualis Thorell, A. javanus Thorell are described; the liphistiid trap-door spiders of Thailand and Burma and the purseweb spiders of the world are revised. New taxonomic characters, including histological and microstructural details, are given; the variation of characters is analyzed, taxonomic relationships are shown. For the spiders observed, information is given on habitat, distribution, web- and burrow structure, annual cycle, postembryonic development, mating, behaviour, prey, predators and parasites. The communities of orthognathous spiders in Thailand, and Chiang Mai Province in particular, are shown; their horizontal, vertical and annual

distribution are discussed. Finally, experimental data on the transpiration rates of 16 species from Thailand and Burma are compared with similar results on orthognathous spiders from the literature. The comparatively high water losses of the species examined are explained with adaptation to life in a burrow. Bulletin of the British Arachnological Society; Natural History Bulletin of the Siam Society; Zoological Scripta. Degree: DR. NAT. Dissertations Abstracts: AAGC173502.

Scott, Ken. 1995. Golden Triangle- Roads And Energy To Replace Opium. John Wiley & Sons, Incorporated. Infrastructure. Descriptors: Asia; Roads. Abstract: Subtitle: With Adb Support, The Economic Prospects Of The Neighbouring Corners Of Thailand, China, Burma And Laos Are Set To Converge Despite Past Enmities. Notes: Infrastructure, Oct. 1995, P. 42-44: ILL. ISSN: 1081-7174. OCLC: 00871446.

Sebastian, A., Myint Myint, Sein and Myat Myat, Thu. 1990. "Suppression of *Aedes Aegypti* (Diptera: Culicidae) using Augmentative Release of Dragonfly Larvae (Odonata: Libellulidae) with Community Participation in Yangon, Myanmar." Bull. Entomol. Res. 2005. Volume 80, Issue 2, Pages 223-232. Descriptors: Evolution And Palaeoecology; International Development Abstracts; Diptera; dragonfly; Odonata; biological control; community participation; mosquito control; water storage; vector control; dengue haemorrhagic fever Species Term: *Aedes aegypti*; Libellulidae; Anisoptera (dragonflies); Culicidae; *Crocothemis servilia*. Notes: Geographic: Burma- Rangoon. Abstract: Describes periodic augmentative release of predatory larvae of *Crocothemis servilia* to suppress a mosquito, of which >90% of pre-adults occurred in domestic water-storage containers. The trial's success was ascribed to: virtual confinement of pre-adult stages of the target mosquito to containers accessible to control operators; behaviour, growth rate, survival and ready availability of the chosen species of dragonfly; and participation of local householders. ISSN: 0007-4853.

Seekins, D. M. 1992. "Japan's Aid Relations with Military Regimes in Burma, 1962-1991: The Kokunaika Process." *Asian Survey*. 2005. Volume 32, Issue 3, Pages 246-262. Descriptors: Water; Japanese aid; military regime; aid relations. Geographic: Burma. Abstract: The central argument of this article is that Japan's aid relations with Burma are comprehensible in terms of the kind of state Japan has evolved into since the end of World War Two. Both Japan's political process, controlled by the business-oriented Liberal Democratic Party and a bureaucratic elite that overshadows the Diet, and the country's foreign policy can usefully be described as kokunaika (domesticization). Domesticized polities operate on the basis of closed, though not necessarily unbreachable circles of individuals and groups who confer favors upon each other within the framework of long-term, reciprocal relationships. Such group dynamics have tended to preclude the pursuit of an active role in global affairs or major contributions to what can be called "international public goods". ISSN: 0004-4687.

Sein, T. and Vernigora, E. G. 1990. Feasibility Study of the Improvements in Navigability of the Irrawaddy and Chindwin Rivers. Descriptors: Channel deepening; Developing countries; Improvements; River navigation; Rivers; Ship pilotage; Waterway improvement; Waterways. Abstract: The Irrawaddy and Chindwin rivers are the main arteries of inland navigation in Burma. Transport on these is inexpensive, which has limited road and railway development. However, navigation is impaired during the low water season. In order to alleviate this problem, a study was undertaken to investigate solutions requiring minimum investment and which are largely self-maintaining, without the need for recurrent dredging. The study and its conclusions are presented in this paper. Notes: PIANC International Navigation Congress, 27th; Maritime Ports and Seaways, Subject 5 (for commercial, fishery and pleasure navigation); Osaka, May 1990, p 97. Notes: 7 pages, 2 ref, 1 table, 5 figures. OCLC: 00698910.

Self, L. S. and Tun, M. M. 1970. "Summary of Field Trials in 1964-69 in Rangoon, Burma, of Organophosphorus Larvicides and Oils Against *Culex pipiens fatigans* Larvae in Polluted Water." *Bulletin of the World*

Health Organization: the International Journal of Public Health. Volume 43(6): 841-851. 1970. French Summary. Descriptors: Abate; Burma; Culex-Pipiens-Fatigans; Dursban; Fenthion; Field; Larvae; Larvicides; Oils; Organo; Phosphorus; Polluted; Rangoon; Trials. Abstract: Tests of the larvicidal activity of various organophosphorus compounds against *C. P. Fatigans*, showed that the activity usually lasted much longer in septic tanks and pit latrines than in open drains. Dursban, abate, fenthion and several other emulsifiable concentrates caused high larval mortality at a concentration of 0.05 ppm but 0.5 ppm was normally required to obtain a minimum of 1-2 wk of complete larval control. For the desired residual activity, dosages about 40-400 times the laboratory  $LC_{95}$  values were normally required, depending on the compound used. The most effective formulation was dursban emulsifiable concentrate, which, at a concentration of 0.5 ppm, was effective for 3, 7 and 12 wk in concrete drains, pit latrines and septic tanks, respectively. Petroleum oils applied at rates of 25-40 us gal/ac (approx. 237 l/ha-380 l/ha) and a pyrethrum derivative at a concentration of 1.0 ppm were toxic to larvae but not highly residual. Some emulsifiable-concentrate/oil mixtures appeared to be outstandingly effective, although inconsistent results also occurred. Granular formulations were normally less effective than the emulsifiable concentrates. ISSN: 0042-9686.

Selth, Andrew. 1999. "The Burma Navy Under the SLORC." *J Contemp Asia*. Volume 29, Issue 2, Pages 227-247. Named Corp: Burma. State Law and Order Restoration Council. Myanmar. Navy. Abstract: The Burmese navy has changed considerably since the creation of the State Law and Order Restoration Council (SLORC) in 1988. Prior to this, the navy was small, ill-equipped, and crippled by its reliance on foreign logistics. However, it has always been, and is still, an important element in Burma's internal security. This view appears to be shared by the new generation of military leaders in the capital, Rangoon, because the the navy has experienced dramatic growth under the SLORC, with the fleet almost doubling since 1988. In a few years, Burma could have a blue water capability for the first time in its history, providing the SLORC's ambitious naval modernization program is successful. ISSN: 0047-2336.

Selth, Andrew. "From Brown Water to Blue Water." N&A Publishing Services 1998: Descriptors: Armed forces. Naval Forces. Volume 19 (6) 1998: pages 30-33. Details: Photograph; Map; Named Corp: Navy-Myanmar; Geographic: Myanmar. Abstract: The Myanmar Navy was small, with limited capabilities, until 1988. In only a few years, the Navy has been transformed from a weak brown water navy to a much larger force more capable of blue water operations. ISSN: 0722-8880.

Sen Gupta, R. Ali, Mohamed; Bhuiyan, A. L., et al. 1990. "State of the Marine Environment in the South Asian Seas Region." International (III): United Nations Environment Programme, Regional Seas Programme, Geneva, International (III). UNEP Regional Seas Reports and Studies. 1990. Volume: 123, Pages: 42. Descriptors: Asia; Bangladesh; Burma; environmental geology; experimental studies; Far East; India; Indian Ocean; Indian Ocean Islands; Indian Peninsula; Indonesian Seas; Malaysia; Maldiv Islands; monitoring; Pacific Ocean; Pakistan; pollutants; pollution; sea water; southern Asia; Sri Lanka; Thailand; water; West Pacific. Notes: FE: References: 61; 9 tables, sketch maps. ISSN: 1014-8647. OCLC: 1992-041070.

Shan Sapawa Environmental Organization. 2006. Warning Signs: An Update on Plans to Dam the Salween in Burma's Shan State. Chiang Mai, Thailand: Shan Sapawa Environmental Organization. Pages: 29. Descriptors: Dams- Social aspects- Burma- Shan State; Hydroelectric power plants- Social aspects- Burma- Shan State; Human rights- Burma- Shan State. Notes: illustrations (some color), maps (chiefly color); 21 cm. OCLC: 81144155; 80805370.

Shaw, R. P. 1992. "The Impact of Population Growth on Environment: The Debate Heats Up." Environ. Impact Assess. Rev. Environ. Impact Assess. Rev. Feb. Volume 12: 11-36. Descriptors: Conservation of Natural Resources; Energy-Generating Resources; Models, Theoretical; Politics; Population Growth; Poverty; Sanitation; Urbanization; Water Supply; Demography; Economics; Environment; Geography; Health; Population; Population Dynamics; Public Health; Research; Socioeconomic Factors; Urban Population; Deforestation; Desertification; Energy Supply; Environmental Degradation; Models;

Theoretical; Political Factors; World Demographic Factors; Economic Factors; Geographic Factors; Natural Resources; Research Methodology; Spatial Distribution; Urban Spatial Distribution. Abstract: A proposed framework, which was introduced at the 1989 meetings of the American Association for the Advancement of Science, included political constraints as well as population growth as a proximate cause with potentially important impacts on the environment in Paul and Ann Ehrlich's well-known PAT equation. PAT limitations are identified as the 1.2 billion people caught in the debt-poverty trap, less developed countries' balance of payments deficits, and "distortionary factors" that undermined economic incentives and contributed to mismanagement of resources. Such factors could be keeping farm prices low and have an impact on deterring use of environmentally sound traditional agricultural practices. Mismanagement of public lands occurs when large commercial enterprises or large scale mechanization displace population onto marginal or less productive lands. Intergroup warfare is a new form impacting on the environment. In Burma loggers are authorized to clear cut large tracts of teak forests in order to ferret out Karen guerrillas. Over 15 million refugees were thus displaced and forced to live in encampments that require trees for shelter, firewood for survival, and overgrazing of livestock. Social and economic environments are also undermined by "dependency" factors such as trade protectionism, brain drain, and limited foreign aid. The Group of 77 Non-Aligned Developing Countries proposed that discussions of the links between population and the environment be omitted from the agenda of the 1994 UN Conference on Population and Development. Basic clarifications are needed to distinguish ultimate versus proximate factors and current versus future concerns. The debate ignores distribution patterns, migration, or changing age structures. The debate blames unjustifiably rapid population growth as the ultimate cause of global environmental degradation and links population growth to a host of other social problems such as famine and refugees, while ignoring civil unrest. The evidence suggests that population limitation will probably prevent environmental degradation in poor, resource constrained countries from getting worse. Resource conservation will remain unaffected. The World Bank proposes National Environmental

Action Plans or the Cleaver Schreiber proposal for a "nexus strategy" for balancing food supply and population in Africa. ISSN: 0195-9255.

Shi, G. U., Wang, C., Tropper, P., Cui, W. and Tan J. Affiliation: G.U. Shi, China University of Geosciences, Beijing, China E-mail: [shiguanghai@263.net.cn](mailto:shiguanghai@263.net.cn). 2005. "Methane (CH<sub>4</sub>)-Bearing Fluid Inclusions in the Myanmar Jadeitite." *Geochem. J.* 2006. Volume 39, Issue 6, Pages 503-516. Descriptors: Hydrochemistry; jadeite; fluid inclusion; methane. References: Number: 93; Geographic: Myanmar Southeast Asia Asia Eurasia. Abstract: A combined hydrogen-carbon-isotope and microthermometric study has been carried out on CH<sub>4</sub>-bearing fluid inclusions high-pressure jadeitites from the famous jadeite tract Myanmar. Two types of fluid inclusions were found in jadeites, large H<sub>2</sub>O-rich and CH<sub>4</sub>-poor inclusions and small H<sub>2</sub>O-poor and CH<sub>4</sub>-rich inclusions, thus indicating a possible entrapment of CH<sub>4</sub>-H<sub>2</sub>O fluids under unmixing conditions. Microthermometric results yield lower temperature limits for the entrapment of these fluid inclusions of ca. 300 to 400°C. The bulk composition of the fluid inclusions is mostly H<sub>2</sub>O (87 to 94 mol.% H<sub>2</sub>O) and the isotopic composition of methane and water in the inclusions is characterized by  $\delta^{13}\text{C}(\text{CH}_4)$  values ranging from -30.1 to -25.5‰, and  $\delta\text{D}(\text{H}_2\text{O})$  values ranging from -56.3 to -49.8‰. The stable isotope data would be indicative of an abiogenic mechanism of CH<sub>4</sub> formation; the occurrence of the jadeite veins in this paleo-subduction zone thus most likely point to the formation of these CH<sub>4</sub>-bearing fluid inclusions by abiogenic thermal maturation of subducted organic carbon. These data not only provide evidence for cycling of organic carbon in paleo-subduction zones but also show that CH<sub>4</sub> not only occurs as shallow CH<sub>4</sub>-rich plumes in accretionary prisms of recent subduction zones but also occurs in deeper portions of at least the upper 20 km of paleo-subduction zones. ISSN: 0016-7002.

Schomaker, Norbert B. and Aufmuth, Raymond E. 1971. Burma Soils. A Study of the Effects of Lime and Cement on Paddy and Laterite Material. Report Date: Mar 1971. Corporate Author: Army Construction Engineering Research Lab Champaign ILL. Report Classification: Unclassified. Abstract: Laboratory tests were performed on samples of paddy and laterite soils obtained from the proposed right-of-way of the

Rangoon-Mandalay Highway, Burma. These tests were conducted to determine the basic engineering properties of the soils and to evaluate the feasibility of stabilizing these soils with lime and cement. The addition of lime to these soils had little beneficial effect on either soil. This was due to the non-reactive nature of the soils and the poor stabilizing quality of the lime available in Burma. Special tests using American lime indicated a strength increase of about 300% over the natural soil strength, compared to an increase of less than 100% with Burma lime. Addition of cement, on the order of 6% by dry weight of soil, effectively stabilizes both soils. Unconfined compressive strengths of both are increased on the order of 300%. (Author). Distribution Limitation(s): APPROVED FOR PUBLIC RELEASE. DTIC Accession Number: AD0720993. Url: <http://handle.dtic.mil/100.2/AD720993>

Siddiqua-Agha, Ayesha. 2000. "Nuclear Navies?" Bulletin of the Atomic Scientists. September/October. Volume 56, Issue 5, Pages 12-14. Descriptors: Nuclear weapons- Pakistan; Nuclear weapons- India. Notes: Details: illustrations. Named Corp: India Indian Navy; Geographic: Pakistan- Foreign relations- India. India- Foreign relations- Pakistan. Abstract: India's naval plans are worrying its long-term adversary, Pakistan. India is developing nuclear weapons and boosting military technological capabilities, and the country's policymakers think that it should also to assert itself at sea. The Pakistani government, which makes no claim to being a regional power, is concerned by India's technological acquisitions. Pakistani analysts think that, with its increasing naval power and blue-water capability, India would be capable of throttling its smaller adversary in the event of war. India's assertion of naval power will probably also be challenged by China, which is attempting to make inroads into the Indian Ocean by forging links with Myanmar, where Chinese naval bases are being constructed. ISSN: 0096-3402.

Sillitoe, R. H. 1999. "Styles of High-Sulphidation Gold, Silver and Copper Mineralisation in Porphyry and Epithermal Environments; PACRIM '99 Congress; Proceedings [Modified]." Publication Series - Australasian Institute of Mining and Metallurgy. AusIMM - Australasian Institute of Mining and Metallurgy, Parkville, Victoria, Australia. Volume 4-99, Pages 29-44. Descriptors: absorption; Arizona; Asia; Bisbee Arizona; Burma; chalcocite; Cochise County Arizona; copper



ores; covellite; depth; digenite; enargite; epithermal processes; Esmeralda County Nevada; Far East; gold ores; Goldfield Nevada; ground water; igneous rocks; metal ores; metasomatism; mineral deposits, genesis; mineral exploration; mineralization; Monywa Burma; Nevada; Peru; Pierina Peru; porphyry; sericitization; silver ores; South America; sulfarsenates; sulfidation; sulfides; sulfosalts; United States; volatiles; zoning. Notes: FE: References: 77; illus. incl. 1 table, sects. Abstract: High-sulphidation (HS) gold, silver and/or copper deposits are generated in both the epithermal and the upper parts of the underlying porphyry environments over vertical intervals of up to 2 km. The HS deposits are generated in advanced argillic lithocaps, which are products of the absorption of acidic magmatic volatiles by voluminous groundwater systems. Mineralisation styles in HS systems reflect depth of formation as well as the interplay between structural, lithological and hydrothermal parameters. The deep parts of HS systems, at depths of >1000 m, are typified by disseminated copper+ or -gold mineralisation comprising digenite, chalcocite and covellite in pervasive advanced argillic as well as underlying sericitic alteration. In highly telescoped systems, such mineralisation may overprint porphyry stocks and associated quartz-veinlet stockworks. Intermediate levels of HS systems commonly contain fault-controlled copper-gold mineralisation, typically as enargite in bodies of vuggy residual quartz, silicification and/or massive pyritic sulphide. The shallow parts of HS systems, at depths of <500 m, may host lithologically controlled disseminated mineralisation in which gold and/or silver tend to predominate over copper. Barren acid-leached zones formed in the steam-heated environment above paleo-water tables may be preserved above or alongside shallow HS deposits. The exploration focus is on four principal HS mineralisation styles: 1. copper (e.g., Chuquicamata, Monywa) or copper-gold (Wafi) in the deep porphyry-hosted parts of systems preferably, in the case of the latter, where supergene oxidation is limited and, hence, flotation may be used for metal recovery; 2. copper+ or -gold-bearing replacement mantos and pipes hosted by carbonate wallrocks in the deep parts of systems (e.g., Bisbee); 3. high-grade gold in late-stage veins or hydrothermal breccias that overprint the intermediate to shallow levels of systems (e.g., El Indio, Goldfield); and 4. large, bulk-mineable gold

deposits in the shallow parts of systems that were subjected to supergene oxidation, thereby permitting heap-leach treatment (e.g., Yanacocha, Pierina). To these preferred HS styles may be added the low-sulphidation vein or disseminated gold+ or -silver mineralisation that is commonplace alongside many HS systems (e.g., Victoria at Lepanto). ISSN: 1324-6240.

Singh, D. and Tiong R.L.K. Affiliation: R.L.K. Tiong, School of Civil/Environ. Engineering, Centre for Adv. Construction Studies, Nanyang Technological University, Nanyang Avenue, Singapore. E-mail: [clktiong@ntu.edu.sg](mailto:clktiong@ntu.edu.sg). 2005. "Development of Life Cycle Costing Framework for Highway Bridges in Myanmar." Int. J. Project Manage. 2005. Volume 23, Issue 1, Pages 37-44 Additional Info: United Kingdom. Descriptors: Hydraulic structures; Transport And Communications; cost; life cycle analysis; engineering; road transport; transportation planning; bridge. References: Number: 20; Geographic: Myanmar Southeast Asia Asia Eurasia Eastern Hemisphere World. Abstract: The aim of any engineering design is to minimize the total cost of the structure without compromising the functional requirements while maximizing the utility of the structure to the users in particular and to the society in general. Life cycle costing is a technique for determining the most effective capital investment option for achieving technical-economic optimization of a structure/system. This paper briefly describes a detailed procedure for developing a framework for life cycle costing analysis (LCCA) of highway bridges in Myanmar. The paper discusses various cost components and other statistical factors that need to be taken into consideration while assessing the life cycle cost (LCC) of a highway structure. A stepwise procedure to determine various cost components that come into LCC calculation is also illustrated. The effect of uncertainties associated with various factors on the total cost of the structure is demonstrated performing sensitivity analysis. An attempt is also made to demonstrate how better quality construction with increased initial cost can lead to lower LCC of a highway structure. The study has made a call for the development of comprehensive life cycle costing framework for transportation-related projects in Myanmar in order to be able to strike a balance between the need for maintenance and replacement of

highway structures and limited funds available for their upkeep. ISSN: 0263-7863.

Singh, D. D. and Rastogi, B. K. 1980. "Source-Mechanism of the Burma-India Border Earthquake of October 17, 1969." *Tectonophysics*. Volume 67, Issue 1/2, Pages 139-151. Descriptors: India-Burma border; earthquake; Oct. 17; 1969; Focal mechanisms; Burma-India border earthquake; Burma-India border; Seismology. Abstract: The focal mechanism for the Burma-India border earthquake of Oct. 17, 1969, has been determined using the P-wave first motions, S-wave polarization angles, and surface wave spectral data. A combination of thrust and strike-slip faulting is obtained along a plane with a strike N34 degree W, dip 26 degree SW and slip angle 141 degree. The direction of rupture propagation is southward. This earthquake, which occurred at latitude 23 degree N, indicates north-south compression and change in the thrusting direction which is in general east-west in the Burma region. This earthquake mechanism may suggest southward underthrusting of the Burmese block, or contortion of the lithospheric block of the Indian plate. The source parameters have been estimated for this event by using the body and surface wave spectra. From the surface waves, calculated values of the magnitude, radiated energy, moment, and apparent stress are 5.7,  $0.21 \times 10^{21}$  ergs,  $0.32 \times 10^{26}$  dyne-cm and 2 bar, respectively. From P-waves, the seismic moment, fault length, stress drop, and dislocation are determined to be  $0.9 \times 10^{26}$  dyne-cm, 51 km, 2.4 bar and 15 cm, respectively. ISSN: 0040-1951.

SINGH, G. P. 1974. "The Sewage System of the City of Rangoon." *The Public Health Engineer*. Issue number 9, Page 96. MAY 1974. Descriptors: Water Supply; Sewerage; Sewers; Municipal Wastes; Waste Water Treatment; Water Utilization; History; Burma (Rangoon). Abstract: the existing sewerage system in Rangoon was installed in the year 1874 during the British regime; it covered an area of 3.4 square miles of central Rangoon, Burma. From 1915 to 1924 the system was extended, bringing the total area covered to 6.3 square miles. The remaining 44 suburbs have no sewerage at present, but are served with bucket and pit latrines. The contents of both collecting

chambers flow into the main sewers which discharge into the eastern end of the Irrawaddy river. Municipal sewage is discharged into the main sewers by ejector stations at the roadside. Water consumption in the city is about 35 gallons per head per day or 70 million gallons per day. The supply is insufficient and authorities have begun the construction of a water reservoir project at pugyi, 32 miles from Rangoon. ISSN: 0300-5925.

Sirisanthana, T., Navachareon, N., Tharavichitkul, P., Sirisanthana, V. and Brown, A. E. 1984. "Outbreak of Oral-Oropharyngeal Anthrax: An Unusual Manifestation of Human Infection with *Bacillus Anthracis*." *Am. J. Trop. Med. Hyg.* Jan. Volume 33, Issue 1, Pages 144-50.

Descriptors: Disease Outbreaks; Abattoirs; Adult; Animals; Anthrax-epidemiology; Anthrax- pathology; Buffaloes; Cattle; Female; Humans; Male; Meat- adverse effects; Middle Aged; Mouth- pathology; Mouth Diseases- epidemiology; Mouth Diseases- pathology; Pharyngeal Diseases- epidemiology; Pharyngeal Diseases- pathology; Pharynx- pathology; Thailand. Abstract: An oral-oropharyngeal form of human anthrax is described in 24 individuals. The cases occurred as an epidemic in northern Thailand, concurrent with an epidemic of the common cutaneous form. This syndrome is a potentially fatal, febrile illness, characterized by a mucosal lesion in the oral cavity and/or oropharynx which can progress to pseudomembranous necrosis, and to cervical adenopathy and edema. Cattle and water buffaloes, recently arrived from Burma and eaten raw or undercooked, were the probable source of the infection. Determination of etiology was based on both microbiologic and epidemiologic evidence. The clinical syndrome and epidemiology are discussed. ISSN: 0002-9637 (Print); 1476-1645 (Electronic).

Smart, J. Samuel and Moruzzi, Victor L. 1971. "Quantitative Properties of Delta Channel Networks." *JAN*. Pages: 29. Descriptors: Hydrology; Limnology And Potamology; (\*Deltas; Mathematical Models); Topology; Distribution Functions; Matrices (Mathematics); Networks deltas; Networks; Network Flows; Geomorphology; Graphs. Abstract: Some simple procedures are developed for studying the topologic and geometric properties of delta distributary systems. A delta channel

network has three kinds of vertices (forks, junctions, and outlets) and six kinds of links, each corresponding to one of the six possible combinations of upstream and downstream vertices. Various functions of the vertex and link numbers may be used to specify the topologic properties of the network. A particularly useful function is the recombination factor, or ratio of number of junctions to number of forks. This ratio varies from zero for networks with no recombination to unity for braided streams. A detailed topologic study of the networks of five natural deltas (Colville, Irrawaddy, Yukon, Niger, and Parana) shows recombination factors ranging from 0.5 to 0.85. The frequency of different kinds of links can be explained reasonably well by a simple model that assumes random connection of vertices. The link lengths for a given network appear to belong to a common distribution and to depend relatively little on location with respect to the coast. The results on the Parana suggest that it should be considered as two deltas in tandem, each with its characteristic recombination factor. Notes: IBM WATSON RESEARCH CENTER YORKTOWN HEIGHTS NY; Contract Number(s): N00014-70-C-0188 (N0001470C0188); Report Number(s): TR-3 (TR3) RC-3217 (RC3217); Task Number(s): NR-389-155; Distribution Limitation(s): Approved for public release. DTIC: AD0719918.  
<http://handle.dtic.mil/100.2/AD719918>

Smedley, Pauline L. 2003. "Arsenic in Groundwater; South and East Asia." Kluwer. Descriptors: aquifers; arsenic; Asia; Bangladesh; Burma; Cambodia; case studies; China; concentration; drinking water; Far East; geochemistry; ground water; hydrochemistry; Indian Peninsula; metals; mineral composition; Nepal; Pakistan; pollutants; pollution; public health; risk assessment; Taiwan; Thailand; toxic materials; Vietnam; water resources. Notes: FE: 11 tables, sketch maps. ISBN: 1402073178. OCLC: 2003-076254.

Sobhan, Rehman. Affiliation: Centre for Policy Dialogue, Dhaka. 2000. "Growth Zones in South Asia: Potential and Feasibility." Asia-Pacific Development Journal. June. Volume 7, Issue 1, Pages 23-41. Descriptors: International Linkages to Development; Role of International Organizations; Industrial Policy; Sectoral Planning

Methods; Economic Development: Regional, Urban, and Rural Analyses. Geographic: S. Asia Region: Asia. Abstract: Following the apparent success of growth zones in South-East Asia and southern China the feasibility of a growth zone embodying Bangladesh, Bhutan, India (north-east India and West Bengal), Myanmar and Nepal (BBIMN) in South Asia needs to be examined. The paper argues that there are significant structural complementarities between the countries concerned to make such a zone a success. These complementarities create opportunities in the fields of transport, water and energy. However, there are substantial concerns arising from possible political differences between the countries that will need to be resolved before such a zone can be translated into reality. ISSN: 1020-1246.

Soe, Kyaw and et al. 2007. "Possible Correlation between Iron Deposition and Enhanced Proliferating Activity in Hepatitis C Virus-Positive Hepatocellular Carcinoma in Myanmar (Burma)." *Journal of Gastroenterology*. Mar 2007. Volume 42, Issue 3, Pages 225-35 (11 pp.). Descriptors: Adult; Aged; Apoptosis; Carcinoma, Hepatocellular-metabolism; Carcinoma, Hepatocellular- virology; Cell Proliferation; Fas Ligand Protein- metabolism; Female; Hepatitis C- complications; Humans; Immunohistochemistry; In Situ Nick-End Labeling; Iron-metabolism; Liver Neoplasms- metabolism; Liver Neoplasms- virology; Male; Middle Aged; Myanmar. Abstract: The aim of this study was to survey the effect of deposited iron on the cell kinetics of hepatitis C virus (HCV)-positive hepatocellular carcinoma (HCC) in Myanmar (Burmese) patients. METHODS: Formalin-fixed and paraffin-embedded liver tissues from 34 Myanmar patients with HCC were used. To detect iron deposition, Prussian blue staining was performed. Cell proliferation and apoptosis were assessed by Ki-67 staining and by the terminal deoxynucleotidyl transferase (TdT)-mediated dUTP-biotin nick end labeling (TUNEL) assay, respectively. HCV RNA was detected by in situ hybridization, and HCV protein, Fas and Fas ligand (FasL) were localized by immunohistochemistry. To identify the subtype of lymphocytes, CD8 was used as a surface marker. RESULTS: Iron deposition was found in 43% of the HCC cases, and was heavier in moderately differentiated HCC than in well-differentiated HCC. The Ki-

67 labeling index (LI) in cancer cells was higher in Prussian blue-positive-HCC than in -negative HCC ( $3.8 \pm 2.2$  vs  $1.5 \pm 1.7$ , mean  $\pm$  SD;  $P=0.0067$ ), whereas there was no significant difference between these groups in TUNEL LI. HCV protein was localized in cancer cells, and was found in 89% of the patients. In addition, Fas was expressed in HCC cells, and FasL was localized in HCC cells as well as in infiltrating CD8+ T lymphocytes. The frequency of apoptosis of HCC cells was correlated significantly with the population density of infiltrating CD8+ T lymphocytes. CONCLUSIONS: Our results indicated that, in Myanmar patients with HCC, iron deposition might accelerate hepatocarcinogenesis, by promoting cancer cell proliferation, without affecting the Fas/FasL apoptotic system. ISSN: 0944-1174.

Soe, T., Batterham, R. L. and Drynan, R. G. 1994. "Demand for Food in Myanmar (Burma)." *Agricultural Economics*. 2005 Elsevier Ltd. All rights reserved.: Volume 11, Issue 2-3, Pages 207-217. Descriptors: Geographical Abstracts: Human Geography; Water; developing country; food demand; double-log model; almost ideal demand system; welfare implication; income elasticity; food pricing policy. Geographic: Burma. Abstract: Aggregate quarterly time series data from 1975 to 1987 on government procurement prices and open (black) market prices were used in estimating an almost ideal demand system (AIDS) and double-log models for consumption of foodstuffs in Myanmar. The results from the AIDS model were superior to those from the double-log models. The estimated income elasticity of demand for non-meat foodstuffs was high. The income elasticities for the non-cereals are positive and less than one. Contrary to expectation, the income elasticities for all meat items are low. Own-price elasticities for most foodstuffs were less than one. The estimated cross-price elasticities indicate the complementary nature of the basic food items to rice. A brief analysis of the effects of taxing Myanmarese rice exports and subsidising consumers indicated that there are net costs to government, unevenly distributed welfare gains to consumers and welfare losses to farmers. ISSN: 0169-5150.

Sood, L. and Basu, S. 1979. "Bacteriophage Typing of Salmonella Weltevreden." *Antonie Van Leeuwenhoek*. Volume 45, Issue 4, Pages

595-604. Descriptors: Bacteriophage Typing- methods; Carrier State- microbiology; Disease Outbreaks; Gastroenteritis- microbiology; Humans; India; Salmonella- classification; Salmonella Infections- microbiology; Salmonella Phages. Abstract: Salmonella weltevreden has been found to be one of the commonest Salmonella serotypes isolated from diverse sources in India and has also been isolated in a number of other countries. A phage typing scheme was developed for this serotype using a set of six typing phages. These phages had been selected out of 146 phage strains isolated and purified from stool samples of man, laboratory animals and other animals, sewage and surface water sources, and the lytic mutants of temperate phages from *S. weltevreden*. The phage typing scheme was applied systematically to type the 946 strains from India isolated during 1958-1974 and 148 strains originating from Australia, Burma, England, Gan Island, Holland, Hong Kong, Malaysia, New Zealand, Papua New Guinea, The Philippines, Thailand, The United States and Vietnam during 1953-1971. The scheme was particularly studied to evaluate its utility in mapping the epidemiologically related strains from various sources. The *S. weltevreden* strains could be classified into ten phage types. Phage types 2 and 7 were found exclusively amongst Indian strains, type 6 from Vietnam and type 8 from Burma, Thailand and Vietnam. Phage types were found to be stable and consistent with the independent epidemiological data available. ISSN: 0003-6072.

Sood, L. R. and Basu, S. 1977. "Phage-Typing of Salmonella Weltevreden Based on Lysogeny. II. Epidemiological Usefulness of the System and Geographical Distribution of its Phage-Types." *Antonie Van Leeuwenhoek*. Volume 43, Issue 3-4, Pages 262-8. Descriptors: Lysogeny; Water Microbiology; Animals; Bacteriophage Typing- methods; Humans; India; Salmonella- classification; Salmonella Infections- epidemiology; Salmonella Infections- microbiology; Salmonella Infections, Animal- epidemiology; Salmonella Infections, Animal- microbiology. Abstract: Nine hundred and forty-six strains of Salmonella weltevreden isolated in different states of India during 1958-1974 and 124 strains from Australia, Burma, Holland, Hong Kong, New Zealand, Papua New Guinea, the Philippines, Thailand, the United States and Vietnam during 1953-1971 were phage-typed



according to the phage-typing scheme described in the first part of this paper (Sood and Basu, 1977). The epidemiological incidence and geographical distribution of phage-types of *Salmonella weltevreden* were studied. All the phage-types were present in India, the predominant phage-types being b, d and i. Phage-type g was isolated exclusively from India. All the 14 strains from Hawaii belonged to phage-type i. Phage-type h was the most predominant phage-type in Vietnam. The 15 strains isolated from Papua New Guinea in 1965, which were supposed to have originated from a single source, belonged to 3 phage-types. Except these cultures all the available epidemiologically related strains were of uniform phage-types - a finding which establishes the epidemiological validity of the scheme. ISSN: 0003-6072.

Southeast Asia Regional Office/World Health Organization. 2006. "Health Aspects of Disaster Preparedness and Response--Panel Session 1: Water-Related Hazards." *Prehosp. Disaster Med.* Sep-Oct. Volume 21, Issue 5, Pages s79-81 Additional Info: United States. Descriptors: Natural Disasters; Asia, Southeastern; Disaster Planning- organization & administration; Humans. Abstract: This Panel Session consisted of three country reports (Bagladesh, Bhutan, and Myanmar) and the common issues identified during the Panel discussions relative to water-related hazards and events in the Southeast Asia Region. The primary event discussed regardless of the hazards encountered was flooding. The merits of the responses generated in Bangladesh before, during, and following the 2004 floods provide evidence of what can be accomplished in community and national levels of preparedness. Many key issues arose in the discussions: (1) command and control systems and SOPs; (2) ready resources; (3) public information and education and human resource development; (4) community-level preparedness; (5) accessibility to health care; (6) increased focus on disease prevention and control; (7) management of dead bodies; (8) need for a legal framework; (9) funding and the management of funds; and (10) relationships with the media. ISSN: 1049-023X (Print).

"Special Report: The Sweet Serpent of South-East Asia - the Mekong River." 2004. ECT. The Economist Newspaper Ltd. Jan 3. Volume 370,

Issue 8356, Pages 28-30. Descriptors: Asia & the Pacific; Natural resources; Economic policy & planning; Rivers; Dams; Water resources; Environmental impact; Economic impact; Economic development. Geographic: Southeast Asia Mekong River. Abstract: Uniquely for such a big river in the heart of tropical Asia, the biggest city along the Mekong River's banks - Phnom Penh - has a mere 1.1 million inhabitants. That makes the river unusual in another respect: the pressure of a burgeoning population and fast economic growth is only just beginning to make its mark on the Mekong. But the outcome could be all too familiar: a poor compromise between conservation and development. The Asian Development Bank is promoting a scheme to integrate the economies of the greater Mekong sub-region. Two north-south highways are under construction to link China and Thailand, one via Laos and the other via Myanmar. One element of the current development drive is bound to leave its mark on the Mekong: dam-building. ISSN: 0013-0613.

Steinberg, D. I. 1991. "Democracy, Power, and the Economy in Myanmar: Donor Dilemmas." *Asian Survey*. Volume 31, Issue 8, Pages 729-742. Descriptors: Water; aid donors; political change; democracy; economic reform. Geographic: Burma. Abstract: The world's critical bilateral economic donors have made the relationship between open markets and open polities explicit. The US Agency for International Development has recently stated a conscious and programmatic link between the two. This essay attempts to demonstrate in the contemporary Myanmar context the gulf between a hypothetically attractive development program and the desirability of its ends, on the one hand, and on the other, the lack of "leverage" of those who might contribute to supporting it as well as the complexity of the relationship. It considers the developmental dilemmas both the Burmese and sympathetic donors face in moving toward an economically and politically pluralistic nation, beginning with discussion of fundamental issues and then focusing on more narrow (although no less acute) problems. ISSN: 0004-4687.

Stoll, Heather M., Vance, Derek and Arevalos, Alicia. 2007. "Records of the Nd Isotope Composition of Seawater from the Bay of Bengal;

Implications for the Impact of Northern Hemisphere Cooling on ITCZ Movement." *Earth Planet. Sci. Lett.* 15 Mar. Volume 255, Issue 1-2, Pages 213-228. Descriptors: Arakan Basin; Asia; Bay of Bengal; Brahmaputra River; Burma; Cenozoic; cores; discharge; drainage; Far East; Foraminifera; Ganges River basin; general circulation models; Holocene; hydrology; ice sheets; ICP mass spectra; Indian Ocean; Indian Peninsula; Inter-Tropical Convergence Zone; Invertebrata; Irrawaddy River basin; isotope ratios; isotopes; last glacial maximum; mass spectra; metals; microfossils; Mn/Ca; monsoons; Nd-144/Nd-143; neodymium; O-18/O-16; oxygen; paleocirculation; paleoclimatology; planktonic taxa; Protista; provenance; Quaternary; rainfall; rare earths; sea water; sediment yield; simulation; snow; spectra; stable isotopes; upper Holocene. References: 57; illus. incl. 4 tables, geol. sketch maps. Abstract: This study presents a record of planktonic foraminiferal neodymium isotopic gradients along a north-south transect in the Bay of Bengal during time slices of late Holocene and last glacial maximum (LGM) age, together with a record of planktonic foraminiferal variation in the northern Bay of Bengal (15 degrees N) over the last 195 ky. In late Holocene core top planktonic foraminifera, the north-south epsilon (sub Nd) gradient rises from nonradiogenic values of -12 at 20 degrees N to -10 at 5 degrees N, in parallel with the modern surface salinity gradient controlled by discharge of Himalayan rivers in the northern Bay. During the LGM, epsilon (sub Nd) increased throughout the Bay, the contrast between northernmost and southernmost sites decreased, and maximum epsilon (sub Nd) values of -6.5 occurred between 12 and 15 degrees N. A small part of the shift to higher mean epsilon (sub Nd) throughout the Bay during the glacial may arise from a uniform increase in deposition of far-field dust from Arabian and Persian Gulf regions. However, the spatial pattern of epsilon (sub Nd) variation between LGM and late Holocene also suggests a shift from modern dominance of nonradiogenic Nd sources from the Ganges-Brahmaputra basin to LGM dominance of more radiogenic Nd sources from Arakan coastal rivers. Over the last 195 ky at 15 degrees N, the most radiogenic epsilon (sub Nd) values of -7 occur at glacial maxima and the most nonradiogenic values of -11 occur during interglacials. epsilon (sub Nd) values are highly correlated with glacial interglacial variations in

planktonic foraminiferal delta (super 18) O. In this record, shifts in river sources from the more northerly Ganges-Brahmaputra watershed to the more southerly Arakan coastal river systems respond dominantly to Inter-Tropical Convergence Zone (ITCZ) movement driven by Northern Hemisphere cooling during 100 ky glacial-interglacial cycles, with a small component of variation on precessional timescales. The nonlinear correlation of epsilon (sub Nd) with ice volume suggests that ITCZ movement responds to aerial coverage of ice sheets and snow rather than to ice thickness and volume. These data add support to recent general circulation models of ITCZ response to Northern Hemisphere ice sheets, which simulate decreased glacial precipitation in the Ganges-Brahmaputra basin and increased glacial precipitation in the southern Arakan coastal basin. ISSN: 0012-821X.

Su, M. and Jassby A.D. Affiliation: A.D. Jassby, Dept. of Envrn. Science and Policy, University of California, Davis, CA. E-mail:

[adjassby@ucdavis.edu](mailto:adjassby@ucdavis.edu). 2000. "Inle: A Large Myanmar Lake in Transition." Lakes and Reservoirs: Research and Management. 2005. Volume 5, Issue 1, Pages 49-54. Descriptors: Pollution; Pollution and waste recycling; lake dynamics; lake pollution; environmental management; agricultural runoff; industrial waste Species Term: Cyprinus carpio; elephant; Saccharum hybrid cultivar; Aves; Pennisetum purpureum; Saccharum. References: Number: 7; Geographic: Myanmar- Inle Lake. Abstract: Inle Lake is situated in the southern part of Shan State in Myanmar. It is the country's second-largest lake, home to more than 120 000 people and a large bird sanctuary and a major source of hydroelectric power for southern Myanmar. Several distinct environmental problems have arisen in the lake basin. A long-term decrease in lake area has taken place over the last 30 years, probably because of siltation and climate. The drought of the last 2 years in particular has caused a drop in hydroelectric power output, which is affecting southern Myanmar. Many marginal parts of the lake are occupied by elephant grass mats (*Saccharum spontaneum* L.), known locally as kaing. These mats mature to form solid, floating islands, which are used for a unique form of agriculture but are also an increasing source of pesticide and fertilizer runoff into the lake. Textile cottage industries also abound, and both natural and

manufactured dyes are discharged into the lake. Households, including many houses built on stilts in the lake, are a source of garbage and sewage. Livestock breeding also is a source of sewage. Shifting (taungyar) cultivation and village expansion has greatly increased erosion. Dredging is now necessary in many places and water clarity has decreased. The Inle carp (*Cyprinus carpio intha*), known locally as nga-phane, plays an important role in the food supply, as well as being a cultural symbol of the local Intha people. Nga-phane population abundance is currently low, probably because of changes in water chemistry and decreased clarity in the lake water. Partially because of the perceived potential for tourism, many sectors are now involved in lake rehabilitation and management. ISSN: 1320-5331.

Subramanian, V. and Ittekkot V. Editor: Degens, E.T. 1990. "Carbon Transport by the Himalayan Rivers." Wiley; SCOPE 42. Pages: 157-168. Descriptors: carbon transport; river transport; surface water quality; sediment transport. Abstract: The Himalayan rivers, i.e. Ganges, Brahmaputra, Indus and Irrawady, contribute one-third of the global sediment transport to the world oceans. Elemental transport by these rivers assumes global importance in continent-ocean mass balance studies. Basic hydrological data for these rivers is summarised. With the exception of the Irrawady, they drain predominantly Tertiary or younger rock types of variable chemical composition. The common watersheds for these rivers lie on either side of an axis running a distance of more than 1500 km west to east. -from Authors. Notes: Geographic: Burma- Irrawady India- Ganges River Bangladesh- Brahmaputra River Pakistan- Indus River. OCLC: 0870803.

Sukhtankar, R. K., Pandian, R. S. and Guha, S. K. 1993. "Seismotectonic Studies of the Coastal Areas of India, Pakistan, Bangladesh, and Burma." Nat. Hazards. Kluwer. May. Volume 7, Issue 3, Pages 201-210. Descriptors: Tectonics; India; Pakistan; Bangladesh; Burma; seismicity; induced; Tsunamis; Indo-Australian plate; Seismology. Abstract: Major geotectonic elements that are seismically active in the near-shore areas of the Indian subcontinent are reviewed. The coastal belt exhibits varied degrees of seismicity

from intensely seismic areas, like the Mekran coast off Pakistan, Kutch (India) and the Arakan-Yoma belt of Burma, with earthquake magnitudes of more than 8.0, while the intervening coastal areas of Peninsular India are moderately seismic to aseismic. The remaining areas, namely, the major part of the coastal belt of Bay of Bengal in India and Bangladesh are broadly aseismic. However, the active Godavari graben and the eastern part of the coast of Bangladesh are frequented by low- to moderate-magnitude earthquakes. An extension of the active Arakan-Yoma belt in the Bay of Bengal in the form of the Andaman-Nicobar Island complex is highly seismic with a maximum earthquake magnitude of more than 8.0, while the Lakshadweep-Minicoy island complex, situated on the Chagos-Laccadive ridge, is moderately seismic. This broad picture of coastal and marginal seismicity is corroborated by the geodynamics of the northern part of the Indo-Australian Plate. ISSN: 0921-030X.

Sullivan, Donna M. 1995. Logistics Planning and Logistics Planning Factors for Humanitarian Operations. Corporate Author: Naval Postgraduate School Monterey, CA. Report Date: Sep 1995. Report Classification: Unclassified. Abstract: (U) Due to the increasing demand on the military to conduct humanitarian operations, the need for logistics planning factors that are applicable to these operations has arisen. This thesis develops a model for humanitarian operations and employs the model to develop logistics planning factors for material consumption and a computer-assisted planning aid relating to the support of the victim population. Distribution Limitation(s): Approved For Public Release. DTIC Accession Number: ADA303995. Url: <http://handle.dtic.mil/100.2/ADA303995>

Summary of Synoptic Meteorological Observations. Southeast Asian Coastal Marine Areas. Volume 4. Area 12 - Victoria Point, Area 13 - Rangoon, Area 14 - Pagoda Point. Corporate Author: Naval Weather Service Command Washington, DC. Report Date: Sep 1972. Report Classification: Unclassified. Abstract: (U) The report contains data taken from marine surface observations in the areas of Victoria Point, Rangoon, and Pagoda Point. Distribution Statement: Approved for public release; distribution is unlimited. DTIC Accession Number: AD0750159. Url: <http://handle.dtic.mil/100.2/AD750159>

Surface Currents. Northeast Indian Ocean Including the Bay of Bengal, Andaman Sea and the South China Sea. 1977. Corporate Author:

Naval Oceanographic Office Nstl Station, MS. Report Date: Oct 1977. Report Classification: Unclassified. Abstract: (U) This atlas, and the series of which it is a part, is computer generated and automatically plotted. It makes available to user the most recent surface current data collected and will be updated whenever sufficient amounts of data are added to the data file. This and the other atlases are based on a vast quantity of data as compared to the previous manually-compiled editions printed in the mid-thirties. This surface current information is based mainly on ship drift, which is the difference between the dead reckoning position and the position determined by any type of navigational fix. This difference describes the direction and speed of the current. Distribution Statement: Approved for public release; distribution is unlimited. Document partially illegible. DTIC Accession Number: ADA093994. Url: <http://handle.dtic.mil/100.2/ADA093994>

"Sustainable Formula Sought for Rural Energy Development in Asia." 2003. Refocus. 7. Volume 4, Issue 4, Pages 14-14. Abstract: A three-day meeting in Bangkok has affirmed official belief in sustainable energy access as the essential "Missing Link" in the global quest for poverty reduction among disadvantaged rural people. The "Expert Group Meeting on Integration of Energy and Rural Development Policies and Programmes", 25-27 June 2003, was coordinated by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), in collaboration with the United Nations Development Programme (UNDP). A crucial problem is that energy is rarely considered in rural planning and agricultural development. Senior specialists from Bangladesh, Cambodia, Laos, Myanmar (Burma), Nepal, Pakistan, Sri Lanka and Vietnam, all countries seeking urgent solutions to considerable rural poverty problems, exchanged views. Ms Keiko Okaido, who currently heads the UNESCAP secretariat in Bangkok, pointed out, "The World Summit on Sustainable Development (WSSD) recognized benefits that energy services could bring about, and identified key areas for action to promote energy for sustainable development." Robert English, UNDP Resident Representative in Thailand, identified sustainable energy development as the "Missing Link" in rural poverty alleviation and environmental conservation. Bangladesh, participants learned, has immense potential for biogas energy technology, wind energy in coastal areas and solar energy. Landlocked Nepal, in contrast, has sustainable fuel-wood

resources of about 15 million metric tons, although only half the country's forests are accessible. Hydropower potential is huge in the mountainous terrain. Sri Lanka already boasts some 100 micro-hydropower installations supplying electricity to around 3,000 families. [Lanna B B] This is a short news story only. Visit [www.re-focus.net](http://www.re-focus.net) for the latest renewable energy news.

Swe, T. 1987. "Aseismic Design of Fifteen Story Reinforced Concrete Building." Individual Studies by Participants at the International Institute of Seismology and Earthquake Engineering. Volume 23, Pages 167-180. Descriptors: Burma; building codes; Japan; Reinforced concrete structures; design; linear response; Tall buildings; Rectangular structures; Framed structures; Reinforced concrete shear walls; Story drift; Earthquake-Resistant Design. Abstract: This report presents the procedure and results of a seismic-resistant design of a 15-story reinforced concrete building, based on the New Aseismic Design Code and Reinforced Concrete Building Standard of the Architectural Inst. of Japan and the Burmese design base shear. The structure is a rectangular shaped and uniform span frame structure with three spans in the X-direction, three spans in the Y-direction, and two shear walls in the Y-direction. The main purpose of this report is to make a comparative study of the seismic performance of this building based upon the seismic codes of Japan and Burma. ISSN: 0074-6606.

## T

Tarling, N. 1993. "The Cambridge History of Southeast Asia. Volume 2: The Nineteenth and Twentieth Centuries." Cambridge University Press. Volume: 2: the nineteenth and twentieth centuries, Pages: 706p. Descriptors: Historical Geography; Water; historical studies; nineteenth century; twentieth century; regional history; political structure. Abstract: The history of the whole of mainland and island Southeast Asia from Burma to Indonesia is analysed. This second volume of the history takes us into the 19th and 20th centuries, from the late 18th century of the Christian era, when most of the region was incorporated into European empires, to the complexity and dramatic change after WWII. This volume covers economic and social



life as well as the religious and popular culture of the region as they develop over two centuries. The political structures of the region are also closely examined, from the insurgencies and rebellions of early this century to the modern nationalist movements which challenged the control of the colonial powers and led to the formation of independent states. The final section of the book indicates that by the late 20th century, a greater degree of regional cohesion has emerged and the Southeast Asian states have gained marginally more control over their futures. Notes: Geographic: Asia- (Southeast); Notes: Special Features: index. ISBN: 0521355060. OCLC: 1021137.

Taylor, Dennis and Van Leeuwen, Theo. 1980. "Porphyry-Type Deposits in Southeast Asia; Granitic Magmatism and Related Mineralization." *Kozan Chishitsu = Mining Geology. Nihon Shigen Chishitsu Gakkai - Society of Resource Geologists of Japan, Tokyo, Japan.* Issue 8, Pages 95-116. Descriptors: Asia; Borneo; Burma; Celebes; Cenozoic; continental margin; copper ores; East Malaysia; economic geology; Far East; faults; geologic maps; gold ores; hydrothermal alteration; hydrothermal processes; igneous rocks; Indonesia; island arcs; Loei; Malala; Malay Archipelago; Malaysia; maps; Mesozoic; metal ores; metals; metasomatism; mineral deposits, genesis; molybdenum; Monywa; paleogeographic maps; plate tectonics; polymetallic ores; porphyry; processes; Sabah Malaysia; silver ores; strike-slip faults; subduction; Sumatra; tectonics; tectonophysics; Thailand; transform faults; Triassic. References: 42; illus. incl. tables, geol. sketch maps. ISSN: 0026-5209.

Tet Ne Wunn. 2006. *Quality of Bottled Drinking Water and Risk Management Systems.* Descriptors: Bottled water; Bottled water industry; Drinking water- Standards; Drinking water- Health aspects; Water quality management; Water quality management- Burma; Thesis/dissertation (deg). Notes: viii, 74 leaves, bound: ill. 30 cm. Dissertation: Thesis (M.Eng.Sc.)--University of Melbourne, Dept. of Civil & Engineering Science, 2006. Notes: Typescript. Includes bibliographical references (leaves 57-62). Responsibility: Tet Ne Wunn. OCLC: 225234029.

Than Nyunt. 1968. "Early Performance Review of the Middle Fifth Sand Water Flood Project in North Central Fault Block Chauk Field." Union of Burma Journal of Science and Technology. Volume 1, Pages 23-31.

Descriptors: Asia; Burma; Chauk field; economic geology; Far East; petroleum; production; reserves; water injection. Notes: Illustrations (incl. sketch map). Abstract: Oil reservoirs, cross faults, north-south trending asymmetrical anticlines, Burma. ISSN: 0566-7542.

Than, U. A. 1989. "Earthquake Disaster Mitigation Problems in Burma." Bulletin of the International Institute of Seismology and Earthquake Engineering. Volume 23, Pages 37-60. Descriptors: Seismicity; Burma; Maps; Seismic zoning; Building codes; Damage; Earthquake-Resistant Design. Abstract: Earthquake disaster mitigation problems in Burma are discussed. Although historically a region of high seismicity, Burma has had to rely on instrumental records from developed countries to indicate earthquake occurrence, and damage potential has thus been difficult to assess. Northern Burma is more seismically active than southern Burma, but most of the cities are located in the central valley or plain bounded by fault lines and are also subject to earthquakes. The Burmese government enlisted the aid of the Japanese government for an expert mission to offer advice and to help draft earthquake-resistant regulations. Civil engineers and seismologists are sent to Japan for training, seismic observation stations are being increased, and a natural disaster committee has been formed. This paper discusses these priorities. ISSN: 0074-655X.

Thet-Khine, Z., Maung-U, K., Myint, Y. Y., Thi, M. and May, K. K. 1992. "Sodium Balance during Acute Diarrhoea in Malnourished Children." J. Trop. Pediatr. Aug. Volume 38, Issue 4, Pages 153-157. Additional Info: Oxford: Oxford University Press. Publishing Agencies: Non-US Imprint, not FAO. Descriptors: Malnutrition; Diarrhea; Sodium; Blood serum; Human feces; Urine; Hydrocortisone; Balance studies; Boys; Preschool children. Notes: Geographic: Burma. Subj Category: Diet and Diseases. Abstract: Forty-six male children 12-59 months old (27 malnourished and 19 with normal nutrition) admitted for acute water diarrhoea of <48 hours' duration were studied. Using a metabolic balance and separate collections of urine and stools over each 6-hour

period, balance studies were carried out up to 48 hours. Blood, stool, and urine samples were analysed for sodium and potassium levels. Serum cortisol levels were determined using radio-immunoassay in a subsample of six normal and five malnourished children. Malnourished children lost more sodium in their stools and urine during diarrhoea, so that they had significantly diminished gut net sodium balance and significantly diminished total body sodium balance. Significantly higher levels of serum cortisol were observed initially on admission among children with malnutrition. This study demonstrated that malnourished children had poorer sodium balance during acute diarrhoea. ISSN: 0142-6338.

Thomas, Axel. 1992. "Agricultural Water Balance of Yunnan Province, PR China: Agroclimatic Zoning with a Geographical Information System." *Agricultural Water Management*. 9. Volume 21, Issue 4, Pages 249-263. Abstract: Yunnan Province is located in the extreme southwest of the PR China, bordering Vietnam and Burma. Mostly mountainous in character it features a subtropical monsoon climate and moderate temperatures due to average elevations of 1000–3000 m. ISSN: 0378-3774.

Tin Tun Aung, Barbier, E., Dickson, M. H. and Fanelli, M. 1988. "Geothermal Resources of Burma; Small Geothermal Resources; Part 2, Geothermal Projects in Developing Countries." *Geothermics*. Pergamon Press. International (III). Volume 17, Issue 2/3, Pages 429-437. Descriptors: Asia; Burma; chemical composition; distribution; economic geology; exploration; Far East; geothermal energy; hot springs; hydrogeology; igneous activity; Karen State; Magwe Division; Mandalay Division; metamorphic rocks; metasedimentary rocks; Mon State; Sagaing Division; Shan State Burma; springs; Tenasserim Division; thermal waters. Notes: References: 1; 1 table, geol. sketch maps. ISSN: 0375-6505.

Tin U, U., Lun Wai, U., Ba Tun, U., Mya Win, U. and Thein Dan, U. 1988. "We Want Water, Not Gold." *World Health Forum*. WHFODN. Vol. 9, no. 4, pages 519-525. 1988. Descriptors: Burma; Sanitation; Technology transfer; Public health; Developing countries; Water

supply; Community development; Economic aspects; Social participation; Financing; Social aspects; Planning; Education. Abstract: A study in the dry-zone township of Ayadaw, Burma has shown that the success of health development activities is largely attributable to collective leadership, viable community organization, balance between local and central priorities, the use of appropriate interventions and technology, community participation, and the maintenance of a proper community financing system. The Ayadaw township People's Health Plan Committee was awarded the 1986 Sasakawa Health Prize at the Thirty-ninth World Health Assembly. Since the People's Health Plan was introduced in 1978, the water supply and sanitation program has been one of the country's major health service programs, as part of the national development plan under the International Water Supply and Sanitation Decade. The main challenge facing technical staff was that of encouraging people to improve their health by their own efforts. An educational campaign dealt with disease carried by water and human waste, the benefits of safe water and sanitation, and the activities required of villagers to combat adverse sanitary conditions. Volunteer health workers were assigned tasks intended to satisfy urgent needs of the community. The Ayadaw case study has thrown light on how community organization evolved in relation to primary health care. It has also indicated effective mechanisms of technology transfer and has shown the importance of timing and sequencing of steps taken for the implementation of health development plans. Further study should help towards planning the expansion of community participation in this work. ISSN: 0251-2432.

Tin, Myint, Myo Thet, Htoon and Tin, Shwe. 1992. "Estimation of Leprosy Prevalence in Bago and Kawa Townships using Two-Stage Probability Proportionate to Size Sampling Technique." *Int. J. Epidemiol.* 2005. Volume 21, Issue 4, Pages 778-783. Descriptors: Medical Geography; Water; medical geography; developing country; leprosy; disease prevalence; control programme; disease estimation technique; leprosy prevalence; disability. Notes: Geographic: Burma-Myanmar- Bago Township Burma- Myanmar- Kawa Township Burma. Abstract: Two surveys to estimate leprosy prevalence using two-stage probability proportionate to size sampling technique were conducted in

Bago and Kawa townships. A total of 3519 and 3739 individuals were examined in each township. The two surveys were finished within 25 (Bago) and 30 (Kawa) working days at a cost of Kyats 10 000 (US\$ 1500) for each survey. The estimated leprosy prevalence obtained in Bago was 9.95 per 1000 population (95% confidence interval (CI): 7.11-12.78) and in Kawa it was 12.04 per 1000 population (95% CI: 8.85-15.22). A total of 30 (Bago) and 34 (Kawa) new leprosy cases were detected in the two surveys. Grade I disability was seen to be 20% in Bago and 18.78% in Kawa, whereas grade II disability was 17.14% in Bago and 15.56% in Kawa. ISSN: 0300-5771.

Towards Ecological Recovery and Regional Alliance (Organization) and Nuin` nam to` Nrim` vap` Pi pra` mhu Taññ` chok` re` A phvai` (Burma). 1997. Hydroelectric and Trans-Basin Water Diversion Projects in the Salween River Basin Including Project Proposals of the Royal Thai Government and the State Law and Order Restoration Council (SLORC), Burma. Bangkok: The Alliance. Pages: 39. Descriptors: Hydroelectric power plants- Thailand; Hydroelectric power plants- Burma; Salween River Watershed; Microfiche; Master microform. Notes: maps; 30 cm. Notes: Includes bibliographical references (p. 39). Reproduction: Microfiche. New Delhi: Library of Congress Office; Washington, D.C.: Library of Congress Photoduplication Service, 2000. 1 microfiche. Responsibility: compiled by Towards Ecological Recovery and Regional Alliance. LCCN: 98-943692. OCLC: 43885956.

Transportation and World Trade. Daily Report. Twin Coast Newspapers, Incorporated. Journal of Commerce. Pages: n.p. Descriptors: International trade; Liner services; Liner shipping; Sailing schedules; Sailing ships; Schedules; Scheduling; Ship motion; Ship movements; Trade routes. Abstract: The Journal of Commerce publishes a daily sailings list in its Transportation and World Trade section. This list includes sailings from the Atlantic Coast to Europe, Iceland, the Mediterranean, South, East, and West Africa, the Red Sea-Persian Gulf, India-Pakistan-Burma, South and Central America and Mexico, Atlantic Islands, the Far East, Indonesia, and Australia-New Zealand; and from the Gulf Coast, Pacific Coast, and Great Lakes ports to all of

the relevant destinations listed above. Also included are future ship arrivals at Atlantic ports; incoming vessels at Gulf, Pacific, Great Lakes, and East Canadian Ports; a 4-day list of vessels due at New York; and sailed from-arrived at information for New York on a daily basis. ISSN: 1542-3867.

Travis, John. 2003. "Children of Sea See Clearly Underwater." *Sci. News*. May 17. Volume 163, Issue 20, Pages 308-309. Descriptors: Bajau (Southeast Asian people); Sight- Man. Abstract: In the May 13 *Current Biology*, Gislén and colleagues report that children of a sea gypsy tribe of Southeast Asia have enhanced underwater vision. The researchers compared the underwater vision of 6 children of the Moken tribe, which inhabits the archipelago along the west coasts of Burma and Thailand, with that of 28 European children and found that the sea gypsy children had superior resolving power and better perception of contrasts. As sea gypsies have depended on the ocean for hundreds of years, Moken children may have inherited genetic variations that enable them to see more clearly under water, although regular diving may simply help the eye learn to adapt to the underwater environment. ISSN: 0036-8423.

TU, M., HLA-GYAW, S. and CHEN, H. 1970. "Bacteriological Findings in the Chlorinated Water Supplies of 1968 in Rangoon." *Union of Burma Journal of Life Sciences*. Volume 3, Number 1. Volume P 59-70, Pages ILLUS. Descriptors: *Alcaligenes-Faecalis*; Bacteriological Studies; Burma; Chlorinated Water Supply; *Citrobacter-Freundii*; *Clostridium-Perfringens*; Coliforms; *Enterobacter*; *Enterococcus*; *Escherichia-Coli*; *Klebsiella-Aerogenes*; *Proteus-Fluorescens*; *Proteus-Vulgaris*; *Pseudomonas*; Rangoon; *Serratia-Marcescens*; *Streptococcus-Fecalis*. Abstract: chlorinated waters from 20 sites in Rangoon were sampled and examined bacteriologically for coliforms enterococci and *Clostridium perfringens*. Bacterial species obtained from primary macconkey bile-salt lactose peptone water and sodium azide cultures were identified. Of a total of 26 samples tested, 22 were of unsatisfactory, and 1 of suspicious, bacterial sanitary quality. The remaining 3 samples should be considered satisfactory. The criteria used were the presumptive coliform count, the presumptive

enterococcus count, and/or the isolation of escherichia coli. The bacterial species isolated included e. Coli, klebsiella aerogenes, citrobacter freundii, streptococcus faecalis, alcaligenes faecalis, and enterobacter, proteus and pseudomonas spp. The viabilities of coliform species at 4 deg c extended up to 112 days in 2 e. Coli and 3 k. Aerogenes strains, and up to 56 days in 2 enterobacter strains and 1 e. Coli strain. In the noncoliform species tested 3 a. Faecalis strains persisted till the 112th, and 1 p. Aeruginosa strain, 2 p. Fluorescens strains and 1 serratia marcescens strain till the 56th day. None of 5 s. Faecalis strains tested persisted till the 56th day. The viabilities of coliform species at room temperature extended up to 112 days in 2 e. Coli and 5 k. Aerogenes strains, and up to 56 days in 3 e. Coli strains, 3 k. Aerogenes strains, and 1 strain each of c. Freundii and an enterobacter species. In the noncoliform species tested, 1 bacillus strain, 2 p. Mirabilis strains, 2 p. Aeruginosa strains and 1 p. Fluorescens strain persisted till the 112th, and 2 a. Faecalis strains, 1 bacillus strain, 1 p. Vulgaris strain, a providence b strain and 4 p. Fluorescens strains till the 56th day. None of 3 s. Faecalis strains tested persisted till the 56th day. ISSN: 0503-2377.

Tuckey, Michael Edward. 1988. Global Biogeography, Biostratigraphy and Evolutionary Patterns of Ordovician and Silurian Bryozoa. Michigan State University; 0128. DAI. Volume: 49, 10B, Pages: 194-4206. Descriptors: Paleontology; Geology. Abstract: The data for each of the chapters in this thesis was dervied from a global bryozoan data base assembled for this project. The data base contains information on nearly all species of Ordovician and Silurian Bryozoa which have been described in the literature. The information recorded for each reported occurrence of a species includes: geographic locality, geologic formation, lithology of the formation, and colony morphology. Ages of formations were estimated from recently published stratigraphic charts. Taxonomy and synonymies of bryozoan clades were assembled with the advice of Dr. Robert Anstey. The bibliography of sources for the data base is contained in Appendix A. Four independent problems were addressed in this thesis: (1) An investigation of the biogeography of Ordovician and Silurian Bryozoa revealed the existence of four major Ordovician bryozoans provinces: Baltic, North American,

Siberian and Mediterranean. The Llandeilo-Carodoc was a period of high provinciality as all four provinces were in existence. Provinciality was reduced in the Ashgill, as the North American and Siberian and the Baltic and Mediterranean Provinces merged. In the Llandovery and Wenlock, the temperate latitude Mongolian Province existed on the northern portion of the Siberian plate. Silurian provinciality was reduced with the merging of the North American-Siberian and Baltic Provinces in the Wenlock. (2) An investigation of Ordovician-Silurian radiations of the Bryozoa revealed that the major center of origin of bryozoan radiation in the Early Ordovician was the temperate latitude continent of Baltica. Within North America, bryozoan genera and families made their first appearances in shallow water and reef environments along the continental margin, while speciation rates were highest in offshore areas of the craton. (3) The statistical technique of gradient analysis was found to be useful for stratigraphic correlation, and faunas from Poland and Burma were dated by this method. (4) The Late Ordovician mass extinction was found to be a composite of three separate extinction events. The major extinction occurred at the end of the Rawtheyan, and was associated with a marine regression which affected primarily species from terrigenous lithotopes. Degree: PH.D. Dissertation Abstracts: AAG8900113. OCLC: 21878408.

Tun-Lin, W., Htay-Aung, Moe-Moe, Sebastian, A., Myo-Paing and Myat-Myat-Thu. 1987. "Some Environmental Factors Influencing the Breeding of Anopheles Balabacensis Complex (Dirus) in Domestic Wells in Burma." J. Commun. Dis. Dec. Volume 19, Issue 4, Pages 291-9 Additional Info: INDIA. Descriptors: Breeding; Seasons; Social Environment; Water Supply; Animals; Anopheles- physiology; Female; Larva- physiology; Myanmar. ISSN: 0019-5138 (Print).

Tun-Lin, W., Maung-Maung-Mya, Sein-Maung-Tha and Tin-Maung-Maung Affiliation: Medical Entomology Research Division, Ministry of Health, Yangon, Myanmar. 1995. "Rapid and Efficient Removal of Immature Aedes Aegypti in Metal Drums by Sweep Net and Modified Sweeping Method." Southeast Asian J. Trop. Med. Public Health. Dec. Volume 26, Issue 4, Pages 754-9. Descriptors: Aedes; Insect Vectors;



Water Supply; Analysis of Variance; Animals; Cost-Benefit Analysis; Dengue- prevention & control; Humans; Larva; Mosquito Control-instrumentation; Myanmar; Time Factors. Abstract: A modified sweeping method was developed using a cotton sweep net for control of *Ae. aegypti* immatures in 200 liter (44 gallon) metal drums which are major sources of breeding in Yangon. Laboratory experiments revealed that with only 4 sweeps (approximately 10 minutes duration), the mean % removal (+/- SD) of *Ae. aegypti* fourth stage larvae was 88.5% +/- 1.47. This was followed by a field study undertaken in Sanchaung township, Yangon. Twenty-eight drums with moderate (or = 500 immatures) *Ae. aegypti* density were tested in the field. It was found that with only 4 sweeps per drum, a total of 24,886 immatures were removed out of 29,155 immatures in these 28 drums, giving a mean % removal per drum of 85.36% +/- 10.74 (range = 55.54-98.62%). This sweeping method is simple, cost-effective, and readily accepted by the community. It could be an appropriate technology for control of the dengue hemorrhagic fever (DHF) vector *Ae. aegypti*. ISSN: 0125-1562 (Print).

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U Khim Zaw, U Aung Pwa and U Thet Aung Zan. 1984. "Lead-Zinc Mineralization at Theingon Mine, Bawsaing, Southern Shan State, Burma; a Mississippi Valley-Type Deposit?" Buletin Persatuan Geologi Malaysia = Bulletin Geological Society of Malaysia. Geological Society of Malaysia, Kuala Lumpur, Malaysia. Dec. Volume 17, Pages 283-306. Descriptors: Asia; Bawsaing; Burma; carbonate rocks; clastic rocks; claystone; copper ores; economic geology; epigene processes; Far East; hydrothermal alteration; hydrothermal processes; leaching; lead-zinc deposits; metal ores; metasomatism; meteoric water; mineral deposits, genesis; mineralization; mississippi valley-type deposits; Ordovician; ore-forming fluids; Paleozoic; sedimentary rocks; Shan State Burma; Theingon Mine; Wunbye Formation. Notes: References: 36; illus. incl. 2 tables, sects., geol. sketch maps. ISSN: 0126-6187.

U Khin Zaw and Daw Khin Myo Thet. 1983. "A Note on a Fluid Inclusion Study of Tin-Tungsten Mineralization at Mawchi Mine, Kayah State, Burma." *Econ. Geol. Bull. Soc. Econ. Geol. Economic Geology Publishing Company, Lancaster, PA.* May. Volume 78, Issue 3, Pages 530-534. Descriptors: Asia; Burma; economic geology; Far East; fluid inclusions; fluorides; fluorite; framework silicates; geologic thermometry; halides; homogenization; hydrothermal alteration; hydrothermal processes; inclusions; Kayah; Mawchi Mine; metal ores; metasomatism; mineral deposits, genesis; ore-forming fluids; paleosalinity; quartz; scheelite; silica minerals; silicates; temperature; tin ores; tungstates; tungsten ores. Notes: References: 13; illus. incl. 1 table, geol. sketch map. ISSN: 0361-0128.

U, K. M., Khin, M., Wai, N. N., Hman, N. W., Myint, T. T. and Butler T Affiliation: Department of Medical Research, Ministry of Health, Yangon (Rangoon), Myanmar, Burma. 1992. "Risk Factors for the Development of Persistent Diarrhoea and Malnutrition in Burmese Children." *Int. J. Epidemiol.* Oct. Volume 21, Issue 5, Pages 1021-9. Descriptors: Case-Control Studies; Child, Preschool; Diarrhea- epidemiology; Diarrhea-etiology; Health Knowledge, Attitudes, Practice; Humans; Infant; Myanmar- epidemiology; Nutrition Disorders- epidemiology; Nutrition Disorders- etiology; Risk Factors; Socioeconomic Factors. Abstract: To identify socioeconomic and behavioural risk factors for development of persistent diarrhoea and malnutrition in children, a case-control study was carried out in Burma. Cases were 67 children 1-59 months old hospitalized for diarrhoea lasting > 14 days and complicated by severe malnutrition; for each case, a healthy control child was selected who was age- and sex-matched from the same neighbourhood. Homes of cases and controls were visited for interviews and for direct observation of household child-care practices. Risk factors were catalogued and calculations made for relative risk and etiologic fractions. Risk factors that were associated with persistent diarrhoea and malnutrition included low family income, low education of mothers, unhygienic latrines, flies in the house and on the child, dirty appearance of child and mother, mother not using soap and water when washing child's hands, defaecation of child on floor, breastfeeding on demand, child eating food from floor, not feeding

recommended weaning foods, and lack of knowledge by mother about causes of diarrhoea and about foods that prevent malnutrition. These results indicated that persistent diarrhoea and malnutrition in Burma is caused by a complex of several interrelated socioeconomic factors, unsanitary behaviour pertaining to personal hygiene, the practice of demand breastfeeding and lack of certain weaning foods, and low education of mothers who showed less knowledge about causes of diarrhoea and prevention of malnutrition. ISSN: 0300-5771 (Print); 1464-3685 (Electronic).

Uchida T Affiliation: Department of Pathology, Nihon University School of Medicine, Tokyo, Japan. 1992. "Hepatitis E: Review." *Gastroenterol. Jpn.* Oct. Volume 27, Issue 5, Pages 687-96. Descriptors: Hepatitis E-microbiology; Hepatitis E- pathology; Animals; Humans. References: Number: 55. Abstract: Hepatitis E is endemic, often provoking epidemics in many developing countries. It resembles hepatitis A clinically and epidemiologically but shows a higher mortality rate and less infectiousness. Several lines of evidence strongly support the assumption that humans become immunized once they contract hepatitis E. Because of the low infectiousness, most of the adult population of endemic areas are susceptible to hepatitis E until an epidemic occurs, although they are almost always infected with hepatitis A during infancy. Epidemics are caused by accidental contamination by the hepatitis E virus (HEV) in feces of water provided to these people. The liver change reveals necroinflammation related to the immune-mediated mechanism. The HEV is molecularly cloned and sequenced and has a single-stranded, positive-sense RNA genome, 7,194 nucleotides followed by a poly (A) tail. There are three open reading frames. The non-structural gene, approximately 5 kb is located at the 5' end, while the structural gene, approximately 2 kb is located at the 3' end of the genome. There is a low level of nucleotide variations among HEV strains isolated from Myanmar and China and a single serotype appears to exist. The HEV may be a new RNA virus or belong to Caliciviridae family. Further investigation include in vitro propagation, elucidation of the gene replication, global seroepidemiology and vaccination of the HEV. ISSN: 0435-1339.

Ul-Haq, Islam. 2005. "Ground Water Arsenic Contamination Integrated Approach for Making Arsenic Free Drinking Water National Action Plan for Arsenic Mitigation (NAPAM, 2005-09); Geological Society of America, 2005 Annual Meeting." Abstracts with Programs - Geological Society of America. Oct. Volume 37, Issue 7, Pages 454-455.

Descriptors: aquifers; arsenic; Asia; Bangladesh; Burma; cartography; China; drinking water; Far East; ground water; India; Indian Peninsula; metals; National Action Plan for Arsenic Mitigation; Nepal; Pakistan; pollutants; pollution; public health; Vietnam; water pollution; water quality; water treatment. Abstract: Ground water arsenic contamination has exponentially endangered the human life and complicated the efforts for obtaining and maintaining drinking water quality standards. The deadly contaminant (arsenic) has created an alarming and catastrophic crises world over, especially in South Asia, e.g., Bangladesh, India, Nepal, Vietnam, China and Myanmar who are facing ground water arsenic contamination problems. Every affected country is combating the arsenic contamination menace within the framework of their own socio-economic, legal and cultural perspectives which may not be cost-effective and efficient in time and space dimensions. The reason might be of devoid of integration approach amongst the key stakeholders. Hence, under the circumstances, there was a dire need of an integrated approach to combat the arsenic contamination which has virtually emerged as a crises situation thus necessitating formulation of national action plan for arsenic mitigation. Strategies and objectives within the Action Plan Framework are based on the earlier initiatives of addressing the serious issue of arsenic contamination resulting in the formulation of national action plan for arsenic mitigation which includes, establishing integrated institutional arrangement and developing capacity, coordination mechanism among all the implementing agencies at various levels of administration with government(s), NGOs, donor agencies and other departments, policy decisions and legislation to enforce for arsenic mitigation, monitoring and surveillance of water quality/aquifer mapping/treatment and data base thereof, establishing case diagnosis/treatment of affected arsenicosis under health department, developing effective and sustainable behavioral change program including community participation/social mobilization and

developing cost-effective water treatment technologies and establishment of research related infrastructures. The major components of national action plan for arsenic mitigation are described diagrammatically in the subsequent paragraphs. This paper is based on the arsenic contamination status in Pakistan and inferences thus were drawn and shaped as national action plan for arsenic mitigation (NAPAM) which is going to be equally good for any affected country. ISSN: 0016-7592.

Umbangtalad, S., Parkpian, P., Visvanathan, C., Delaune, R. D. and Jugsujinda A Affiliation: Environmental Engineering and Management Program, School of Environment Resources and Development, Asian Institute of Technology, Pathumthani, Thailand. 2007. "Assessment of Hg Contamination and Exposure to Miners and Schoolchildren at a Small-Scale Gold Mining and Recovery Operation in Thailand." *Journal of Environmental Science and Health - Part A Toxic/Hazardous Substances and Environmental Engineering*. Dec. Volume 42, Issue 14, Pages 2071-9. Descriptors: Gold; Mining; Child; Creatine- analysis; Creatine- metabolism; Creatine- urine; Environmental Exposure- analysis; Female; Geography; Hair- metabolism; Humans; Male; Mercury- analysis; Mercury- metabolism; Mercury- urine; Students- statistics & numerical data; Thailand. Notes: Chemical Subst: Creatine [57-00-1] Mercury [7439-97-6] Gold [7440-57-5]. Abstract: Gold extracted by Hg-amalgamation process, which can cause both health and environmental problems, is widespread in South East Asia including Myanmar, Laos, Cambodia, and Thailand. Small-scale gold mining operations have been carried out since the year 2000 in Phanom Pha District, Phichit Province, Thailand. Since no data is available for evaluating Hg exposure, an investigation of mercury (Hg) contamination and exposure assessment was carried out at this mine site. Environmental monitoring illustrated the total Hg in water was as high as 4 microg/l while Hg in sediment ranged between 102 to 325 microg/kg dry weight. Both Hg deposition from the air (1.28 microg/100 cm<sup>2</sup>/day) and concentration in surface soil (20,960 microg/kg dry weight) were elevated in the area of amalgamation. The potential of Hg exposure to miners as well as to schoolchildren was assessed. The concentrations of Hg in urine of 79 miners who were

directly (group I) or indirectly (group II) involved in the gold recovery operation were 32.02 and 20.04 microg/g creatinine, respectively, which did not exceed regulatory limits (35 microg/g creatinine). Hair Hg levels in both groups (group I and group II) also were not significantly higher than the non-exposed group. In terms of risk factors, gender and nature of food preparation and consumption were the two significant variables influencing the concentration of Hg in urine of miners ( $P < 0.05$ ). A hazard quotient (HQ) was estimated based on the inorganic Hg exposure of individual miners. The HQ values of group I were in a range 16 to 218 times higher than the safety level set as 1. By comparison the group II HQ index was very low (0.03-0.39). The miners in group I who worked and ate food from this area experienced potentially high exposure to Hg associated with the mining process. In a second Hg exposure assessment, a group of 59 schoolchildren who attended an elementary school near the gold mine site was evaluated for Hg exposure. A slightly higher Hg urine concentration was detected in group I and group II (involved and not involved in gold recovery) at average levels of 15.82 and 9.95 microg/g creatinine, respectively. The average Hg values for both groups were below the established levels indicating no risk from Hg intake. Average Hg hair level in all schoolchildren (0.93 microg/g) was not significantly higher than reference group. There were two variables (gender and personal hygiene) which affected the concentration of Hg in urine of schoolchildren ( $P < 0.05$ ). The result (HQ) also suggested that schoolchildren were not at risk ( $< 1$ ). Schoolchildren involved in gold mining activities showed some indirect exposure to Hg from the adults working in mining area. ISSN: 1093-4529 (Print); 1532-4117 (Electronic).

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Malaysia; Sorghum; Nigeria; Iron; Water Supply; Soils; Rural Population; Urban Population; Early Warning Systems; Joint Who/Unicef Nutrition Support Programme. Notes: p. 289-371: charts, graphs, tables. Notes: Includes bibliographical references. Reports and studies. General (not for deposit). OCLC: 81951160; 123412897. ISSN: 0379-5721.

UN University. 1982. Food and Nutrition Bulletin, v. 4, no. 4, Oct. 1982. Tokyo: United Nations University. Pages: 81. Descriptors: Cretinism; Statistical Data; Health Statistics; China; Malnutrition; Mexico; Breast-Feeding; Myanmar; Child Development; Nutrition; Maternal Welfare; Family; Child Nutrition; Nutrition Statistics; Food; International Trade; Trade Statistics; Protein Research; Fish; Conferences; Infant Feeding; Developing Countries; Vitamins; Water Hyacinth. Notes: charts, diagram, ill., maps, tables. Notes: Includes bibliographical references. Miscellaneous documents. ISBN: 9280804618; 9789280804614. OCLC: 78567245.

UN. Department of Technical Cooperation for Development. 1986. Ground Water in Continental Asia (Central, Eastern, Southern, South-Eastern Asia). New York: UN. Pages: 391. Descriptors: Groundwater; Water Resources; Maps; Asia; East Asia; South Asia; Southeast Asia; Afghanistan; Bangladesh; Bhutan; Myanmar; China; Cambodia; India; Lao People's Democratic Republic; Malaysia; Maldives; Mongolia; Nepal; Pakistan; Republic Of Korea; Singapore; Sri Lanka; Thailand; Siberia; Ussr; Viet Nam; Hydrogeology; Hydrology; Government publication; International government publication. Notes: viii; maps, tables. Notes: At head of title: Department of Technical Co-operation for Development. "Annex: Ground-water projects in continental Asia sponsored by the United Nations Development Programme": p. 390-391. Includes bibliographical references. Includes UN map no. 3323: Asia (Mar. 1985); UN map no. 3323.1x: [Asia]: surface configuration; UN map no. 3323.2x: [Asia]: geologic structure; UN map no. 3323.3x: [Asia]: rainfall; UN map no. 3323.4x: [Asia]: population; UN map no. 3319: Afghanistan (Feb. 1985); UN map no. 3323.5: Afghanistan: hydrogeology (June 1985); UN map no. 3323.6x: Bangladesh: mean annual rainfall and major rivers; UN map no. 3323.7x: Bangladesh:

depth to main aquifer; UN map no. 3323.8x: Bangladesh: potentiometric surface, June 1979; UN map no. 3323.9x: Bangladesh: depth to water, June 1979; UN map no. 3323.10x: Bangladesh: transmissivity of wells, tapping main aquifer; UN map no. 3323.11x: Bangladesh: total dissolved solids, dry season, 1978; UN map no. 3323.12: Bhutan: geological sketch (Apr. 1985); UN map no. 3323.14x: Burma: rainfall distribution; UN map no. 3323.13: Burma: geological sketch (Apr. 1985); UN map no. 3323.15x: Burma: hydrogeological map of the dry zone; UN map no. 3323.29x: China: hydrogeology; UN map no. 3323.16: Democratic Kampuchea: geological-lithological sketch (May 1985); UN map no. 3323.17: India: main ground-water units (May 1985); UN map no. 3323.18x: India: average annual rainfall; UN map no. 3323.21x: Lao People's Democratic Republic: summary geology; UN map no. 3323.22x: Lao People's Democratic Republic: hydrographic basins; UN map no. 3323.23x: Malaysia: simplified hydrogeological map; UN map no. 3323.24x: Malaysia: areas of hydrological investigations in Sarawak; UN map no. 1692 rev. 1: Maldives (Apr. 1982); UN map no. 3215: Mongolia (Jan. 1983); UN map no. 3323.25x: Nepal: geological map; UN map no. 3112: Pakistan: administrative divisions (Aug. 1980); UN map no. 3323.26x: Pakistan: physiography; UN map no. 3323.27x: Pakistan: aquifers of Punjab, Sind and north-west frontier provinces; UN map no. 3323.28x: Pakistan: aquifers of Baluchistan; UN map no. 3323.21x: Korean peninsula: geology; UN map no. 3323.20x: Republic of Korea: ground-water resources; UN map no. 3323.30x: [Singapore: geology]; UN map no. 3323.31x: [Singapore: sketch map and section of the Quarternary basin in the eastern part of Singapore]; UN map no. 3323.32x: Sri Lanka: wet and dry zones; UN map no. 3323.33x: Sri Lanka: geology; UN map no. 3323.34x: Sri Lanka: system "A" project area; UN map no. 3323.35x: Thailand: physiographic provinces; UN map no. 3323.36x: Thailand: main aquifers; UN map no. 3323.37: Outline of the hydrological zones of the Asian part of the USSR (May 1985); UN map no. 3323.38x: Viet Nam: hydrological regions. UN sales no.: 86.II.A.2. Contains: Maps (in UN documents). General Info: Distribution: General. ISSN/ISBN: 9211041759; 9789211041750; Stock no: 86.II.A.2. OCLC: 123533779.



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Discrimination, Xenophobia and Related Intolerance (2001: Durban, South Africa); Meeting of Experts on the United Nations Programme in Public Administration and Finance (12th: 1995: New York); Government publication; International government publication; Internet resource (url). Notes: viii; tables. Title Subject: International Year of Older Persons (1999) UN New Agenda for the Development of Africa in the 1990s (1991) Decade for Action to Combat Racism and Racial Discrimination (3rd: 1993-2002) World Youth Programme of Action to the Year 2000 and Beyond (1995) International Decade for Natural Disaster Reduction (1990-2000) Declaration on the Granting of Independence to Colonial Countries and Peoples (1960) International Drinking Water Supply and Sanitation Decade (1981-1990); Notes: UN Job no.: N9617196 E. Material type: Annual/sessional reports (UN). Issued under agenda item 12, agenda document A/50/251. General Info: Distribution: General. ISSN: 0082-8203. OCLC: 84598802.

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Promotion; Lao People's Democratic Republic; Russian Federation; Uzbekistan; Asia And The Pacific; Government publication; International government publication. Notes: ix; tables. Notes: UN sales no.: 97.II.F.11. Material type: Sales publications (UN). General Info: Distribution: General. ISBN: 9211197406; 9789211197402; Stock no: 97.II.F.11 Series 0082-8130. OCLC: 82644272.

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UN. ESCAP. 1991. The use of Microcomputers in Selected Fields of Water Resources Development. New York: UN. Pages: 347. Descriptors: Water Resources Development; Bangladesh; China; India; Viet Nam; Myanmar; Nepal; Philippines; Sri Lanka; Thailand; Urban Water Supply; Sewerage; Water Supply; Iran (Islamic Republic Of); Water Management; Water Policy; Computer Applications; Microcomputers; Mathematical Models; Data Processing; Conferences; Seminar on the Use of Microcomputers in Water Resources Development (1989: Bangkok); Government publication; International government publication. Notes: xii; ill., charts, graphs, tables. Notes: Material type: Misc. General Info: Distribution: General. OCLC: 79192857.

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maps, tables. Notes: At head of title: United Nations Development Programme. Miscellaneous documents. OCLC: 84510934; 123435152.

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UNICEF. Executive Director. 1987-02-19. Country Programme Recommendation: Burma. New York: UN. Pages: 26. Descriptors: Basic Services; Children; Nutrition; Drinking Water; Sanitation; Primary Education; Immunization; Oral Rehydration; Primary Health Care; Literacy Programmes; Non-Formal Education; Women In Development; Country Programmes; Statistical Data; Socio-Economic

Indicators; Maps; Myanmar; Recommendations; Programme Management; Financing; Unicef--Programme Management. Notes: map, tables. Notes: Includes UN map no. 3107 rev. 1: Burma (Apr. 1981). - Consists of recommendation of the Executive Director of UNICEF. UN development projects. UN maps included in documents. OCLC: 79373883.

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United Nations Development Programme and World Meteorological Organization. 1968. Burma: Expansion of Meteorological and Hydrological Services, Report. Geneva: United Nations Development Programme: World Meteorological Organization. Pages: 31. Descriptors: Meteorological services- Burma- International cooperation; Hydrometeorological services- Burma- International cooperation; Technical assistance- Burma; Economic development projects- Burma- Costs- Statistics; Government publication; International government publication. Notes: ill., maps; 28 cm. Other Titles: Expansion of meteorological and hydrological services. Burma; Responsibility: prepared for the Government of Burma by the World Meteorological Organization acting as executing agency for the United Nations Development Programme. OCLC: 50050587.

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maps; MP: Scale: 1:1,500,000; 1:1,500,000. type: Geologic map; economic geology map. ISBN: 9211196825.

United Nations and Dept. of Technical Cooperation for Development. 1986. Ground Water in Continental Asia (Central, Eastern, Southern, South-Eastern Asia). New York: United Nations. Pages: 391. Descriptors: Groundwater- Asia; Groundwater; Water Resources; Maps; Asia; East Asia; South Asia; Southeast Asia; Afghanistan; Bangladesh; Bhutan; Myanmar; China; Cambodia; India; Lao People's Democratic Republic; Malaysia; Maldives; Mongolia; Nepal; Pakistan; Republic Of Korea; Singapore; Sri Lanka; Thailand; Siberia; Ussr; Viet Nam; Hydrogeology; Hydrology; Government publication; International government publication. Notes: viii; [1] folded leaf of plates: ill. 28 cm. Responsibility: Department of Technical Co-Operation for Development. ISBN: 9211041759; 9789211041750. LCCN: 87-106389. OCLC: 14269367.

United Nations and Economic and Social Commission for Asia and the Pacific. 1995. Assessment of Water Resources and Water Demand by User Sectors in Myanmar. New York: United Nations. Pages: 54. Descriptors: Water resources development- Burma; Water-supply- Burma; Water consumption- Burma; Government publication; International government publication. Notes: ix; ill., maps; 30 cm. Notes: At head of title: Economic and Social Commission for Asia and the Pacific. "ST/ESCAP/1573"--T.p. verso. "Sales. No. E.95.II.F.13"--T.p. verso. Includes bibliographical references. ISBN: 9211196787; 9789211196788. OCLC: 35405064.

United States; Agency for International Development and Metcalf & Eddy. 1965. Report on Immediate Improvements to Water Distribution System, Rangoon, Burma. Boston: Metcalf & Eddy Engineers. Descriptors: Water resources development- Burma; Water-supply- Burma; Water use- Burma; Water consumption- Burma. Notes: 1 v. (various pagings); 29 cm. Notes: Prepared for National Housing & Town and Country Development Board, Union of Burma and United States Agency for International Development. OCLC: 22439674.

Upadhyay, S. K., Ahuja, V. K. and Sri Ram, V. 1983. "Focal Mechanism Solutions and Dynamic Parameters of Earthquakes in the Eastern Himalayas and Northern Burma." *Tectonophysics*. 10 Apr. Volume 93, Issue 3/4, Pages 233-244. Descriptors: Tectonics; Burma; Himalayas; Indian plate; Faults; Seismology. Abstract: Focal-mechanism solutions of four earthquakes in the eastern Himalayas and northern Burma are determined using the first motion of compressional waves. Two possible solutions thus obtained for each event reveal a steeply dipping fault with predominantly strike-slip motion. The stress directions inferred from the focal mechanism solutions are interpreted in light of predictions using plate tectonics theory, i.e., the underthrusting of the Indian plate in the Burma region in an easterly direction. Dynamic parameters (seismic moment, apparent stress, and average dislocations) are obtained using the corrected spectra of Love waves. The earthquakes are found to possess low seismic moment and apparent stress values. A comparison of these estimates with values for intraplate earthquakes is made. ISSN: 0040-1951.

USSR. Selkhozpromexport; UN; UNDP and Burma. 1977. Development of the Sittang River Valley: Yenwe-Pyuntaza Project. Moscow: Selkhozpromexport. Descriptors: Agricultural Development; Maps; Water Resources Development; Project Activities; Myanmar; Project Management; Undp--Programme Management. Notes: Prepared by Selkhozpromexport for the United Nations acting as executing agency for UNDP. 3 parts in 14 volumes: charts, maps; ans, tables. Project symbol: BUR-68-513. Government. UN development projects. Responsibility: Selkhozpromexport. OCLC: 82119060; 123416233.

## V

Valmet Barge Feeder Boris Polevoy. 1984. *Shipbuilding & Marine Engineering International*. Volume 107, page 192 (4 pp., gen. arr. plan, 8 fig.). Descriptors: Boris polevoy. Abstract: A Soviet shipping company operates Seabee type barge carriers, carrying 1070 dwt Danube barges between the Black Sea and India, the Bay of Bengal, and Burma. The first of a pair of feeder vessels to supplement these long-distance barge carriers has now been delivered; this vessel is

capable of carrying either 6 Danube barges or 12 LASH barges, and can also operate as a ro-ro or conventional container vessel. The twin-screw ship is propelled by a pair of 7560-bhp Diesel engines, and there is an 80-kN bow thruster. Principal dimensions are:-length oa/bp 158.9/141.2m; breadth 31.0m; depth 15.4m; draught operating/trimmed down 4.4/9.3m; deadweight 8800 t; Speed 23.4 knots. ISSN: 0262-463X.

van Spilbergen, Joris; Balbi, Gasparo; Viaggio dell' Indie Orientali, et al. 1606. *Indiæ Orientalis. Pars Septima, Nauigationes Duas: Primam, Trium Annorum, à Georgio Spilbergio, Trium Nauium Præfecto, Ann. 1601, Ex Selandia in Indiam Orientalem Susceptam: Alteram, Nouem Annorum, à Casparo Balby, Gemmario Veneto, Anno. 1579, Ex Alepo Babyloniam Versus, & Inde Porro Ad Regnum Pegu Vsque Continuatam, Continens: Omnium, Quæ Illi Quidem Ad Annum 1604, Huic Vero Ad Annum 1588, Vsque Acciderunt, Commemoratione: Regum Item, Locorum, Populorum, Rituumque Variorum Descriptione Addita.* Francofurti: Typis VVolffgangi Richteri, Place: Germany. Descriptors: Mon (Southeast-Asiatic people)- Early works to 1800; Voyages and travels- Early works to 1800; Water-marks- Specimens; Spilbergen, Joris van, 1568?-1620; Sri Lanka- Description and travel- Early works to 1800; Sri Lanka- Discovery and exploration- Early works to 1800; Burma- Description and travel- Early works to 1800; Burma- Discovery and exploration- Early works to 1800; Syria- Description and travel- Early works to 1800. Notes: [4], 126, [2] p., [22] leaves of plates (some folded): ill. (engravings), maps; rt. 32 cm. (fol.); References: Church, E.D. *Discovery*,; 216. Genre/Form: Exploration literature- Germany- Frankfurt am Main- 17th century. Travel literature- Germany (West)- Frankfurt am Main- 17th century. Engravings- Germany (West)- Frankfurt am Main- 17th century. Notes: Sole ed., 2nd issue. Signatures: (: )2, A-Q4, a-b4, c-d2, e-f4, g6 (Q4 and g6 blanks). Engraved t.p. border, dedication vignette with coat of arms of Johann Adam, Archbishop of Mayence, ornaments. Sidenotes. Separate t.p. to plates, sig. a1r: *Icones, hoc est: Veræ variorvm popvlorvm et regvm ...* Contains: 1. An account of a voyage made under the command of Joris van Spilbergen to Ceylon in 1601-1604: p. 1-42. It was first published at Delft; was translated into

German, for the German ed. of: *India Orientalis*, by Gotthardt Artus, and again into Latin for the present ed. these translations are much abridged and mutilated. 2. The relation of the voyage of Gasparo Balbi, a Venetian, to the kingdom of Pegu, via Syria, in 1579-1588: p. 43-126. This translation was made from the Italian ed., published at Venice under the title: *Viaggio dell' Indie Orientali ...* Other Titles: *Nauigationes duas. 1606; India Orientalis. Pars 7. Indiæ Orientalis. Pars 7. Indiæ Orientalis. Pars VII. Icones, hoc est, Veræ variorum populorum et regum ... Veræ variorum populorum et regum ...* Responsibility: auctore M. Gotardo Arthvs Dantiscano; omnia elegantissimis in æs incisis iconibus illustrata & in lucem emissa, à Ioanne Theodoro et Ioanne Israël de Bry ... OCLC: 81988425.

Vandewiele, G. L., Chong-Yu, Xu and Ni-Lar-Win. 1992. "Methodology and Comparative Study of Monthly Water Balance Models in Belgium, China and Burma." *Journal of Hydrology*. 2005. Volume 134, Issue 1-4, Pages 315-347. Descriptors: Runoff, streamflow and basins; rainfall/runoff; water balance; river discharge; areal precipitation; evapotranspiration. Geographic: Belgium China Burma. Abstract: A set of new monthly rainfall runoff models is defined, for use in river catchments smaller than about 4000km<sup>2</sup>, without appreciable frost or natural or artificial lakes. The input series are areal precipitation and potential evapotranspiration. The output is riverflow. The number of parameters used in the description of the hydrological phenomena in the catchment, is in most cases three or four. The statistical methodology used for calibrating the models of given catchments is described; it reduces essentially to regression analysis, including residual analysis, sensitivity to calibration period and extrapolation test. Automatic calibration is used, excluding subjective elements. ISSN: 0022-1694.

Varady, Robert G. 1982. *Draft Environmental Profile of Burma*. Washington, D.C. : [United States National Committee for Man and the Biosphere, Dept. of State], 1982. Notes: "National Park Service Contract No. CX-0001-0-0003 with U.S. Man and the Biosphere Secretariat, Department of State, Washington, D.C." "June 1982." Prepared by the Arid Lands Information Center, Office of Arid Lands

Studies, University of Arizona; Robert G. Varady, compiler. viii, 233 pages: ill., maps. Environmental protection -- Burma. Environmental impact analysis -- Burma. Natural resources -- Burma. OCLC: 12151724.

Vaziri, M. 2006. "Sustainable Development of Urban Water Resources: An Appraisal for Asian Monsoon Region." Asian J. Water Enviro. Pollut. Volume 3, Issue 2, Pages 43-50. Descriptors: Article Subject Terms: Droughts; Economics; Flooding; Meteorology; Monsoons; Sustainable development; Urban areas; Wastewater treatment; Water resources; Water wells; air flow; summer; sustainability; taxonomy; water demand; winter. Abstract: The challenges of water resources sustainable development are enormous in the Asian monsoon region. Meteorological behaviour in this region is signified by its warm and moist winds, northwest monsoon, blowing from the sea to the land during summer and bringing heavy rains in India and South East Asia. On the contrary, the northeast monsoon occurs when cold and dry winter air flows out of the interior of Asia from the northeast and bring the cool and dry winter season. This unique cyclic behaviour often results in several months of drought followed by a period of flooding, demanding robust water resources management at regional as well as local scales. The objective of this study was to assess water resources sustainable development for selected urban areas in the Asian monsoon region during the last decade. Using centralized databases of international agencies, for the period of 1993 to 1998, urban information pertinent to water resources were collected, analyzed and modelled. The study database consisted of information regarding urban water accessibility, consumption, price, wastewater treatment, and other pertinent social, environmental and economic indicators. Due to data inaccessibility, incompleteness and missing, less than 20 cities from Bangladesh, Brunei, China, India, Indonesia, Laos, Myanmar, Malaysia, The Philippines, Singapore, Sri Lanka, South Korea, Thailand and Vietnam were selected for detailed analysis. The statistical analyses for the selected cities showed interesting results and relations in connection with urban water resources sustainable development of Asian monsoon region. For the period of 1993 to 1998, elasticity of database indicators were developed. Using elasticities, a

composite urban water resources sustainability index was suggested. The elasticities and index were used in taxonomy of the selected cities, and reflected considerable variations in urban water demand and supply development. The study confirmed the significance of urban areas water resources sustainability challenges of the 21st century for the Asian monsoon region. Database: Environmental Sciences and Pollution Mgmt. ISSN: 0972-9860.

Verma, R. K. and Krishna Kumar, G. V. R. 1987. "Seismicity and the Nature of Plate Movement Along the Himalayan Arc, Northeast India and Arakan-Yoma: A Review." *Tectonophysics*. 1 Mar. Volume 134, Issue 1-3, Pages 153-175. Descriptors: Seismicity; Himalayas; India; Tectonics; Source mechanisms; Faults; Burma; Seismology. Abstract: The seismicity along the entire Himalayas and northern Burma is studied in detail. In addition to the main boundary fault and the main central thrust, several very active transverse features are described, which appear to behave like steeply dipping fracture zones. Along the Arakan-Yoma the relation between seismicity and subduction of the Indian lithosphere to the east is evaluated. Focal mechanism solutions are analyzed for the Himalayas. Orientation of P-axes for all thrust solutions is described. ISSN: 0040-1951.

Verma, R. K., Mukhopadhyay, M. and Ahluwalia, M. S. 1976. "Seismicity, Gravity, and Tectonics of Northeast India and Northern Burma." *Bulletin of the Seismological Society of America*. Oct. Volume 66, Issue 5, Pages 1683-1694. Descriptors: Tibetan plate; Tectonics; Burma; India; Seismicity; Plate tectonics; Indian plate; Himalayas; Dauki fault; Burmese plate; Seismology; Earthquake Risk. Abstract: Practically the whole of northeastern India and northern Burma is characterized as an anomalous gravity field as well as an area of high seismicity. The Bouguer anomaly in the region varies from +44mgals over Shillong Plateau to -255mgals near North Lakhimpur in Assam Valley. Isostatic anomaly (Hayford) varies from +100 to -130mgals in these areas. Over Arakan-Yoma and the Burmese plains, the isostatic anomalies vary from -20mgals to -100mgals. Regions of high seismicity in the area include the eastern Himalaya (including Assam syntaxis), Arakan-Yoma including the folded belt of Tripura, Irrawaddy

basin, Shillong Plateau, Dauki fault and the northern part of Bengal basin. The abnormal gravity and seismicity are related to large-scale tectonic movements that have taken place in the area mostly during the Cretaceous and Cenozoic times, due to interaction of the Indian, Tibetan, and Burmese plates. The high seismicity indicates that the movements are continuing. The seismic zone underlying Burma is approximately V shaped and dips toward the east underneath Arakan-Yoma. Most of the intermediate-focus earthquakes in Burma underlie the area characterized by negative isostatic anomalies, indicating the probable existence of a subduction zone underneath the Arakan-Yoma and the Burmese plains. The Shillong Plateau has a history of vertical uplift since Cretaceous times. Provided this statement is true, the uplift of the plateau preceded Himalayan tectonics starting 20 to 30m.y. before continental India made solid contact with the Eurasian plate. The plateau is characterized by large positive isostatic anomalies as well as high seismicity. The positive isostatic anomalies may be due to intrusion or incorporation of basic material from the mantle into the crust underlying the plateau. These intrusions may have taken place through deep seated faults such as the Dauki and could be responsible for its uplift as well. ISSN: 0037-1106.

Verma, R. K., Mukhopadhyay, M. and Nag, A. K. 1980. "Seismicity and Tectonics in South China and Burma," *Tectonophysics*. 1 Apr. Volume 64, Issue 1/2, Pages 85-96. Descriptors: Tibet; tectonics; Seismicity; Burma; People's Republic of China; Plate tectonics; Focal mechanisms; People's Republic of China earthquakes; Seismology. Abstract: A seismicity map of southwest-south China, eastern Burma, and adjoining areas lying between latitudes 19 degree and 35 degree N, and between longitudes 91 degree and 108 degree E for the period 1900-1975 (except the period 1952-1954) is presented using all available data. The relationship between seismicity and tectonics of the area has been studied. On the basis of analysis, it is suggested that the seismicity in the region is well-defined by several arcuate fracture belts surrounding the Assam wedge. Intense seismic activity is observed along the Burmese arc, Assam wedge, Hengtuan ranges, Kang Ting and Red River faults, Kang Tien ranges, and western Szechwan province. Twenty-five new focal mechanism solutions for



earthquakes in south China and the adjoining areas have been determined. These, in conjunction with the results obtained through earlier studies, suggest the dominance of thrust and normal faulting in the Burmese arc as well as in the Himalayan region, while normal faulting predominates in the mountainous regions in south China. The Kang Ting and Red River faults are mostly associated with strike-slip faulting. The results indicate that, in Burma, the seismic slip vectors are directed towards the east from the Arakan-Yoma side and towards the west from the Shan plateau side, thus creating a V-shaped seismic zone underlying the Irrawaddy plains. Focal mechanism solutions of Himalayan earthquakes located north as well as south of the Indus suture zone indicate that the Indian plate is underthrusting the Tibetan plateau towards the north, whereas the latter is underthrusting the Indian plate towards the south. It further appears that, following the convergence of the Indian and the Eurasian plates, the Tibetan and surrounding landmass is moving east to southeast. This, in turn, seems to create strike-slip faulting along giant faults in eastern Tibet and south China. ISSN: 0040-1951.

Verma, Rishendra and Jaiswal, T. N. 1998. "Haemorrhagic Septicaemia Vaccines." Vaccine. 7. Volume 16, Issue 11-12, Pages 1184-1192.

Descriptors: Haemorrhagic septicaemia vaccines; immune responses. Abstract: Haemorrhagic septicaemia (HS), an economically important disease of cattle and buffaloes, is caused by *Pasteurella multocida* (6:B). Vaccination against this disease is widely practised. Plain broth bacterins, or alum precipitated and aluminium hydroxide gel vaccines are administered twice a year since these vaccines offer an immunity of 4–6 months. Many countries use oil adjuvant vaccine (OAV), which gives both a higher degree and a longer duration of immunity up to 1 year. A double emulsion and multiple emulsion vaccine consisting of a thin viscosity have also been experimentally developed that gave an immunity parallel to OAV. Recently, a live vaccine developed from a fallow deer strain (B:3,4) has been used in Myanmar that offers an immunity for more than a year but is not free from constraints. The present review provides information on HS vaccines developed from time to time using whole bacteria or their components. The kinetics and isotype of antibody and cell-mediated immune responses have

also been poorly understood so far, and hence information on their role in protection against HS is reviewed.

LaViolette, Paul E. 1967. "Temperature, Salinity, and Density of the World's Seas: Bay of Bengal and Andaman Sea." Naval Oceanographic Office, Nstl Station, Mississippi. Aug. Descriptors: (\*Oceanographic Data; Indian Ocean); Surface Temperature; Climate; Salinity; Periodic Variations; Rainfall; Drainage; Wind; Transport Properties; Ocean Currents; Physical Properties; Density; Weather; Meteorology Physical And Dynamic Oceanography. Abstract: The values and variations of temperature, salinity, and density in the Bay of Bengal and the Andaman Sea depend largely on the monsoonal regime. In addition, because of the semienclosed geography of the region, water masses outside the area can influence the bay waters only from the south. The wind, rain, and land drainage cause a year-round low-salinity surface layer to form. Toward the end of the northeast monsoon, the surface waters in the Bay of Bengal and Andaman Sea become warmer and more saline, reaching the year's maximum for temperature and salinity in May. As the southwest monsoon approaches the east coast of India, the warm, highly stratified surface layers cool, tumble and mix thoroughly. Upwelling is a prominent feature of both monsoons. During the northeast monsoon it is prevalent along the coasts of Burma and eastern India, whereas during the southwest monsoon it occurs along the coasts of southwestern India and the Malay Peninsula. (Author). Distribution Statement: Approved for public release. DTIC Accession Number: AD0820709.

<http://handle.dtic.mil/100.2/AD820709>

Volker A. Editor: Keller, R. 1983. "Rivers of Southeast Asia: Their Regime, Utilization and Regulation." International Association of Hydrological Sciences; IAHS Publication 140. Pages: 127-138. Descriptors: Hydrology; Meteorology and Climatology; hydrological regime; Irrawaddy; Chao Phya; Mekong; Red River. Abstract: Deals mainly with the hydrological regime, utilization and possible regulation of large rivers such as the Irrawaddy (Burma), Chao Phya (Thailand), Mekong (an international river), and the Red River (Vietnam). Emphasis is given to the effects of human intervention in the river

valleys and deltas on the river regime.-from Author. Abstract: Southeast Asia is a region with copious rainfall, large rivers and a high population density. The population is concentrated in the lower river valleys and deltas where lowland rice, the staple diet is produced. Therefore river flooding and high rainfall play an important role in agricultural water supply. The annual average per capita volume of water available is 4,000 cu m, which is below the world average and about equal to that for Europe. The intimate relationship between man and rivers in southeast Asia is due both to these facts and to the warm climate. The paper deals mainly with the hydrological regime, utilization and possible regulation of large rivers such as the Irrawaddy (Burma), Chao Phya (Thailand), Mekong (an international river), and the Red River (Vietnam); some smaller rivers are also considered. Emphasis is given to the effects of human intervention in the river valleys and deltas on the river regime. Some of these effects are: 1) possible rise of flood levels due to embarking, 2) possible rise of river levels due to embanking, 3) elimination of silt creating a situation where agricultural lands are being deprived of the fertilizing effect of silt, and 4) elimination of the beneficial flushing and rinsing effects of the floods removing dirt, waste products and human disposal. Notes: Special Features: 9 figs, 5 refs. OCLC: 0486679.

Volker, A. Boekelman, R. H. de Haas, A. W., et al. 1993. "Hydrology and Water Management of Deltaic Areas." Rotterdam, Netherlands: A.A. Balkema. Volume: 93-5, Descriptors: Africa; aquifers; Argentina; Asia; Burma; case studies; coastal environment; deltaic environment; deltas; discharge; drainage basins; ecology; ecosystems; Egypt; estuarine environment; Europe; Far East; floods; geologic hazards; ground water; human activity; hydrology; Irrawaddy Delta; land use; marshes; Mekong Delta; mires; Netherlands; Niger Delta; Nigeria; Nile Delta; North Africa; Parana River; planning; policy; pollution; preventive measures; protection; reclamation; Rhine River; salt-water intrusion; sea-level changes; soils; South America; surface water; urban environment; Vietnam; water management; water quality; water resources; water supply; West Africa; Western Europe. Notes: Includes seven appendices; References: 195; illus. ISBN: 9054101687.

Vorosmarty, Charles J., Ericson, Jason P., Dingman, S. Lawrence, Ward, Larry G. and Meybeck, Michel. 2007. "Future Impacts of Freshwater Resource Management; Sensitivity of Coastal Deltas; Water Quality and Sediment Behaviour of the Future; Predictions for the 21st Century." IAHS-AISH Publication. International Association of Hydrological Sciences. Volume 314, Pages 231-238. Descriptors: Andaman Sea; Asia; Burma; coastal environment; deltaic environment; deltas; economics; environmental management; Far East; fresh water; geologic hazards; hydrocarbons; hydrology; Indian Ocean; Irrawaddy Delta; land subsidence; landform evolution; organic compounds; risk assessment; sea-level changes; sedimentation; water management; water resources; watersheds. References: 19; illus. incl. 3 tables, sketch map. Abstract: We present an assessment of contemporary and future effective sea-level rise (ESLR) using a sample of 40 deltas distributed worldwide. For any delta, ESLR is a net rate defined by eustatic sea-level rise, natural gross rates of fluvial sediment deposition and subsidence, and accelerated subsidence due to groundwater and hydrocarbon extraction. Present-day ESLR, estimated from geospatial data and a simple model of deltaic dynamics, ranges from 0.5 to 12.5 mm year (super -1). Reduced accretion of fluvial sediment from upstream siltation of reservoirs and freshwater consumptive irrigation losses are primary determinants of ESLR in nearly 70% of the deltas, while for only 12% eustatic sea-level rise predominates. Future scenarios indicate a much larger impact on deltas than previously estimated. Serious challenges to human occupancy of deltas worldwide are conveyed by upland watershed factors, which have been studied less comprehensively than the climate change and sea-level rise question. ISBN: 1901502145.

Vouillamoz, J. M., Baltassat, J. M., Legchenko, A., Chatenoux, B. and Mathieu, F. Affiliation: J.M. Vouillamoz, Institut de Recherche pour le Développement, Indo-French Cell for Water Science, Indian Institute of Science, Bangalore, India E-mail: [Jean-Michel.Vouillamoz@ird.fr](mailto:Jean-Michel.Vouillamoz@ird.fr). 2007. "Efficiency of Joint use of MRS and VES to Characterize Coastal Aquifer in Myanmar." J. Appl. Geophys. 2007. Volume 61, Issue 2, Pages 142-154 Additional Info: Netherlands. Descriptors: Electricity; Geophysical techniques; vertical electrical sounding; coastal aquifer;

water quality; hydrogeology; geophysical survey; site investigation; magnetic survey; electron spin resonance; phreatic zone; borehole logging; drilling; pumping; electrical conductivity; electrical resistivity. References: Number: 23; Geographic: Myanmar Southeast Asia Asia Eurasia. Abstract: The productivity and the water quality of coastal aquifers can be highly heterogeneous in a complex environment. The characterization of these aquifers can be improved by hydrogeological and complementary geophysical surveys. Such an integrated approach is developed in a non-consolidated coastal aquifer in Myanmar (previously named Burma). A preliminary hydrogeological survey is conducted to know better the targeted aquifers. Then, 25 sites are selected to characterize aquifers through borehole drillings and pumping tests implementation. In the same sites, magnetic resonance soundings (MRS) and vertical electrical soundings (VES) are carried out. Geophysical results are compared to hydrogeological data, and geophysical parameters are used to characterize aquifers using conversion equations. Finally, combining the analysis of technical and economical impacts of geophysics, a methodology is proposed to characterize non-consolidated coastal aquifers. Depth and thickness of saturated zone is determined by means of MRS in 68% of the sites (evaluated with 34 soundings). The average accuracy of confined storativity estimated with MRS is  $\pm 6\%$  (evaluated over 7 pumping tests) whereas the average accuracy of transmissivity estimation with MRS is  $\pm 45\%$  (evaluated using 15 pumping tests). To reduce uncertainty in VES interpretation, the aquifer geometry estimated with MRS is used as a fixed parameter in VES inversion. The accuracy of groundwater electrical conductivity evaluation from 15 VES is enough to estimate the risk of water salinity. In addition, the maximum depth of penetration of the MRS depends on the rocks' electrical resistivity and is between 20 and 80 m at the study area. ISSN: 0926-9851.

Vuoristo, K. -V. 1994. "Kaakkois-Aasian Eriyistalousalueet Translated." Title: "The Special Economic Zones and Regions in Southeast Asia." Terra. 2005. Volume 106, Issue 2, Pages 96-104. Descriptors: Water; international cooperation; developing region; economic zone; regional development; export processing zone; special economic zone; trade; foreign direct investment; industrial

development. Geographic: Asia- (Southeast). Abstract: A lot of economic zones and regions have been established during last decades in the Asean member countries in order to improve industrial regional development and foreign trade and to get foreign direct investments to Southeast Asia. Some development projects cross the state borders. They are known as triangles or quadrangles, and most of them are still not in operation. One regional project (The Golden Quadrangle) will be developed in cooperation between an Asean (Afta-) country (Thailand) and three non-member neighbours (Myanmar, Laos, China). The most interesting inter-state economic region is The Southern Triangle (Singapore-Johore-Batam) around the globally important "Straits of Malaka". Most of these economic regions are however areas or zones which are situated in one country or province. In this article, the different types of economic triangles and regions are presented and analyzed, especially the most important ones. ISSN: 0040-3741.

## **W**

Wain, Barry. 2004. "The Mekong's Toothless Guardian." FER. Far Eastern Economic Review. Dow Jones & Company Inc. Aug 26, 2004: Aug 26. Volume 167, Issue 34, Pages 50. Descriptors: Asia & the Pacific; Natural resources; Short articles; Rivers; Resource management; Conservation; Water resources. Notes: Geographic: Mekong River Asia. Abstract: Efforts to ensure that the Mekong isn't ruined by development are hampered by the lack of an umbrella organization with authority over the entire river. The Mekong River Commission, formed by Thailand, Vietnam, Laos and Cambodia in 1995 to coordinate the management and conservation of the Mekong basin, has some obvious flaws: China isn't a member. Nor is Burma, also along the river's upper reaches. ISSN: 0014-7591.

Walker, Andrew. 1999. The Legend of the Golden Boat: Regulation, Trade and Traders in the Borderlands of Laos, Thailand, China, and Burma. Richmond: Curzon. Pages: 232. Descriptors: Boundaries- Mekong River Region; Ethnology- Mekong River Region; Inland water transportation- Mekong River; Trade regulation- Laos; Trade regulation- Thailand; Trade regulation- China; Trade regulation-

Burma; Mekong River Region- Commerce; Southeast Asia- Commerce. Notes: xviii; [4] leaves of plates: ill., maps; 25 cm. Notes: Includes bibliographical references (p. 196-224) and index. ISBN: 0700710744; 9780700710744. OCLC: 42682034.

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Wang, Dandan; Yuan, Xiping and Gan, Shu. 2008. Study on Land Cover Remote Sensing Monitoring and LUCC Analysis in Frontier Small River Basin. Barcelona, Spain: Institute of Electrical and Electronics Engineers Inc., Piscataway, NJ. Pages: 3482-3485. 2007 IEEE International Geoscience and Remote Sensing Symposium, IGARSS 2007. Conference: Jun 23-28 2007. Descriptors: Remote sensing; Geographic information systems; Land use; River basin projects. Abstract: Selected WanDing river basin as a case study which is located in Yunnan frontier area, based on comprehensive integrated application of remote sensing and GIS technology, this research used interpretation method to extract study area's land use/land cover information in 2004, and adopted spectrum direct comparison method to extract its land use/land cover change information from 1990 to 2004. In consideration of the small river basin's special character that its land cover or landscape not only has spatial integrity of surface unit, and internal characteristic similarity, but also has some difference

in land use forms and intensions between different neighboring nations, in order to obtain LUCC information in this study area, this research analyzed each land use type's quantity, spatial distribution characteristic and their land use/land cover change's quantity, spatial distribution characteristic, land use change degree characteristic etc, emphasized on those characteristics' difference between different neighboring nations. Finally, took the area in china in this basin as example, discussed and analyzed the main driving factors which caused its land use/land cover change, and their influence process. The preliminary results indicate that: 1) remote sensing monitoring and GIS processing technology is necessary, progressive, and scientific when apply to this kind of special area, and after field sampling analysis we could come to conclusion that the interpretation precision of this study area's monitoring result comes near to 90%; 2) the landscape pattern in 2004 was that the percentage of woodland was the biggest one (47.35%), the next was farmland (30.68%), the remaining lawn, water area, construction land and unused land were 14.14%, 1.06%, 4.43%, and 2.34% respectively; 3) contrasted the land use structure status belongs to our country and Burma in this basin, we can find that there exited obvious difference in land use forms and its effect in 2004, the most obvious representation was construction land use, its proportion in our country was 6.34%,while 3.62% in Burma, this phenomena shows that the urbanization level was higher in our country, and our land use degree was greater than that of our neighboring country; 4) it can be concluded from LUCC monitoring result that, from 1990 to 2004, the total area whose land use type had changed in this basin up to 25.81Km<sup>2</sup>, reached 12.06% of the whole basin's area, it indicates that, the land use changed greatly, the most prominent performance was that construction land expanded to a large degree, its grow index up to 6.02% per year, the spatial distribution of this expansion main occurred along important road regions on the edge of WanDing economic development zone, and expanded at the cost of occupying a mass of farmland. The next prominent performance was that water area and woodland reduced in a large-scale. 5) contrasted and analyzed the two neighboring countries' LUCC in this basin, we can conclude that, except water area and construction land changed in a consistent way, the others were all



presented a different tendency, this distinction fully presents land use difference between the two countries; 6) made analysis to nature factors and humanities factors which affects land use and land cover change in the part of china in this basin, it indicates that, the special climate and terrain landform natural factors, the rapid growth of population and economical, the progress of social product level and technical, and the guidance function to land use by system and policy were the main driving forces, within them, the driving function of social economy factor was dominant. International geoscience and remote sensing symposium (IGARSS). ISBN: 1424412129.

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[http://www.fao.org/nr/water/aquastat/water\\_res/myanmar/myanmar\\_wr.xls](http://www.fao.org/nr/water/aquastat/water_res/myanmar/myanmar_wr.xls)

Waters, Dale C. 1995. Food Aid and Security: The Hunger Professionals' Dilemma. Corporate Author: National War College, Washington, DC. Report Date: Jan 1995. Report Classification: Unclassified. Abstract: (U) Traditional views of world hunger that propel the actions of global relief agencies are increasingly dysfunctional in the chaotic security environment of the post-Cold War world. The current crop of starving children are not random victims of drought or other "acts of God." They are not just starving, they are being starved. They are the targets of man-made famines, the victims of savage tribal and ethnic warfare. Those providing aid to the starving are finding out that food alone is not enough. Without security- without lasting political solutions- food is just another weapon to sustain the conflicts and magnify the suffering. If emerging realities show a direct connection between effective security and effective humanitarian aid, then the organizations that can enforce security and those that provide aid must learn to work together. And that is the

rub. To a significant degree, international relief groups and the armies and security forces of the world operate with different world views -- one focused on relieving human suffering regardless of cause, and the other devoted to protecting the security and interests of individual nation-states. The aid givers and security providers contemplate each other across this ideological chasm with open suspicion and thinly veiled hostility. Nonetheless, global realities are driving them together. The following discussion will look at how these groups differ, the chaotic situation compelling their cooperation, and some suggestions for practical ways to further their common interests. Distribution Statement: Approved for public release; distribution is unlimited. Accession Number: ADA441050. Url: <http://handle.dtic.mil/100.2/ADA441050>

Wellner, P. 1994. "A Pipeline Killing Field: Exploitation of Burma's Natural Gas." *Ecologist*. 2005. Volume 24, Issue 5, Pages 189-193. Descriptors: Water; natural gas; gas production; cultural impact; energy investment; investment source; pipeline; social impact; environmental impact; hydrocarbon exploration; gas industry. Abstract: Burma received independence from Britain in 1948 but has been under military rule since 1962 when the military seized power from the democratic government. The military leaders in need of funds for their operations have in the past sold timber and fishing concessions to foreign companies. Multinationals have also been invited to prospect freely for oil. Economical workable quantities of reserves seemed for some time to be unlikely leading some companies to pull out until the discovery of natural gas in the Yadama field. This gas field is expected to be on line by 1998. To enable transportation a gas pipeline is being constructed from the Andaman Sea across Tenasserim to Thailand. Its construction has resulted in the forcible displacement of villages, deforestation and enforced labour. This paper investigates the source of both moral and financial support for these abuses from both governments and multinationals. ISSN: 0261-3131.

Wijayananda, N. P. and Cronan, D. S. 1994. "The Geochemistry and Mineralogy of Marine Sediments from the Eastern Indian Ocean." *Marine Geology*. 3. Volume 117, Issue 1-4, Pages 275-285. Abstract: Chemical, mineralogical and smear slide analyses of marine sediments from the eastern Indian Ocean have revealed at least eight sediment

groups in the region. The Bay of Bengal contains sediments derived from the Himalayan Range, Indian subcontinent, Sri Lanka and West Burma. Sediments from the Indian subcontinent are carried south, passing the eastern abyssal plain of Sri Lanka and then turn west. This sediment path can be identified by Al, Fe and smectite distributions. The principal sediment source to the Andaman Sea is the Irrawaddy River. In the Central Indian and Wharton Basins, hydrogenous sediments contain additional material slumped from Java and Sumatra and wind blown from Western Australia. ISSN: 0025-3227.

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recommended for the soils in question and if the transmitted loading is less than the effective swelling pressure of the soil allowance should be made for the stresses induced by soil movements. Notes: Vol 24, pp 441-444, 1 Table, 5 References. OCLC: 00237981.

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Wyszogrodzka, Anna Julia. 1984. Multiple Pathogen Inoculation and Selection For Gummy Stem Blight Resistance In Cucumbers (Cucumis, Didymella, Screening). The University of Wisconsin Madison. DAI. Volume: 45, 04B, Pages: 142-1077. Descriptors: Agriculture, Plant Pathology. Abstract: Methodology was developed for simultaneous inoculation of cucumber seedlings with *Pseudomonas syringae* pv. *lachrymans*, *Pseudoperonospora cubensis*, *Colletotrichum orbiculare* race 1 and *Cladosporium cucumerinum* and sequential inoculation with *Corynespora cassiicola* under controlled environments. Localized inoculation of selected sites on two-day-postemergent cotyledons with *P. syringae* pv. *lachrymans* ( $2.2 \times 10^4$  colony forming units delivered into a toothpick wound), with *P. cubensis* (50 zoospores in 1 (μl) of water), with *C. orbiculare* (200 spores in 5 (μl) of water) and with *C. cucumerinum* (2000 spores in 10 (μl) of water delivered on the apical growing point), followed by 48 hr incubation at 20 C, 100% RH in the dark and 24 hr in a 20 C lighted growth chamber, resulted in interaction phenotypes permitting differentiation between resistant and susceptible cucumber cultivars GY14, Wisconsin SMR18, GY3 and Straight 8. No induced resistance was observed in GY14 when *C. cassiicola* was inoculated (1000 spores in 5 (μl) of water followed by 48 hr incubation at 24 C, 100% RH in the dark) 72 hr after inoculation with the above pathogens. Resistance to gummy stem blight (*Didymella bryoniae*) was not detected among 1208 cucumber lines of diverse origin when cotyledons of four-day-old seedlings were inoculated with an aqueous suspension of 5000 spores of *D. bryoniae* delivered to freshly crushed tissue, followed by 48 hr incubation at 20 C, 100% RH in the dark. Among 49 lots evaluated for gummy stem

blight in the field, cv. Homegreen #2 and PI 200818 from Burma were resistant. Earliness in fruit maturity was positively correlated with susceptibility to gummy stem blight ( $r = 0.424$ ). Cucumber accessions differed in the incidence of stem and hypocotyl cankers. In greenhouse grown plants at the 2nd-3rd leaf stage, differentiation of resistant lines was obtained by spraying plants with an aqueous suspension of  $10^6$ /ml *D. bryoniae* spores followed by 48 hr incubation at 20 C, 100% RH in the dark. One cycle of mass selection in Homegreen #2 resulted in improved gummy stem blight resistance. Notes: Degree: PH.D. OCLC: AAG8410804.

Xu Zongxue, Gong Tongliang and Liu Changming. 2007. "Detection of Decadal Trends in Precipitation Across the Tibetan Plateau; Methodology in Hydrology." IAHS-AISH Publication. International Association of Hydrological Sciences, [Louvain]. Volume 311, Pages 271-276. Descriptors: Asia; atmospheric precipitation; Bhutan; Brahmaputra River; Burma; China; climate; climate change; data bases; data processing; Far East; geographic information systems; Himalayas; hydrology; India; Indian Peninsula; information systems; land use; Lhasa China; meteorology; mountains; Nepal; seasonal variations; Sikkim India; Tibetan Plateau; water resources; Xizang China. Notes: CD: PIHSD9; FE: References: 10; illus. incl. sketch maps. ISBN: 1901502930.

Yamamoto, K., Fukuda, Y., Nakaegawa, T. and Nishijima J. Affiliation: K. Yamamoto, Department of Geophysics, Graduate School of Science, Kyoto University, Kitashirakawa Oiwake-cho, Sakyo-ku, Kyoto Country: Japan E-mail: [yamamoto@kugi.kyoto-u.ac.jp](mailto:yamamoto@kugi.kyoto-u.ac.jp). 2007. "Landwater Variation in Four Major River Basins of the Indochina Peninsula as Revealed by GRACE." Earth, Planets and Space. 2007. Volume 59, Issue 4, Pages 193-200. Descriptors: Applications: hydrosphere; estimation method; gravity field; hydrological modeling; numerical model; river basin; satellite imagery; water storage. Notes: References: Number: 26; Geographic: Asia Central Region [Thailand] Chao Phraya Basin Eurasia Indochina Irrawaddy River Mekong Basin Myanmar Salween Basin Southeast Asia Thailand. Abstract: We estimated mass variations in four major river basins - the Mekong,



Irrawaddy, Salween and Chao Phraya river basins - of the Indochina Peninsula using the newly released GRACE (Gravity Recovery and Climate Experiment) monthly gravity field solutions of UTCSR RL02 (University of Texas at Austin, Center for Space Research Release 02), JPL RL02 (Jet Propulsion Laboratory Release 02) and GFZ RL03 (GeoForschungsZentrum Potsdam Release 03). The estimated variations were compared with that calculated from a numerical model. The results show that there is a good agreement between the GRACE estimations and the model calculation for the Mekong and Irrawaddy basins, while the agreement for the Salween and Chao Phraya basins is poor, mainly due to the spatial scale of the areas concerned. The comparison over the combined area of the four river basins shows fairly good agreement, although there are small quantitative discrepancies. The amplitudes of the annual signals of the GRACE solutions are 0.9- to 1.4-fold larger than that of the hydrological model, and the phases are delayed about 1 month compared with the model signal. The phase differences are probably due to improper treatments of the groundwater storage process in the hydrological model, suggesting that the GRACE data possibly provide constraints to the model parameters. ISSN: 1343-8832.

Yan, X., Ohara, T. and Akimoto H. Affiliation: X. Yan, Frontier Res. System Global Change, Yokohama, Japan. E-mail: [yanxy@jamstec.go.jp](mailto:yanxy@jamstec.go.jp). 2003. "Development of Region-Specific Emission Factors and Estimation of Methane Emission from Rice Fields in the East, Southeast and South Asian Countries." *Global Change Biol.* 2005. Volume 9, Issue 2, Pages 237-254 Additional Info: United Kingdom. Descriptors: Global Ecology; Biogeochemical cycles; rice; agricultural emission; methane; geographical distribution; estimation method. References: Number: 83. Abstract: Rice cultivation areas in East, Southeast and South Asia account for 89% of the world total, and field measurements of methane (CH<sub>4</sub>) emission from rice cultivation have been widely performed in this area. In this paper, we assembled most of the measurements and developed region-specific CH<sub>4</sub> emission factors. Efforts were made in order to regionalize rice fields by climate and soil properties, and to incorporate the effect of organic input and water regime on emission. Data on rice cultivation

areas of 1995 were collected at subdivision level (province, state, prefecture, etc.). Total emission from these areas was estimated at 25.1 Tg CH<sub>4</sub> year<sup>-1</sup>, of which 7.67 Tg was emitted from China and 5.88 Tg from India. Irrigated and rainfed rice fields contributed 70.4 and 27.5% to the total emission, respectively. Deepwater rice fields had a very small share. A high-resolution and quality emission distribution map was constructed as the emission was directly estimated at province level and below that, a 30-second land-use dataset was used in order to translate the emission to grid format. As the rice cultivation area in the study region accounts for 89% of the world total, extrapolating the estimate to the global scale indicates a global emission of 28.2 Tg CH<sub>4</sub> year<sup>-1</sup>. The estimate was compared with country reports made by local scientists. For some countries - such as Indonesia, Myanmar, Thailand, Vietnam, Japan, South Korea, Pakistan and the Philippines - the results of this estimate agree reasonably well with their country reports (CV <15%). For some other countries - such as China, India and Bangladesh - there is relatively large disagreement between our estimate and their country reports. The reasons for the discrepancies were discussed. ISSN: 1354-1013.

Yang Jin and Wang Zhihui. 2001. "Textures and Genesis of Jadeite Ore from Burma." *Chengdu Ligong Xueyuan Xuebao* = Journal of Chengdu Institute of Technology. Chengdu Liguong Xueyuan = Chengdu Institute of Technology, Chengdu, China. Oct. Volume 28, Issue 4, Pages 363-365. Descriptors: Asia; Burma; chain silicates; clinopyroxene; Far East; gems; hydrothermal alteration; jadeite; magmatism; metamorphism; metasomatism; mineral deposits, genesis; P-T conditions; pyroxene group; silicates; textures. Notes: FE: References: 8; illus. incl. 2 tables. Abstract: Based on the characteristics of jadeite and its mineralization, the textures of jadeite ore from Burma are classified as three types. According to the geology of the deposit, chemical composition and textures of the ore, physico-chemical conditions of ore formation, ore-forming source, and geotectonic environment, jadeite ore is thought to be the result of magmatism, hydrothermal metasomatism and metamorphism during plate collision. The metamorphic temperature was 200-350 degrees

and the pressure 500-800 MPa. Jadeite ore is closely related to glaucophane schist. ISSN: 1005-9539.

Yang, Zhixian and Zhang, Peizhen. 1997. "Seismic Hazard Assessment in the Boundary Region of Indo-China: First Phase of Implementation of the Global Seismic Hazard Assessment Program (GSHAP) in Continental Asia." *Earthquake Research in China*. Volume 11, Issue 3, Pages 323-340. Descriptors: People's Republic of China; ground motion attenuation; India; earthquake hazard analysis; Bangladesh; Burma; Vietnam; Tibetan plateau; Himalayan region; Indian plate; Eurasian plate; Earthquake catalogs; Acceleration; maximum ground; Tectonics; Indo-China; seismic source zones. Abstract: The primary goal of the demonstration project endorsed by the Scientific and Technical Committee for IDNDR in 1992 is to ensure that national agencies are able to assess seismic hazard in a regionally coordinated fashion by using advanced methods. China, as a Regional Center of Central Southern Asia, has contacted with countries of the region to realistically practice seismic hazard assessments of continental Asia. A test area located in the collision boundary between the Indian and Eurasian plates was chosen to examine the seismic hazard assessment approach in the regional coordinates. The seismotectonics and three versions of seismic sources of the test area are described in this paper; and under the Global Seismic Hazard Assessment Program (GSHAP) guidelines an earthquake catalogue of the test area was assembled. Because of the incompleteness of earthquake data in different countries, we adopt different time windows for different magnitude intervals in order to obtain the seismicity parameters of sources. By using a computer program (FRISK88M), we compute peak ground acceleration with 10% excess probability in the coming 50 years for the test area. The result is roughly consistent with the Chinese National Seismic Zonation Map. ISSN: 0891-4176.

## **Z**

Zangaki. 1889. [Album of Photographs of Burma, India and Egypt]. Descriptors: Buddhist temples- Burma; Carts & wagons; Castles & palaces- Burma; Churches- India; Clubhouses- India; Dancers-

Burma; Forts & fortifications- Burma- Mandalay; Forts & fortifications- India; Gardens- India; Markets- India; Men- Clothing & dress; Monks- Burma; Monuments & memorials; Mosques- India; Nuns- Burma; Pagodas- Burma; Palms; Railroad stations- India; Sailing ships- Egyptian; Schools- Burma; Taj Mahal (Agra, India); Tombs & sepulchral monuments- India; Water buffaloes; Wells- Egypt; Women- Burma- Clothing & dress; Graphic; Photograph. Abstract: Views in Burma: Mandalay: fort and moat, and the King Thibaw's classroom in the fort; the palace; pagodas; pagodas and monasteries at Wunsho, Rangoon and other locations, and including view of Phomsee school, and monks with begging bowls; individuals and groups, including group from Sagiang, a Burmese princess in court costume, Shan woman, Kachin woman, Hunthol (?) woman, women and girls including one identified as "Sussanah, the artist's wife"; a Burmese nun; men, a father and child; women cleaning rice; men and water buffalo at oil cake factory; water buffalo-drawn carts; dancers who performed for Prince Albert Victor... Notes: 1 album (68 photographic prints); Named Person: Thibaw, King of Burma, fl.1875-1885- Homes and haunts. Genre/Form: Albums. Group portraits. Portraits. Albumen prints. Photographic prints. Silver gelatin prints. Notes: Title devised by cataloger. Photographic prints are mounted on heavy paper in a half-leather-bound album. "Early photos of the East" in pencil on inside cover. Two images depict dancers who performed for Prince Albert Victor who visited Burma beginning late 1889. See Rees, H.R.H. The Duke of Clarence and Avondale in Southern India, 1891. Most are captioned in English on page below photographs. Those that lack captions are silver gelatin prints which may have been added to the album later. Some are numbered and captioned in English in negative; images by "Zangaki," have photographer's name, captions in French and numbers in negative. General Info: Admission is granted through application to the Office of Special Collections. Transfer from Dance Collection, 1985. Other Titles: Early photos of the east. OCLC: 81220913.

Zaw, Khin. 2004. "Geological Setting and Formation of the Bawdwin Deposit, Northern Shan State, Myanmar; a Silver-Rich, Volcanic-Hosted Polymetallic Massive Sulfide Deposit; Dynamic Earth; Past,

Present and Future." Abstracts - Geological Society of Australia. Geological Society of Australia, Sydney, N.S.W., Australia. Volume 73, Pages 139. Descriptors: Asia; Bawdwin Deposit; Burma; Cambrian; Far East; hydrothermal vents; igneous rocks; intrusions; isotope ratios; isotopes; marine environment; massive deposits; massive sulfide deposits; metal ores; mineral deposits, genesis; Paleozoic; pipes; polymetallic ores; rhyolitic composition; S-34/S-32; Shan State Burma; silver ores; stable isotopes; sulfur; volcanic rocks; volcanoclastics. ISSN: 0729-011X.

Zaw, Khin. 2002. "Sediment-Hosted Gold Mineralisation at Kyaukpahto, Kawlin-Wuntho District, Northern Myanmar; Geoscience 2002; Expanding Horizons; Abstracts of the 16th Australian Geological Convention." Abstracts - Geological Society of Australia. Geological Society of Australia, Sydney, N.S.W., Australia. Volume 67, Pages 349. Descriptors: aliphatic hydrocarbons; alkanes; Asia; Burma; carbon dioxide; Cenozoic; clastic rocks; disseminated deposits; Eocene; epithermal processes; Far East; faults; fluid inclusions; fractures; gold ores; hydrocarbons; inclusions; Kawlin-Wuntho mining district; Kyaukpahto Burma; laser ablation; laser methods; Male Formation; metal ores; methane; mineral deposits, genesis; Miocene; Neogene; northern Burma; organic compounds; Paleogene; Sagaing Fault; sandstone; sedimentary rocks; strike-slip faults; sulfides; sulfur; Tertiary; transfer faults. Notes: References: 2. ISSN: 0729-011X.

Zaw, Khin. 1998. "Geological Evolution of Selected Granitic Pegmatites in Myanmar (Burma); Constraints from Regional Setting, Lithology, and Fluid-Inclusion Studies." *Int. Geol. Rev.* Winston & Son, Silver Spring, MD. Jul. Volume 40, Issue 7, Pages 647-662. Descriptors: Asia; beryl; Burma; dikes; Far East; fluid inclusions; gems; geologic thermometry; granites; granitic composition; hydrothermal conditions; igneous rocks; inclusions; intrusions; kaolin deposits; lithofacies; metal ores; mineral deposits, genesis; mineral exploration; mineralization; ore-forming fluids; P-T conditions; pegmatite; petrography; plutonic rocks; ring silicates; S-type granites; silicates; structural controls; tin ores; tungsten ores; veins. Notes: References: 71; illus. incl. 3 tables. Abstract: Pegmatite deposits commonly occur

in the 1500 km long, N-S-trending, tungsten-tin-bearing granitoid belt in Myanmar. Pegmatites are emplaced as veins and dikes that cut granitoid, migmatite, gneiss, gneiss, and schist. The pegmatite veins and dikes are mostly 2 to 5 meters wide and 30 to 150 meters long, and some are traceable over a distance of 300 meters. The pegmatites are composed of quartz, orthoclase, albite, microcline microperthite, and muscovite, with minor biotite, tourmaline, beryl, garnet, topaz, lepidolite, magnetite, wolframite, cassiterite, and rare columbite. They are commonly zoned, feldspars and muscovite being more abundant in the center and quartz more common at the margin. The zoning pattern is rather distinct in the pegmatite body, where tourmaline is present. The light-colored felsic minerals are confined to the core zone and the dark-colored tourmaline crystals to the outer zone. Numerous fluid inclusions have been found in quartz, topaz, and beryl. Most of the inclusions are rounded to elliptical, with a variable degree of liquid filling. All inclusions are aqueous, two-phase (liquid and vapor) inclusions with no daughter minerals. Homogenization temperatures of 173 fluid inclusions were measured in this study. Geothermometric studies indicate that the pegmatites were formed over a homogenization temperature range of 230 degrees to 410 degrees C. Salinities of fluid inclusions in pegmatite minerals yielded from 1.0 to 10.8 NaCl equiv. wt%. Topaz and quartz single crystals (several cm across) from the Sakangyi pegmatite provide an opportunity to extract the fluids trapped in these minerals. The Na/K ratios of the fluid inclusions in two topaz samples were 3.0 to 4.9, and those of two quartz samples were 2.9 to 10.5, suggesting the presence of substantial potassium in the pegmatite-forming fluids. In this study, evidence for phase separation of the pegmatite-forming fluids was not observed. The post-magmatic, hydrothermal fluids responsible for the pegmatite veins evidently emanated from cooling S-type granitoids, with which they are spatially associated. ISSN: 0020-6814.

Zhang, J. and Zang, S. 1986. "Characteristics of Earthquake Distribution and the Mechanism of Earthquakes in the Boundary Area between Burma, India and China." *Acta Seismologica Sinica*. Aug. Volume 8, Issue 3, Pages 240-253. Descriptors: India; earthquakes; faults; People's Republic of China; Burma; Source mechanisms; Burma

earthquakes; India earthquakes; People's Republic of China earthquakes; Seismology. Abstract: The spatial distribution was studied of the earthquakes of  $m$  subscript  $b$  greater than or equal to 4.0 which occurred in the region from January 1965 to October 1981. Fault plane solutions for 38 earthquakes occurring in the same period have also been determined. ISSN: 1000-9116.

Zhu, B. Q., Mao, C. X., Lugmair, G. W. and Macdougall, J. D. 1983. "Isotopic and Geochemical Evidence for the Origin of Plio- Pleistocene Volcanic Rocks Near the Indo-Eurasian Collisional Margin at Tengchong, China." *Earth & Planetary Science Letters*. 2005. Volume 65, Issue 2, Pages 263-275. Descriptors: Mineralogy. Notes: Notes: Special Feature: 10 figs, 2 maps. Abstract: In Yunnan Province, China, regional extensional stresses associated with the collision between India and Asia have formed a series of downfaulted N-S-trending basins. Near Tengchong, in extreme W Yunnan, close to the Burma border, one of these basins is characterized by volcanism which began in the Pliocene (approx 7 m.y. B.P.) and has continued until historic times. This suite ranges in composition from basalt to dacite, with most lavas being K- rich. Five chemical groups are recognized, which are broadly consistent with previous groupings made on the basis of geological and age data. The main series of lavas was derived by partial melting of a metasomatized and heterogeneous mantle source, with crustal and possibly sea-water components probably related to prior subduction beneath Asia. An andesite-dacite series with similarities to Tibetan calc-alkaline lavas shows clear indications of assimilated crust and crystal fractionation. There is no evidence for a strongly depleted subcontinental mantle such as has been recognized elsewhere. ISSN: 0012-821X.

Zhu, B-Q, Mao, C-X, Lugmair, G. W. and Macdougall, J. D. 1983. "Isotopic and Geochemical Evidence for the Origin of Plio-Pleistocene Volcanic Rocks Near the Indo-Eurasian Collisional Margin at Tengchong, China." *Earth and Planetary Science Letters*. 11. Volume 65, Issue 2, Pages 263-275. ISSN: 0012-821X.

Ziegler, Jean and UN. Commission on Human Rights. Special Rapporteur on the Right to Food. 2003. The Right to Food: Report. Geneva: UN. Descriptors: Right To Food; Food Security; Right To Drinking Water; Guidelines; Hunger; Malnutrition; Food Policy; Case Studies; Niger; Bangladesh; Brazil; Human Rights Violations; Zimbabwe; Myanmar; Territories Occupied By Israel; Recommendations; FAO; UN. Committee on Economic, Social and Cultural Rights; World Food Summit: Five Years Later (2002: Rome); Government publication; International government publication; Internet resource. Abstract: Reports on the Special Rapporteur's activities to promote greater awareness and implementation of the right to food; focuses on the development of International Guidelines on the Right to Food, under the auspices of FAO, and a new General Comment no. 15 on the right to water by the Committee on Economic, Social and Cultural Rights; describes the process in place for receiving and responding to allegations of violations of the right to food; ends with conclusions and recommendations. Notes: 23 p. Title Subject: International Guidelines on the Right to Food (Draft) International Covenant on Economic, Social and Cultural Rights (1966); Notes: Includes bibliographical references (p. 21-23). UN Job no.: G0311070 E. Material type: Reports/studies. Issued under agenda item 10, agenda document E/CN.4/2003/1. OCLC: 81285490.