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THE EFFECTS OF HERBICIDES IN SOUTH VIETNAM  
PART B. WORKING PAPERS: BELIEFS, ATTITUDES, AND  
BEHAVIOR OF LOWLAND VIETNAMESE

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL

FEBRUARY 1974

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## Beliefs, Attitudes, and Behavior of Lowland Vietnamese

JANE M. MURPHY, GARY D. MURFIN, NEIL L. JAMIESON, III, A. TERRY RAMBO,  
JERRY ADRIAN GLENN, LEROY P. JONES, AND ALEXANDER H. LEIGHTON<sup>a</sup>

### SECTION I. INTRODUCTION

#### Purpose

The general purpose of this part of the study was to discover and describe the effects of herbicides on people--psychological, social, and cultural. The exigencies of time, resources, and war conditions made it necessary to translate the purpose into a limited set of goals. These may be expressed by the following questions:

1. What are the main patterns of belief about herbicides to be found in South Vietnam?
2. What attitudes are associated with these beliefs?
3. What consequences are there in terms of behavior, emotional states and social and cultural change?
4. How realistic are the beliefs?

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### Limitations

The operational development of the goals made it necessary to accept a number of limitations with regard to data sources and methods. These may be summarized as follows: The study is confined to the ethnic Vietnamese and focuses primarily on two provinces and one refugee village in a third province. As will be explained later, these selections were made with a view to examining areas that would be indicative of conditions more widely distributed in the country. The data sources consist of interviews with Vietnamese officials at various levels from province to hamlet and with selected others such as farmers, fishermen, market women, merchants, and loggers; Vietnamese official documents, mostly at the provincial level; the analysis of newspapers; U.S. advisors at a number of levels; and the results of numerous U.S. surveys. In the refugee village a systematic questionnaire survey of a small sample of rural people was also conducted. Thus, the information upon which this report is based comes from official South Vietnamese and U.S. sources and from extensive field work with selected informants ("knowledgeable people") at village and hamlet level.

Another type of limitation stems from the fact that the large scale use of herbicides had been suspended for two years at the time our study was done. We were thus unable to make any direct observations of impact on populations and had to rely on the observations of others as noted above. We did, however, look for and see the still visible consequences of the herbicides on trees and fields from plane, helicopter, car, sampan, and on foot.

It is appropriate to note some additional limitations that do not derive from either data or field conditions, but from the nature of our

central purpose. Thus, we do not deal with the question of the military effectiveness of herbicides, nor are we entitled to draw conclusions about long term ecological effects. And finally, we are not concerned with using Vietnamese statements of their beliefs as "proof" of real biological effects of herbicides on plants, animals or humans. Our goal is to present what various groups of people say they believe and the patterning of their consequent feelings and behavior.

It is, of course, of interest to know to what extent the systems of belief are congruent with official views and scientific knowledge. For this reason, we shall present factual information (e.g. date and place of spray runs) when such is available. It may be that some of the beliefs of Vietnamese farmers that are not in harmony with what is "accepted" will turn out to be leads toward better knowledge.

Our emphasis, however, is on what people believe, whether true or not, because these beliefs may be of major significance in determining what people can and will do. For this reason the beliefs and their attendant attitudes are worthy of consideration in matters of future policy and planning.

#### Frame of Reference

From the foregoing it is evident that in this section there will be no attempt to establish causal relationships, for such would require some form of controlled experimentation. On the other hand, we shall be interested in discussing hypotheses about cause and it seems therefore desirable to indicate the frame of reference, or causal model, we propose to use.

The first point to make is that the model is multifactorial. Our notion is that any given pattern of belief or of human behavior is the product of many factors. These can be conceived in various terms such as social, psychological, cultural, economic, biological, etc. Thus, any attitude or belief about herbicides in an individual is not only the product of herbicides as an event, but also the result of cultural orientations, social role, economic needs, political persuasion, intellectual capacity, emotional stability, temperament and so on. The belief, in other words, is like a nodal point in a three dimensional network composed of interacting influences.

One of the characteristics of an interacting network is that it permits the formation of feedback loops. We used the example above of a single belief in a single individual in order to introduce the concept of the network of interacting factors. If we now consider many individuals with reference to multiple beliefs, the network is pictured as far more complex, and by that fact, closer to being a model of reality. The operation of feedback loops in such a system means that a belief once established in a person can become itself a factor contributing to beliefs in others, and then in turn draw continuation from return reinforcement from these others. Thus, it is possible for beliefs to be perpetuated without any supporting real event. In South Vietnam beliefs about herbicides and attitudes of anger, fear, tolerance, indifference, or approval are in a context of a wartime struggle for survival which at times reaches extreme ferocity. Bombing, intravillage fighting, being overrun by the National Liberation Front or by the Government of South Vietnam forces, and economically devastating effects of the war often dominate people's lives.

Thus, feelings from many sources can become channeled on herbicides, and conversely feelings originally generated by herbicides can masquerade as feelings about some other topic.

As will be seen in the last chapter, these considerations turn out to be highly relevant. Herbicides have come to play a symbolic role for many Vietnamese, a fact which heightens the importance of distinguishing between behavior that flows from herbicides as biological agents and herbicides as symbols.

"It is not actions, but opinions about actions that disturb men."

-Epictetus

## SECTION II. METHODOLOGY

### Introduction

This report has been prepared by six behavioral scientists. We represent or have consulted with advisors from anthropology, economics, political science, psychology, psychiatry, sociology, and statistics. The methods used derive from these disciplines and include such techniques as key informant interviewing, questionnaire surveys, review of public records, content analysis, and a variety of statistical procedures. The purpose of this section is to describe the research design and indicate which methods were employed in the different phases and sites of the design.

This section is divided into four parts: A ) Initial Steps, B ) Selection of Provinces, which includes a description of the two provinces in which field work was conducted, C ) Data Collection, which deals with the techniques used in the province studies, in a sub-study of a refugee village, and a sub-study of newspaper analysis, and D ) The Problem of Validity.

#### A. Initial Steps

Preliminary to the field work there was a preparatory phase in the Spring of 1972. During this time a short trip to South Viet-Nam was made by two of the authors and extensive discussions were conducted among all six. Out of this came a detailed plan that entailed survey sampling of contrasting populations and the development of quantitative data. By mid-June, due in large measure to war conditions and the deterioration

of security in rural areas, the plan was replaced by a more flexible and qualitative approach. While the original scheme was kept in mind, the actual form of the research design emerged after the team members arrived in Saigon. It took shape as a gradual process geared to opportunities as they opened.

Time was our most precious resource and most dangerous enemy. Whatever field work we could do had to be accomplished between the beginning of July and the middle of October. Despite generous aid from Vietnamese and U.S. officials, selecting and investigating many sites would have been far too time consuming. There were also the delays inherent in traveling to be considered.

On the other hand, we were aware of the great diversity of terrain, climate, population density, cultural tradition, economic activity and standards of living to be found in Viet-Nam, not to mention differences from area to area in the dates, intensity and duration of exposure to herbicides, plus the constantly shifting conditions of security. We knew that what might be true in one village often would not be true in another village just a few miles away. So while the geographical scope of the study had to be restricted, the areas selected were chosen so as to be as representative as possible of major segments of the population and various human adaptations to the environment.

Our approach was to think in terms of ecological zones, and here again we were faced with major decisions. Should we attempt to study all ecological zones or concentrate on certain ones? And, if selection were to be made, what criteria should be used? Within an ecological zone, how

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would we balance the need for depth of coverage against the need for breadth of coverage?

Our preference was for data derived from an intensive study of a small number of sites. It seemed to us that only through intensive study of carefully delineated areas could an understanding of beliefs about the systemic effects of herbicides be fully appreciated.

We chose, therefore, two major ecological zones: 1) the Mekong Delta region, and 2) the Mekong plateau transition zone between Saigon and the highlands. Because this meant that the highlands proper and the central coastal plain would receive minimal attention, the decision was difficult.

The tribal people of the highlands have suffered greatly from the war and have numerous problems peculiar to themselves. The Vietnamese of the central coastal plain have also endured their own particular kinds of difficulties. To study either, however, was beyond our capabilities, unless we had been willing to make this the sole focus of the study. In both areas security risks would have constituted formidable obstacles. The highland people, because of multiple cultural groups and languages, would have presented major technical difficulties and much time would have been needed in order to find and train assistants and interviewers.

#### B. Selecting the Provinces

For selecting a province within a zone we used the following criteria:

1. Ecology - The province ought to share general features of terrain and climate with other provinces in the zone, and

should include most major ecological features to be found throughout the zone.

2. Population - The population of the province should contain a large number of ethnic Vietnamese.
3. Exposure to herbicides - The province should have received at least as much exposure to herbicides as most other provinces in the zone, and under similar crop and climatic conditions.
4. Variety and representativeness of economic activities - The province should include all major economic activities to be found throughout the ecological zone.
5. Security - Ease of access to a large sample of villages and different areas within the province should be possible throughout the study period.

As a result of these considerations, we chose the provinces of Kien Hoa and Long Khanh. A brief description of each now follows:

1.) Kien Hoa is located in the Mekong Delta approximately 85 kilometers southeast of Saigon. It is bounded to the southeast by the South China Sea and by provinces at the other points of the compass, Co Cong to the northeast, Dinh Tuong to the northwest, Vinh Long to the west, and Vinh Binh to the south. The province consists of three islands formed by four of the nine branches of the Mekong River: the Cua Dai (My Tho), Ba Lai, Ham Luong and Co Chien Rivers. The coastline along the South China Sea is primarily mangrove forests which have wide mud flats stretching to the sea for nearly a mile or so.

Kien Hoa covers an area of approximately 215,500 hectares of which more



than 150,000 hectares are cultivated. The land is flat with only a few places over a meter above sea level. Transportation is principally by boat, although a number of roads are utilized. An elaborate network of canals and natural waterways greatly facilitates water travel.

The soil in this province, characteristic of most of the Delta, is an acidulous alluvial clay with little sand content, and it is considered quite fertile. The three coastal districts of Ba Tri, Binh Dai, and Thanh Phu contain the best land.

The climate in Kien Hoa is generally hot and humid with an average temperature of 78 degrees Fahrenheit and a temperature range from 65 degrees Fahrenheit to 100 degrees Fahrenheit. The dry season usually begins in November or December and lasts until May. The Southwest monsoon begins in May and June and heavy rains occur from June to November.

Crop distribution overlays prepared by the agriculture cadre in each of the districts studied show that land utilization patterns have been stable for many years. In 1972 practically all arable land under South Vietnamese government control was under cultivation. It included: 1) rice land, 2) secondary crop land (fruit trees, peanuts, manioc, beans, etc.), and 3) coconut land. Because of high population density and dispersed settlement pattern, crops are usually grown close to residences.

Administratively, Kien Hoa is divided into nine districts with 115 villages and 640 hamlets. As of 1971, the Province was the most populous in the Delta, listing a total of 618,870 people. The nine districts are: Truc Giang, Giang Trom, Ham Long, Ba Tri, Binh Dai, Don Nhon, Mo Cay, Huong My, Thanh Phu.

The most populous district is Truc Giang. The Province has two "urban centers" - one being Ben Tre, the Province capitol, and the other Binh Dai Village. Figures on the population under National Liberation Front control were not available, but an estimate given from U.S. sources is 100,000 and, according to a map maintained by the U.S. Advisory Team in Kien Hoa, large portions of every district except Ba Tri, Huong My and Binh Dai were still under National Liberation Front control as of October, 1972, as seen in Chart I-1.

Population settlement in Kien Hoa is characterized by hamlets which are strung out along roads, canals, rivers and streams throughout the Province. Because the communities are spread out, there are fewer areas of large population concentration.

2.) Long Khanh Province, part of Military Region III and located northeast of Saigon, is bounded by Phuoc Long and Lam Dong Provinces to the north, Phuoc Tuy to the east and Bien Hoa and Binh Duong to the west. It has an average width of 70 kilometers, a maximum length of 90 kilometers and a total land area of about 4,460 square kilometers (446,000 hectares).

The Province is located in the transition zone between the Mekong Delta and the Central Highlands. The southern portion is plateau while the northern part is mountainous. Three river systems flow within the Province; the Dong Nai, the La Nga and the Be. The Dong Nai drains the northwest section and forms part of the boundary with Phuoc Long and Lam Dong Provinces. The La Nga River empties into the Dong Nai and drains the central part of Long Khanh and Binh Tuy. The Be River forms part of the western boundary with Bien Hoa and Binh Duc.g.

130 131 132 133  
140 141 142 143

GO CONG

DINH TUONG

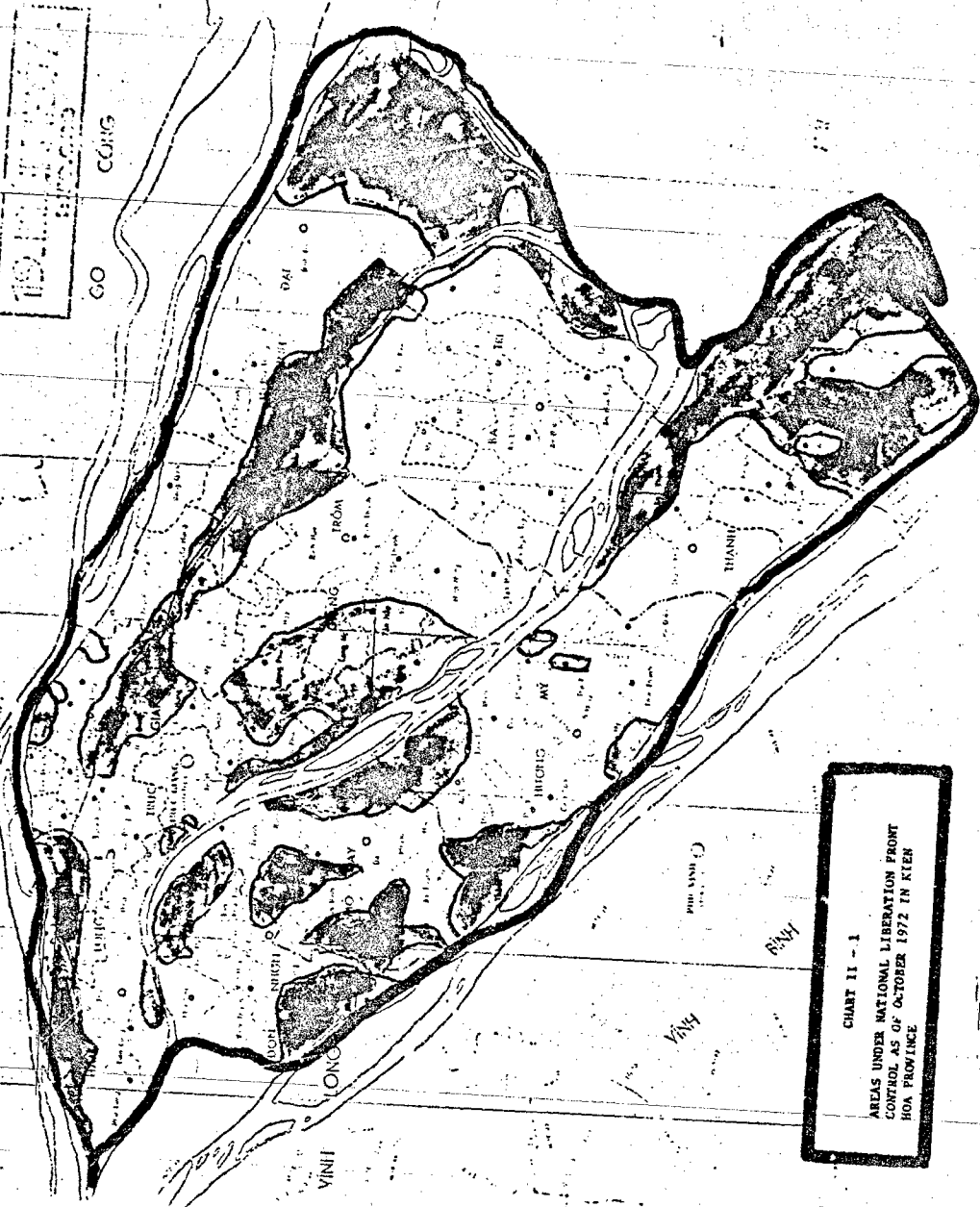


CHART II - 1  
AREAS UNDER NATIONAL LIBERATION FRONT  
CONTROL AS OF OCTOBER 1972 IN HOA PROVINCE

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Long Khanh has an average temperature of 90 degrees Fahrenheit and a low of 64 degrees Fahrenheit in December and January and a high of 98 degrees Fahrenheit from February through May. The wet season usually begins in late April and ends in early November and produces an average yearly rainfall of about 60 inches. Generally temperatures are cooler during the wet season, especially at night.

Approximately 100,000 hectares of land are utilized for agricultural production aside from rubber and timber. Rubber accounts for 17,000 (planted) hectares, and timber over 200,000, mostly in "War Zone D." Over 2,000 hectares are utilized for living space. The remaining land consists of both closed and open forest. The soil is mainly the reddish brown mixture of latosol on basalt which is common to the region, although some parts of the Province display a grey-black soil.

Crop distribution maps for the years 1965 to 1972 prepared by the Province Agriculture Office show that villages generally cultivated the same plots of land each year until 1968. At that time old plots began to be expanded, and by 1969 to 1970 entirely new areas had been added by some villages. Fields were located anywhere from 1 to 5 kilometers from village centers, except in the case of crops planted along roadways, which sometimes extended up to 8 kilometers on either side of a village.

Administratively, Long Khanh is divided into three districts, 19 villages and 94 hamlets. Dinh Quan District in the north has three villages with an approximate population of 23,983. Kim Tan in the central portion has five villages with a total population of 59,079. Xuan Loc consists of 11 villages with some 83,477 people. The most heavily populated areas of

Long Khanh are the capitol city, Xuan Loc - population 38,044, and two villages situated side by side in Kiem Tan District: the villages of Gia Kiem - population 19,276 and Gia Tan - population 23,743.\*

Most of the northern half of Long Khanh ("War Zone D") is considered to be almost totally uninhabited except for military forces. In addition, large jungle areas along the Binh Tuy border and in the southeastern corner are also very sparsely populated.

Most communities in Long Khanh lie astride the two main communication arteries of the Province, National Route 1 and National Route 20. Route 1 cuts across the southwestern and south central part of the Province as it extends from Saigon through Long Khanh to the coast and points north. This road passes through the boundaries of six different villages and has approximately fifteen hamlets along it. Route 20 winds from the south central part of the Province to the northeast corner, passing into Lam Dong Province on its way toward Dalat. Situated along it are 34 hamlets from seven different villages.

In all but a few settlements, houses are closely grouped together in a clearly nucleated pattern, although the hamlets of some villages are spread out over several square kilometers so that these villages do not have a centralized area of settlement. Hieu Kinh Village, for example, has a population of 12,500 spread out in thirteen hamlets along several different roads. The populated areas of this village tend to form an upside down 'L' and are spread out over 12 square kilometers.

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\* All these figures are from the 1972 Hamlet Evaluation System statistics.

### C. Data Collection

Data collection was carried out by four American and one Vietnamese social scientists, three Vietnamese research assistants, and four interviewers. In addition, eight content analysts were employed in the newspaper study. Division was made into three teams which conducted the several sub-studies on which our report is based. As each sub-study involved different methods and personnel, these will be described separately below:

1.) Provincial Studies. Work in Long Khanh and Kien Hoa was carried out between July and October, 1972, with at least two months spent in each province by one or more of the American researchers. Each team concentrated on key informant interviewing, that is on semi-structured interviewing of a wide range of local inhabitants and government officials. Tables II-1 and II-2 give lists of the types and numbers of respondents. In addition, we retrieved data from South Vietnamese government and U.S. agency archives. Visual observations were also made of areas reported to have been sprayed.

There were some differences in the research strategies employed in the two provinces. In Long Khanh, with its sparse population aggregated into a relatively small number of readily accessible settlements, the effort was to collect comparable information on herbicide effects for all areas in the Province. In this we were relatively successful with coverage of 15 out of 19 villages. These villages visited appear on Chart II-2 and the map coordinates on Table II-3.

TABLE II - 1

KIEN HOA - INTERVIEWS

Number of Districts Covered - 6  
Districts in Province - 9  
Number of Villages Covered - 26  
Villages in Province - 115

Deputy Province Chief  
U.S. Province Senior Advisor

Province Level Offices Located in Ben Tre

Chief - Economic Section  
Chief - Agricultural Service  
Cadre - Agricultural Service  
Chief - Animal Husbandry  
Chief - Information Service  
Cadre - Information Service  
Chief - Social Welfare Office  
Chief - Land Office  
Deputy Chief - Land Office  
Chief - Tax Office  
Director of Joint Military-Civilian Province Hospital (JMC)  
Doctors (5) - Joint Military-Civilian Hospital (JMC)  
Chief - Obstetric Ward - JMC Hospital  
Chief - Public Health Service  
Chief of Hospital Attendants - JMC Hospital  
Chief of Midwife Section - JMC Hospital  
Health Specialist - U.S. Province Development Office  
Chief - Military Sector Political Warfare Office  
Officer - Military Sector Political Warfare Office  
U.S. Advisory Team Personnel

District Level Officials and Officers (10)

Ham Long  
Giong Trom  
Binh Dai  
Thanh Phu  
Truc Giang  
Ba Tri

Village and Hamlet Officials (Average 2 per village)

Luong Quoi Village	Giong Trom District
Chau Binh Village	Giong Trom District
Luong Phu Village	Giong Trom District
Chau Hoa Village	Giong Trom District
Luong Hoa Village	Giong Trom District
Phu Nhuan Village	Truc Giang District
Quoi Son Village	Truc Giang District
Son Phu Village	Truc Giang District
Huu Dinh Village	Truc Giang District
An Khanh Village	Truc Giang District

TABLE II - 1 (Continued)

Village and Hamlet Officials (Average 2 per village) - Continued

Giao Thanh Village	Thanh Phu District
An Nhon Village	Thanh Phu District
Vang Quoi Village	Binh Dai District
Thoi Vinh Village	Binh Dai District
Tan Thuy Village	Ba Tri District
Phu Duc Village	Ham Long District
Tuong Da Village	Ham Long District
Phu Tuc Village	Ham Long District
Thanh Trieu Village	Ham Long District

Farmers (41)

Luong Phu Village	Giong Tron District
Luong Quoi Village	Giong Tron District
Nhon Thanh Village	Truc Giang District
Tan Thach Village	Truc Giang District
Thanh Trieu Village	Ham Long District
Tuong Da Village	Ham Long District
Phu Tuc Village	Ham Long District
Phu Duc Village	Ham Long District
Thanh Phong Village	Thanh Phu District
An Nhon Village	Thanh Phu District
Giao Thanh Village	Thanh Phu District

Fisherman (11)

Bai Ngao (Tan Thuy Village)	Ba Tri District
Tiem Tom (Tan Thuy Village)	Ba Tri District
An Thuan Village	Thanh Phu District

Coconut Oil Mill Operators/Owners (3)

Thai Nguyen Oil Mill	
An Hoi Village	Truc Giang District
Nam Phat Oil Mill	
An Hoi Village	Truc Giang District

Commodity Wholesalers and Retailers (4)

Ben Tre



TABLE II - 2

LONG KHANH - INTERVIEWS

Number of Districts Covered - 3	Number of Villages Covered - 15
Districts in Province - 3	Villages in Province - 19

Province Chief  
U.S. Province Senior Advisor

Province Level Offices Located in Xuan Loc City

Chief - Economic Section  
Chief - Agricultural Service  
Chief - Animal Husbandry  
Chief - Water/Forestry Service  
Chief - Land Office  
Deputy Chief - Land Office  
Chief - Information Service  
Deputy Chief - Tax Office  
Chief - Health Service  
Officials (2) - Health Service  
Officials (2) - Chieu Hoi Center  
Chief - S-3 Military Sector Office  
Chief - S-4 Military Sector Office  
U.S. Advisory Team Personnel

Long Khanh Agricultural Research Station Officials (2)

District Level Officials and Officers (5)

Xuan Loc  
Dinh Quan  
Kiem Tan

Village and Hamlet Officials (21)

Xuan Loc Village	Xuan Loc District
An Loc Village	Xuan Loc District
Tan Lap Village	Xuan Loc District
Dau Giay Village	Xuan Loc District
Hung Loc Village	Xuan Loc District
Hieu Kinh Village	Xuan Loc District
Han Thuan Village	Xuan Loc District
Thoi Giao Village	Xuan Loc District
Dinh Quan Village	Dinh Quan District
Phuong Tho Village	Dinh Quan District
Dong Hiep Village	Dinh Quan District
Bien Hoa Village	Kiem Tan District
Gia Kiem Village	Kiem Tan District
Gia Tan Village	Kiem Tan District
Ben Nam Village	Kiem Tan District

TABLE II - 2 (Continued)

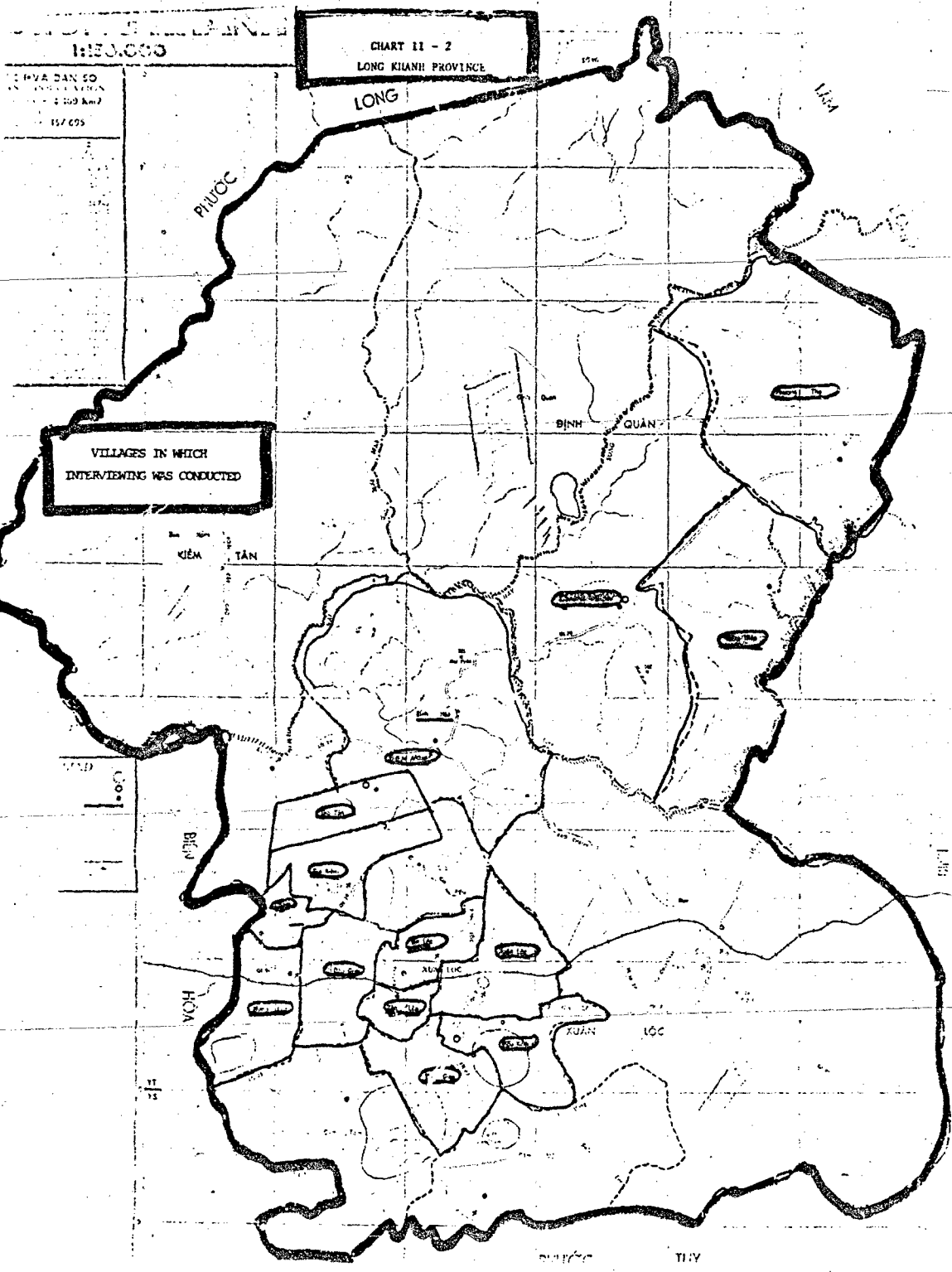
Farmers (15)

Phuong Tho Village  
Hiep Kinh Village  
Thoi Giao Village  
Dinh Quan Village  
Ben Nom Village

Saw Mill Operator (3) - Dinh Quan Village  
Loggers (3) - Dinh Quan Village  
Carpenter (1) - Dinh Quan Village  
Soldier (1)  
Fruit Wholesalers and Retailers (3) - Xuan Loc City  
Restaurant Owner (1) - Dinh Quan Village  
Priest - Gia Kiem Village

SIPH Rubber Plantation

General Manager  
Production Manager  
Tappers (4)



II-15

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TABLE II - 3

MAP COORDINATES FOR ALL VILLAGES IN LONG KHANH PROVINCE

Xuan Loc District

Xuan Loc Village	YT 470093
An Loc Village	YT 394092
Tan Lap Village	YT 390080
Dau Giay Village	YT 337090
Hung Loc Village	YT 324093
Hieu Kinh Village	YT 474052
Thoi Giao Village	YT 440019
Cam Tam Village	YS 374994
Cam My Village	YS 462924
Gia Ray Village	YT 637125
Ham Thuan Village	YT 293124

Dinh Quan District

Dinh Quan Village	YT 569385
Phuong Tho Village	YT 720476
Dong Hiep Village	YT 680695

Kiem Tan District

Gia Kiem Village	YT 380199
Gia Tan Village	YT 374232
Bien Hoa Village	YT 418267
Binh Loc Village	YT 392168
Ben Nam Village	YT 300243

Kien Hoa was not accessible to such a comprehensive treatment because of its vast population dispersed in 115 often inaccessible villages and 632 hamlets, and with its shifting and generally poor security conditions. Research, therefore, was concentrated on areas identified by provincial officials as having been sprayed. The 26 villages in which we worked appear on Chart II-3 and the map coordinates in Table II-4.

As it turned out, these different research strategies were suited to the differing patterns of the two provinces. In Long Khanh the people reported spray effects over extensive areas, whereas in Kien Hoa the effects were apparently localized.

It is impossible to give exactly the number of people with whom we talked in these provinces. Many of the conversations written up as a single interview consisted of input from five or six individuals such as the doctors and nurses at a particular hospital; in addition, we held numerous casual conversations which were not recorded in detail. However, our records for the two provinces are organized as 85 interview units, and we can safely estimate that our sample of key informants numbered about 300 individuals.

To conclude these comments on the Provincial Studies, Table II-4a has been prepared to give the reader an overview of salient characteristics of Kien Hoa and Long Khanh.

19. KIEN HOA  
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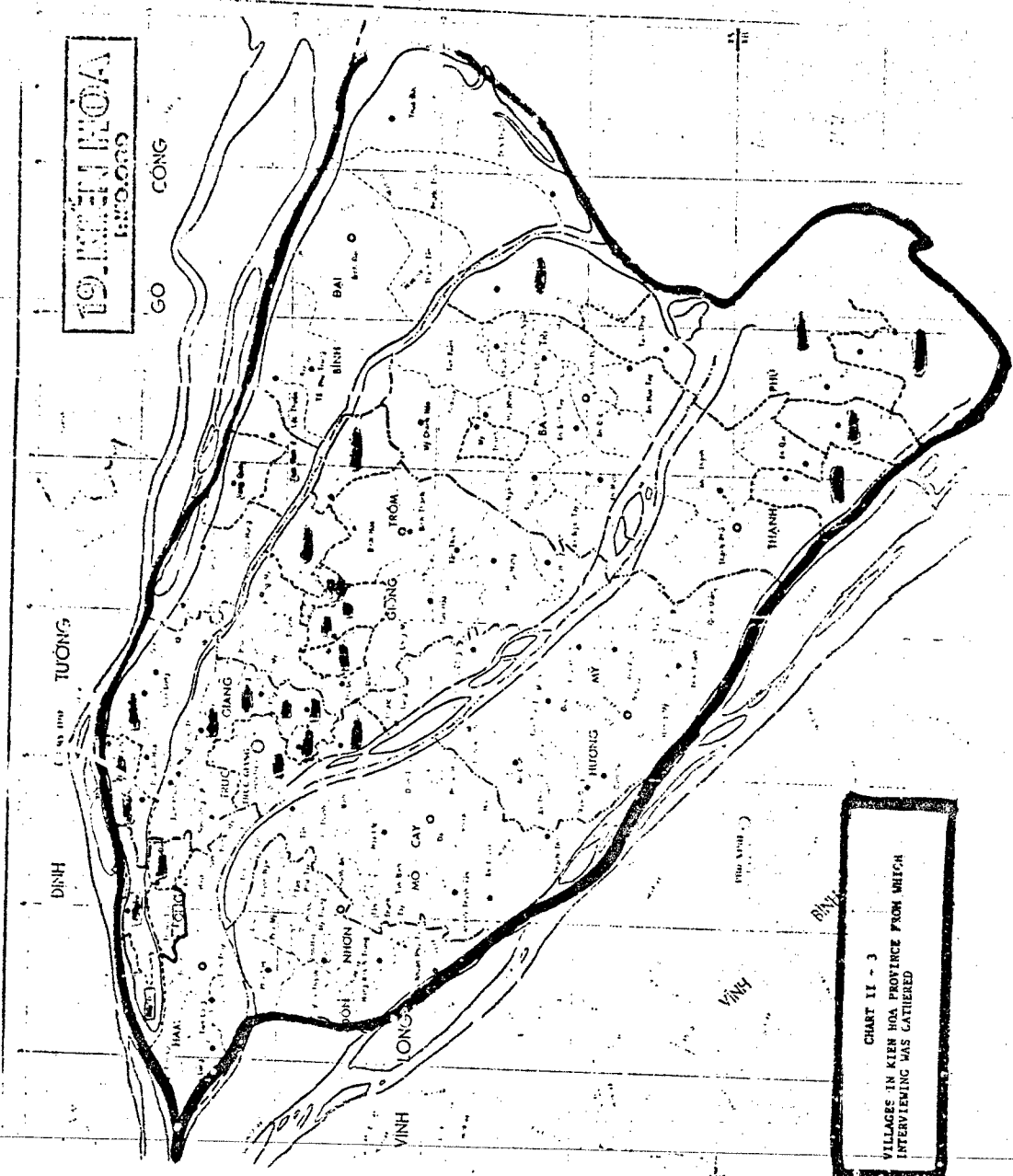


CHART II - 3  
VILLAGES IN KIEN HOA PROVINCE FROM WHICH  
INTERVIEWING WAS GATHERED

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TABLE II - 4

## MAP COORDINATES FOR VILLAGES STUDIED IN KIEN HOA PROVINCE

## Truc Giang District

An Hoi Village	XS 522315
Tan Thach Village	XS 493415
Huu Dinh Village	XS 497362
Son Phu Village	XS 515265
An Khanh Village	XS 470405
Phu Nhuan Village	XS 517287
Nhon Thanh Village	XS 548294
Quoi Son Village	XS 550390

## Ham Long District

Phu Tuc Village	XS 388398
Phu Duc Village	XS 335387
Tuong Da Village	XS 433370
Thanh Trieu Village	XS 389362

## Giong Trom District

My Thanh Village	XS 573300
Luong Hoa Village	XS 588274
Chau Binh Village	XS 680260
Chau Hoa Village	XS 640294
Luong Quoi Village	XS 626275
Luong Phu Village	XS 579267

## Ba Tri District

Tan Thuy Village	XS 783064
Bao Thanh Village	XS 820141

## Thanh Phu District

An Thuan Village	XR 696966
An Nhon Village	XR 741934
Giao Thanh Village	XR 762934
Thanh Phong Village	XR 790917

## Binh Dai District

Thoi Vinh Village	XS 680310
Van Quoi Village	XS 683341

Table II - 4a. Characteristics of Provincial Study Sites

Study Unit	Kien Hoa Province	Long Khanh Province
Ecological setting	Mekong Delta	Terrace Region
Vegetation	Rice paddies, coconut groves, mangroves	Upland forest, rubber plantation, cultivated fields
Surface area	2,155 km <sup>2</sup>	4,460 km <sup>2</sup>
Population (1971)	618,870	166,539
Population density	287 persons/km <sup>2</sup>	37 persons/km <sup>2</sup>
Ethnic composition	Lowland Vietnamese	Lowland Vietnamese, and a few Montagnards
Settlement pattern	Lineal hamlets and dispersed homesteads	Nucleated, with most of forest areas uninhabited
Economic orientation	Small holder rice, fruit and vegetable farms, coconut groves, fishing	Timber, rubber plantations, small holder fruit, vegetable and rice farms
Population under NLF Control (1968)	Approximately 50% of population	Approximately 10% of population
Quantity of herbicides 1965-1970 (gals.)	276,935	1,639,350
Agent	78% Orange, 22% White	60% Orange, 39% White, 1% Blue
Spray Locales	Chiefly mangroves, coconut groves, and waterways	Principally heavily forested areas
Exposure of people and crops	Direct spraying over inhabited areas, especially those under NLF control	Apparent long-range wind drift from spray runs over forest areas



2.) The Binh Hoa Village Sub-study. The refugee community, Binh Hoa, was known to us as a place in which many if not all inhabitants had been exposed to herbicides both prior to 1967 while they were still residents in their native location, and again subsequent to their resettlement at the Binh Hoa site. These locations appear on Chart II - 4. A sample of 102 respondents was selected for interviewing using a battery of four questionnaires. The questionnaires, as well as further details on the methods used in this one intensive community study, appear in the chapters on Hazards to Health and Psychological Responses to Stress.

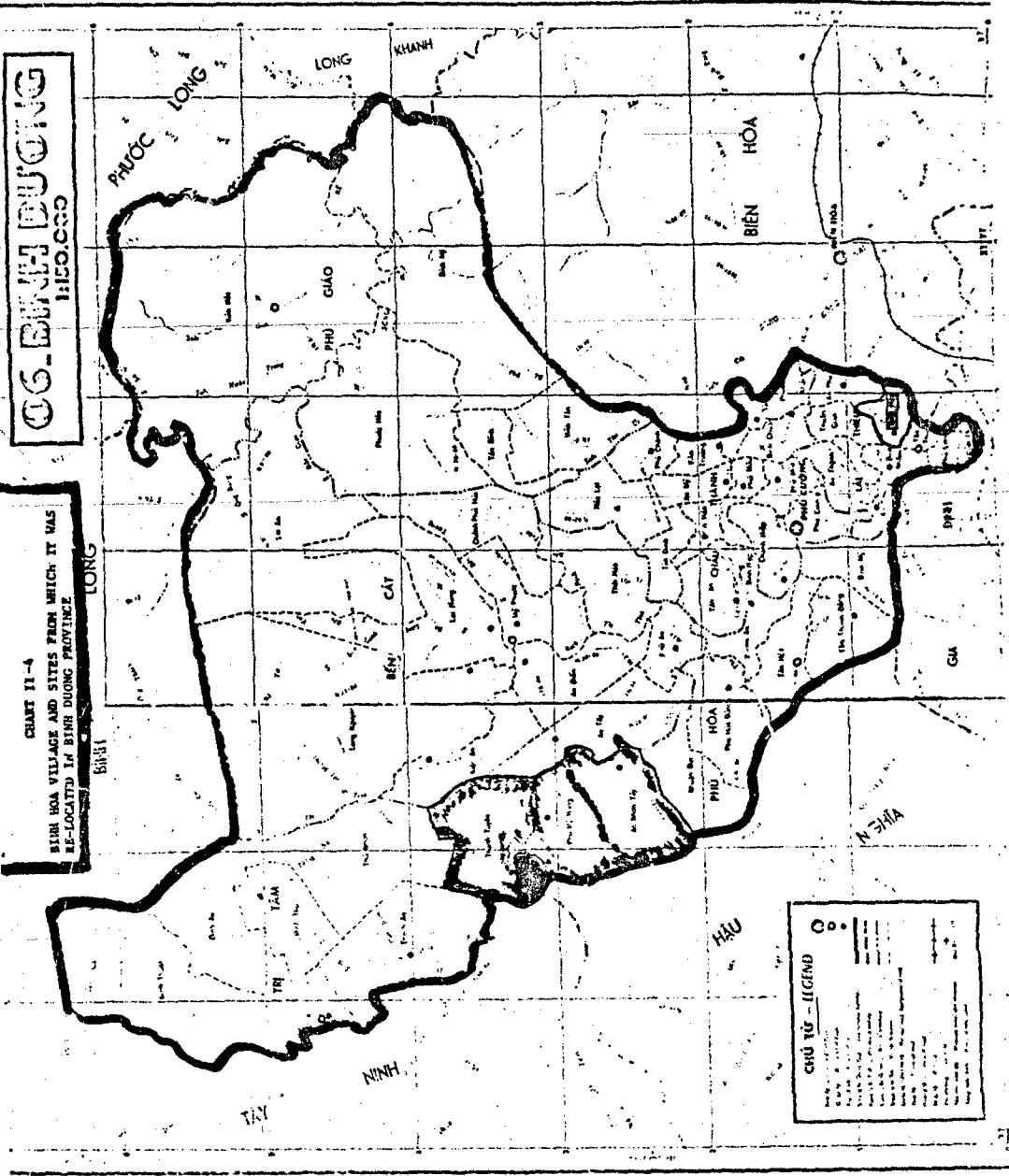
The interviewing began in late August and was supervised in situ by a senior Vietnamese research assistant who had worked with the authors in the 1967 study of Binh Hoa. Three Vietnamese interviewers worked under his direction. This work was terminated in mid-October when security in the surrounding area began to deteriorate. By that time we had collected a sufficient amount of data to use Binh Hoa as a site for exploring certain hypotheses about individual reactions to herbicides.

3.) Newspaper Content Analysis Sub-study. This was designed to analyze news reporting and editorial comment contained in certain Vietnamese newspapers between 1965 and 1972. The newspapers selected represent viewpoints which reflect two markedly contrasting orientations, one being opposition to the Government of South Viet-Nam and the other giving favor to the "establishment." The approach adopted called for two independent analyses to be performed; one to place the issue of

# 06-BINH DUONG

1:50,000

CHART 11-4  
BINH HOA VILLAGE AND SITES FROM WHICH IT WAS  
RE-LOCATED IN BINH DUONG PROVINCE



### CHU TIEP - LEGEND

○	Village Site
○	Re-located Site
○	Religious Site
○	Public Building
○	Industrial Site
○	Medical Center
○	Market
○	Post Office
○	School
○	Police Station
○	Military Base
○	Administrative Center
○	Health Center
○	Bank
○	Communication Station
○	Water Source
○	Other

herbicides in perspective vis-a-vis other war-related issues, and another to ascertain the nature of the statements made by the press on the subject of herbicides alone.

In order to compare the topic of herbicide use with other war-related issues, 39 categories including herbicides were constructed for the purpose of a systematic coding of articles. A sampling scheme and coding method were devised for an assessment of the pro-establishment and anti-government papers which would allow us to make a comparison of the degree of concern expressed for each issue across all newspapers, over time, and to determine concern for different topics, over time, according to the two selected viewpoints.

The second approach was designed to focus upon the content of only those articles discussing herbicides which could be found in the pro-establishment and anti-government papers. Using the same papers, every available issue of the pro-government paper from May, 1964, to July, 1972, and the opposition paper from April, 1967, to July, 1972, were examined for articles written on herbicides. All articles found were translated, as well as content analyzed, to determine the frequency of citation of various reported herbicide effects and to ascertain the nature of the attitudes prevalent within the articles.

Two trained coders/translators worked for three and one-half months on this part of the study. The researchers coded and translated 90 articles from the pro-establishment press and 247 articles from the opposition papers. Ten trained coders worked the same period of time content analyzing over 700 issues of the pro-establishment paper and approximately 450 issues of the opposition paper. Statistics

generated from the coding were then analyzed using a variety of statistical methods.

The results of the newspaper study as well as a general overview appear in Section on "Views of the Vietnamese on the Use of Herbicides."

D. The Problem of Validity

The orientation and philosophy of this study has had to be that of achieving the best approximation of truth that time and circumstances permitted. This has meant accepting statements on a common sense basis, with due regard to contrary evidence and reason for doubt. Techniques for comparing belief statements with observed behavior ("concurrent validity") do exist, and had we been able to carry out the original research plan, it would have been possible to develop some indicators of this type.

In lieu of such opportunity, we endeavored to maximize the accuracy of our data in the following ways:

1. Diversifying sources of information - both documentary and human - so as to reduce the likelihood of consistent bias.
2. Qualitative analysis designed to detect inconsistencies.
3. The employment of Vietnamese field workers and research assistants who had had previous experience and technical training as interviewers. The main three had worked with the American members of the field team in a number of projects over a period of six years. Bonds of mutual loyalty had been established and there existed shared concern with accuracy of reporting. One

is a high school principal; one was on temporary leave from the staff of the Ministry of Education in Saigon; and the third is the director of a private Vietnamese research organization.

4. The employment of a Vietnamese social scientist with an M.A. degree in Psychology from Ohio University. She secured leave from a teaching post at the University of Saigon in order to join the project.

5. The background of the American members of the field team.

The four members had a combined total of twelve years experience in Viet-Nam, with about half this time spent in conducting social science research projects. All had some language proficiency, with two of them at nearly a native level of proficiency in both written and spoken Vietnamese. One of the other two had good reading and fair speaking ability, while the fourth member could speak Vietnamese well enough to express his ideas and have a general understanding of what was being said around him. Thus, much of the data was gathered and analyzed at firsthand and not through the service of interpreters and translators. Independent checks were possible in many specific details in the research situation and spot-checks were made of all translations.

6. Both American and Vietnamese team members had personal friends in both Long Khanh and Kien Hoa who provided independent sources

of information which were valuable in supplementing and assessing the information obtained from the main sources.

Having collected the data with as much accuracy as possible during the process of analysis and synthesis, there has been continuing effort to sort out the more from the less probable. Thus, the validity, or level of approximation, of the report varies somewhat according to topic, and this is pointed out in the course of the analysis.

### Section III. Beliefs About Exposure to Herbicides

#### Introduction

The purpose of this section is to report what people said about their experiences and observations in regard to being exposed to herbicides. One point that emerged immediately is that knowledge of planes and helicopters having flown overhead and having sprayed out a substance which kills plants is extraordinarily widespread. This is true not only in the population centers, but also in the countryside. We consider it is an important point in a study which deals with the perceptions of people in a developing country where communication and education do not form as far-flung a network as in the industrialized countries.

The Vietnamese words used for herbicide spraying varied considerably, although the term that appears to be coming into common usage is thuoc-khai-quang, which translates approximately as a "medicine to open and clear away." Other ways of explaining knowledge of herbicides took the form of phrases such as "chemical from the sky" and "poison sprayed from airplanes." Whether the concept derives from first-hand observation or from the mass media, the point is that the idea has reached into most quarters, even remote areas.

Although our primary concern in this chapter is with regard to beliefs about exposure to herbicides, it has seemed to us relevant to make some assessment of actual exposure. By this means it was hoped that anchor points could be provided for assessing beliefs.

"Exposure" is defined here as any physical contact of plants, animals, or humans with herbicides. Obviously a full assessment of exposure should consider intensity and duration, but the information available to us is not sufficiently complete to carry out such an evaluation. Intensity and duration,

therefore, can only be estimated from the amount of agent dropped and frequency of spraying. Our procedure has been to measure distance from spray run sites to villages in which respondents said exposure had occurred. Data on the environmental, geographic, and demographic features have been compared to the official spray records for the same locales. The spray information itself includes time and frequency of spraying, amount utilized, agent utilized, and location of deposition. From this comparison a fairly comprehensive picture of exposure and risk of exposure emerges.

This section is divided into three main parts. The first takes up these issues in terms of the data obtained in the Province of Long Khanh where most of the spraying, as indicated in Table II-4a, was conducted over essentially uninhabited forests located away from populated and cultivated areas. In this province, as it will be seen, people attributed exposure to wind drift of herbicides. The second concerns the Province of Kien Hoa where there appears to have been direct exposure to people and crops, especially in NLF areas. The third deals with the area in Binh Duong Province which was sprayed as part of Operation Cedar Falls. This was the site from which the Binh Hoa refugees whom we interviewed were removed.

#### I. Long Khanh

Analysis of the data obtained from this province reveals the beliefs that crops, livestock, and humans had most often been affected by herbicides in situations where no direct spraying was reported either by the mission log\* or on-the-scene observers. A number of explanations are possible such as mistaking the effects of insects or plant disease, or the actual effect of

\* Official MACV/DCD record on herbicide spraying as found in HERBS tape.



wind drift of the herbicide spray from a spray run made elsewhere. Belief in exposure through drift is a major one in Long Khanh and is quite different from the views in Kien Hoa Province and Binh Hoa (refugee village).

Crop damage from herbicides was cited for every year in Long Khanh from 1965-1971. The number of villages involved ranged from a low of four for the years 1965, 1966 and 1971 to a high of twelve for 1968.

To explore the meaning of these reports of herbicide effects, coordinates of recorded spray missions for the years 1962-1970 were plotted on a 1:50,000 map overlay of the Province. Missions flown within Binh Tuy and Bien Hoa Provinces were also plotted if these missions occurred within twenty kilometers from villages in Long Khanh.

Spraying in Long Khanh utilized all three major herbicide chemicals: Agent Orange (2,4-D and 2,4,5-T), Agent White (2,4-D and Picloram), and Agent Blue (Cacodylic Acid). Between 1965 and 1969, the gallons of Agent Orange applied numbered 994,240, while 628,820 gallons of Agent White were dropped. A significantly smaller amount, 16,290 gallons of Agent Blue was employed. Altogether, including helicopter spraying, 1,639,350 gallons of defoliant were sprayed on Long Khanh. This is estimated to be enough to cover in one spraying over 546,450 acres of land.\* In reality, however, only certain areas in the Province were sprayed and, consequently, there were some locations which received multiple applications.

Examination of recorded runs indicate that no missions were flown directly over populated areas, but for three villages a number of missions were flown in

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\* Calculated at a three-gallon per acre density of deposition (see Appendix A of Joint Munitions Effectiveness Manual).

their immediate vicinity (1 - 2 kilometers). Thus, in 1965 two missions were flown directly over land cultivated by Ben Nom villagers, and in 1966 land planted by farmers from Xuan Loc and Gia Ray villages were in the immediate vicinity of spray runs. It seems likely that crops as well as people were exposed during these operations but, because of poor security, these sites could not be visited by us in 1972 for on-the-spot confirmation.

Except in the above instances, all missions flown in Long Khanh appear to have been conducted over essentially uninhabited forests. Three distinct areas stand out on the map: 1) all of the northern part of the Province north of Highway #20; 2) forest areas 8 - 10 kilometers southeast of Dinh Quan Village; and, 3) forests in the southeastern tip of the Province on both sides of Highway #1.

Measurements were made on the 1:50,000 map to determine the distances between spray runs and the approximate central point of population distribution of each village. This center point was selected as appropriate on the basis of actual observation and official reports. In almost every case cultivated fields were 1 - 3 kilometers closer to the spraying than the population centers. Table III-1 is an aggregate listing of Long Khanh villages and distances to spray runs.<sup>1</sup> Given these figures, it would appear possible that long-range herbicide spray drift could be responsible for some herbicide damage in Long Khanh.

This finding raises a question since, according to an official Department of the Army study conducted on herbicide spray drift, ". . . . . the maximum

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1. See Appendix at the end of this chapter for details on plotting methodology as well as yearly listings for the 19 villages of Long Khanh.

Table III--1 Distance to Closest Recorded Spray Run  
for All Villages by Year

	0-2	2-5	5-10	10-15	15-20	Total
1965	0	0	3	2	1	6
1966	1	0	8	5	5	19
1967	0	0	5	4	5	14
1968	1	3	2	3	7	16
1969	1	0	0	2	6	9
1970						
1971						

distance at which drift hazard from six sortie missions with ORANGE would occur was 1 to 2 kilometers under most unfavorable crosswind conditions of 9 mph."<sup>1</sup> This study goes on to add that, ". . . . . under the atmospheric conditions in which the 12th Air Command Squadron operates, drift damage (by Agent ORANGE) on broadleaf crops should not occur at distances greater than 2 kilometers."<sup>2</sup> Another study, however, indicates that Agent ORANGE could form a vapor cloud under the right conditions. It notes that, ". . . if there should be a slight breeze (2-3 mph), the cloud would move out of the sprayed area and could affect plants 2 - 3 kilometers immediately downwind of the target. Plant damages might occur under the circumstances if the concentration of the vapor and the exposure time were sufficiently great."<sup>3</sup>

Other studies conducted under the auspices of the Army and the Air Force on the subject of spray drift contain numbers of statements which indicate that slight changes in meteorological conditions, flight characteristics and defoliant droplet size could result in significantly greater changes in the production of drift as well as the effect of that drift on vegetation.

One such study written as late as March, 1970, concluded that,

"Spray drift of fine droplets (droplet size L 100 u) influences the effectiveness of herbicide applications and occasionally some spray drifts from target areas causing damage to adjacent rice crops and rubber trees."

1. C.E. Minarik, Cr., Director, Plant Sciences Laboratory, Department of the Army, and Dr. R.A. Darrow, Chief, Plant Physiology Division, Department of the Army. Herbicide Spray Drift, 5 April, 1968. (Mimeo) Spray applied with D6/46 nozzles with a mass deposit of 350 microns MMD, at a flight altitude of 150 feet under maximum crosswind velocities of 9 mph.
2. IBID
3. Op. Cit. Potential Hazards of Herbicide Vapors, 6 April, 1968.

The writers add that, "There exists a need for a methodology to be developed to predict target contamination levels and to determine off-target drift of defoliant materials."<sup>1</sup> This last statement is further supported by an evaluation of off-target drift which appears in the Joint Munitions Effectiveness Manual (JMEM) on defoliants.<sup>2</sup> According to the manual, "sufficient amounts of agent to damage crops have not been found to drift more than one-half mile from the release on the upwind or cross-wind directions. However, substantial drift may occur downwind from the release point."

Between 1965 and 1969 eleven villages under 10 kilometers from the site of spray runs reported effects, while during the same period seventeen villages located between 10 - 20 kilometers away from the spraying reported various herbicide effects.

It may be, of course, that all of the Vietnamese reports of herbicide effects in Long Khanh are in error. Given the nature of our information sources, however, this does not seem plausible.

While it is possible that farmers in particular areas might attribute effects to herbicide spraying that were in fact caused by other agents, or might even invent damages in the hope of getting reparations, it is improbable that so many independent sources, including senior Government of Viet-Nam provincial officials, would all mistakenly report similar plant phenomena and attribute them to herbicides. The phenomena they report moreover are congruent with those known from laboratory studies to be caused

1. Booz Allen Applied Research, Inc. Methods for Predicting Contamination Density and Off-Target Drift of Defoliant Materials, March, 1970.
2. Joint Munitions Effectiveness Manual (Air to Surface) Defoliants. FO 8635-71-C-0199, 21 December 1971, pp. 5-6.

by herbicides.

The alternative possibility is that spray drift did occur over a greater distance than was commonly supposed by those engaged in the herbicide operations.

A careful analysis was made of the relationship between spraying and meteorological conditions. Data were assembled on the location and time of spraying, amount of herbicides dropped by month, general prevailing surface winds throughout the year, and timing of wet and dry seasons in the Province. Information on wind direction and rainfall by month collected at the Xuan Loc station were obtained from the monthly and annual bulletins of the Directorate of Meteorology and the yearly agriculture reports for the Province prepared by the Agriculture Office.

Examination of the weather reports indicated that a relatively consistent pattern of wind direction exists in Long Khanh. From October through January the winds come from the North. During March, April, May and June, the direction is from the South, Southeast, and sometimes the Southwest. From July through September, the winds shift and come from the West and Southwest.

According to the official spray records and map overlays of spraying, at least eighty percent of all missions conducted within Long Khanh were flown over the northern part of the Province. The statistics on gallons sprayed between 1965 - 1970 showed that a little over seventy percent of all herbicides used was dropped when prevailing winds were coming from the North. Most of the populated areas and cultivated lands of the Province are located downwind to the south of the spray zones.

See Table III - 2.

Table III--2 WIND DIRECTION AND SPRAYING

Long Khanh Province

Year	North Oct, Nov, Dec Jan, Feb	SE/SW Mar, Apr, May June	West/SW July, Aug, Sept	Total (Gallons)
1965	60,900 (100%)			60,900
1966	171,900 (80%)	43,000 (20%)		214,900
1967	649,535 (64%)	156,460 (15%)	209,280 (21%)	1,015,275
1968	240,275 (92%)	15,000 (6%)	6,855 (3%)	262,130
1969	69,700 (80%)	800 (.009%)	16,000 (19%)	86,500
1970		100		100

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The consensus among respondents in all areas visited (in both provinces and in the refugee village) was that spraying which occurred during the dry season was the most harmful to the vegetation. It was generally noted that fruit trees and broad leafed plants would react more quickly to herbicides at this time.

In Long Khanh the dry season usually begins in December and lasts into April. The wet season often begins in late April or early May and lasts into November. The months of heaviest rain are May through September during the West Southwest monsoon.

Calculations of gallons dropped in Long Khanh between 1965-1970, according to seasons, show that about thirty percent of the total was applied during the dry season. 1967-1968, however, are the peak years, as can be seen on Table III - 3. The total gallons dropped in the dry season was much greater in these two years than at any other time.

According to the Province Agriculture Report, 1967 was considered to be a drought year - that is, a year when the rainfall was considerably less than in other years. This would mean that plants exposed to herbicide in 1967 during the normal "wet season" would be more likely to have been under conditions of reduced moisture.

The relationship of the winds, spraying, and effects is illustrated by the case of reported effects on rice. The 1967 Province Agriculture Report states that that year was a particularly bad year for rice production, although this is not reflected in statistics in the National Agriculture Yearbook. The Province Agricultural Office says that damage to rice caused by herbicides was one factor reducing rice production. According to the report, in 1967 seventy-five percent of the land cultivated for rice was planted in upland



Table III-- 3 DRY AND NET SEASON SPRAYING

Year	Dry Season	Wet Season	Total gallons dropped
1965	6,700 (11%)	54,200 (89%)	60,900
1966	31,100 (14%)	183,300 (86%)	214,900
1967	282,580 (28%)	732,695 (72%)	1,015,275
1968	202,675 (77%)	59,455 (23%)	262,130
1969	10,400 (12%)	76,100 (88%)	86,500

Long Khanh Province

rice and the rest in wet rice. In upland rice, the pollen stage normally occurs from late October until mid-November. In wet rice, the pollen formation stage takes place from mid-November into December. Farmers, village officials and agriculture cadres reported that rice in Long Khanh was affected by sprays primarily during the pollen formation stage. When exposure occurred at this time, it was stated that the damage was most severe.

A close study of winds and spraying for 1967 showed that for this year over ninety-five percent of the missions were flown in the north of the Province. Measurements made on spray overlays placed a considerable number of runs within 20 kilometers of at least thirteen villages. 1967 is the year when the greatest amount of herbicide was dropped and the three months of heaviest spraying during the year were October (208,710 gallons), November (199,875 gallons) and December (92,900 gallons). Not only was this the time for the rice plants to have pollen, but it was also the time when the prevailing surface winds were from the North.

Turning more generally to other crops, according to village and district level interviews, 1967 and 1968 were also the years when the heaviest damage was sustained. The Annual Province Agriculture Report likewise stated that in 1967 herbicides most affected agriculture production. From tables given in the Appendix at the end of this chapter it can be seen that 1968 was the year in which spraying was conducted closest to inhabited areas, while 1967 was the year when a significantly greater number of spray missions were flown and more gallons of herbicides were dropped.

The reporting of the dates on which effects of spraying were said to have been observed were not sufficiently accurate to reveal a monthly pattern of multiple and/or successive exposure. People often related that spraying

occurred several times during a certain year, but seldom were specific months mentioned. When they were mentioned, the dates were plausible in terms of recorded mission data. For example, several respondents in Long Khanh mentioned October, 1967, as a particularly bad month in terms of damage from herbicides. Official records indicate that October was the month in which the most missions were flown and the most gallons dropped in Long Khanh.

A careful comparison of the spray mission log data to the reports of effects by peasants and officials does reveal a number of inconsistencies in the reporting. For example, there are eight cases in Long Khanh between 1965-70 in which individuals reported herbicide effects in their village, yet according to the official records no spray runs were made in Long Khanh within 20 kilometers of their village at the time they reported. This discrepancy may be attributable in part to spraying in other provinces bordering Long Khanh, particularly Phuoc Tuy Province. Several of the villages in which this occurred were within 20 kilometers of Phuoc Tuy and we did not plot spray runs in this province.

Another conflict between the reporting of respondents and the official spray records is that there are a considerable number of cases occurring in different years in which spraying has been conducted within 20 kilometers of the villages (some within 5-10 kilometers) and no reports of herbicide effects were related to us by inhabitants of those villages. A case in point is 1966 in which there are spray runs within 5-20 kilometers from nine different villages, yet no one we interviewed from those villages stated that spraying occurred in that year. Analysis from this approach shows that there were 22 cases (for the years 1965-70) in which spray runs occurred within 20 kilometers of a village and effects were not mentioned for that year by our

respondents. This stands in contrast to the 29 cases, covering the same time period, in which spraying had occurred within 20 kilometers and inhabitants reported effects of herbicides in our interviewing.

The number of years during which exposure was believed to have occurred can be assessed. Between the years 1965 - 1971, only one of the 15 surveyed villages did not report effects. One village reported being affected twice, and nine villages reported being affected three or more times.

## II. Kien Hoa

People and officials in Kien Hoa reported that land used for residence and crop cultivation under the Government of Viet-Nam, as well as National Liberation Front, was affected by herbicide spraying. Effects included damage to crops, illness and death to animals, and illness to humans. Data were collected from village officials and residents coming from twenty-six villages located in six districts. The number of these villages reporting effects in particular years ranged from a low of three in 1970 to a high of twelve in 1968.

At least fourteen of the twenty-six villages had been under National Liberation control for some time between 1963 - 1971. The reports of respondents who had resided in these villages indicated that each village was sprayed while under National Liberation Front control. At that time people were living and growing crops in the immediate vicinity of the spray runs.

Coordinates of recorded spray missions were available for the years 1962 - 1971. These missions were plotted on a 1:50,000 scale map overlay of the Province. Most of the runs were over the relatively uninhabited mangrove area of the three coastal districts: Binh Dai, Ba Tri and Thanh Phu. These were said to contain National Liberation Front base camps.

Some spray missions were also flown in five other inland districts, with the targets being rivers, canals and base camp areas located in coconut groves.

Between 1965 and 1970 the volume of spraying in Kien Hoa totalled over 276,960 gallons of defoliant. Nearly seventy-eight percent (217,555 gallons) of this was of Agent Orange and twenty-two percent (58,070 gallons) of Agent White. Using the official figures for calculations, we estimated that the total number of gallons dropped between 1965 - 1970 could cover once approximately 92,320 acres of land. As in Long Khanh, spraying in Kien Hoa was generally confined to the same locations in the Province each year and these were sprayed several times during the period 1965 - 1969.

According to the official spray mission records, some flights were made directly over populated areas. In practically all cases, these areas were sprayed at a time when they were under the control of the National Liberation Front. Our overlays showed that six of the villages covered in our interviewing had been sprayed within one-half kilometer from each of their administrative centers. Because of the proximity of cultivated lands to the centers, it seems likely that crops were affected. Many of the missions in the five inland districts were over coconut groves close to villages.

As in Long Khanh, we calculated distance, using the 1:50,000 scale map, between the location of the spray runs (closest point) and the administrative center of each of the twenty-six villages studied in Kien Hoa. This information appears on Table III - 5. The hamlets of the villages in Kien Hoa tend to be stretched out along roads, rivers, streams and canals, thereby creating a dispersed settlement pattern. This stands in contrast to the nucleated settlement pattern found in Long Khanh.

Table III-- 5 Spiny Runs and Distances to Center of Villages reporting effects from 1965-72

Kien Hoa Province

Village	District	1965 -	1966	1967	1968	1969	1970	1971	1972
An Hoi	Truc Giang	5.0			5.0	4 runs 2.8 - 5.1			
Son Phu		5.0			2.0	3 runs 3.5 - 4.5			
Tan Thach					2 runs 2.0	5 runs 2.0 - 4.0			
Phu Nhuan			7.5						
An Khanh					1.5				
	Giong Trom								
		2 runs 3.5 - 4.0		2 runs 1.3 - 3.2	5.0	4 runs 2 - 4.25			
Luong Quoi					4.75	4 runs 2 - 4			
Luong Hoa					1.5	5 - 1.0			
Luong Phu		2 runs 1.0		2 runs 2 - 3		5 runs 5.0 - 7.5			
Chau Hoa		2 runs 1.0 - 1.5	1.0	2 runs 1.3 - 2.0		3 runs 2.0 - 7.5	2 runs 4.75 - 5		
Chau Binh			2.0			4 runs 1.0 - 3.75			
My Thanh					3.5				
	Han Long								
Phu Tuc					3 runs 25 - 1.5				
Phu Duc					3 runs 1.5				
Tuong Da					3 runs .5 - 1.5				
Thanh Trieu					3 runs .1 - 1.5				



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Table III--5 (Cont.) Spray Run, and Distances to Center of  
Villages reporting effects from 1965-72

Kien Hoa province

Village	District	1965	1966	1967	1968	1969	1970	1971	1972
Ba Tri									
Tan Thuy		3 runs 1.5 - 3.0	17 runs 5 - 7.0	1.25					
Bao Thanh		4 runs 2 - 3	5 runs 2.5 - 5						
Thanh Phu									
Thanh Phong		5.0 2 runs	13 runs .75 - 4.5	2 runs 2 - 4.5					
Giao Thanh		2 - 4.0	11 runs .1 - 3.0	2 runs 1.0 - 3.0					
An Thuan			6.5	4.75					
An Nhon		2 runs 3.5 - 4.5	13 runs .75 - 4.75	2 runs .5 - 1.0					
Binh Dai									
Tai Vinh									
Vang Quoi									

III - 17

III-17

Because of the dispersion and the maximum utilization of land, the people are generally located closer to their crops than in Long Khanh. This, in turn, means that spraying done within an estimated three or four kilometers of a village administrative center would be likely to have exposed people as well as crops to herbicide spray. For this reason the village administrative center (the hamlet where village offices are located) was selected as a reference point even though it does not represent the geographic center of population.

As indicated in Table III - 6, between the years 1965 - 1970, 17 villages reporting effects were located between .1 and 3.0 kilometers from the closest spraying, and another eight villages were between 3.1 and 7.5 kilometers away.

As mentioned previously in this report, villages in which interviewing was conducted in Kien Hoa were selected on the basis of 1) proximity to the actual spray runs, 2) relatively good security, and 3) physical accessibility. This approach does not lend itself to an evaluation of herbicide exposure of the Province population as a whole; but only of the villages covered.

Between 1965 - 1969 nineteen of the 26 villages studied had two or more spray runs conducted nearby during a one-year period. For example, in 1969 Chau Hoa Village had five spray runs; the closest was 5.0 kilometers and the farthest 7.5 kilometers. Most of the close spray runs were conducted within a range of .1 to 3.0 kilometers. In view of the evident proximity of spraying to settlement areas, it is not surprising that respondents in Kien Hoa tended to describe their exposure as resulting from a direct application of herbicide as opposed to drift. Many of the respondents saw the spray craft and considered themselves to be within the target area of the plane. Only



Table III--6

Number of Villages Reporting Herbicide effects and Distance to Closest spray run

Kien Hoa Province

Number of Villages Reporting that they are Located More Than 10 Kilometers Distant.

Year	0-1.0'	1.1-3.0	3.1-5.0	5.1-7.0	7.0+	Number of Villages Reporting that they are Located More Than 10 Kilometers Distant.
1965	2	1	3	0	0	0
1966	3			1		1
1967	3	2	1			1
1968	2	3	2			5
1969		1			1	3
1970						2
1971						2
1972						2
	17		8			6T-III

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occasionally did we find a respondent who talked purely in terms of drift exposure. Thus, a woman living in Ba Tri District claimed that her fruit trees had been damaged in 1971 by drift, which she said had come from Thanh Phu District. Her claim was not improbable as, according to the spray overlay provided by Military Assistance Command-Viet-Nam, several missions were flown in July, 1971, in Thanh Phu District. In July the prevailing winds are in the direction of the respondent's village in Ba Tri and, according to measurements, the distance from the closest run to the village was approximately six kilometers.

The analysis of village and district level interviews points to 1967 and 1968 as the years when the greatest numbers of villages reported effects and when the estimates of damage were the highest. Reports of effects were fewer in 1969 and the damage appeared to be confined primarily to coconuts. The official spray mission records show that 1965 - 1967 were the years when the highest numbers of missions were flown and the largest volume of defoliant was dropped. Examination of the pattern of spray flights, however, reveals that in 1965, 1966, and 1967, 90 percent of the runs were made over mangrove areas. Some missions flown in 1967 and most of those in 1968 were conducted over areas in the more populated inland districts, and it would seem that this could account for the increase in reports from villagers.

More villages reporting spray effects in 1967 - 1968 had missions flown within 3 kilometers of them than in other years. The reporting of specific dates of spraying in Kien Hoa was similar to that in Long Khanh, that is respondents could usually provide dates in terms of years, but few could recall specific months.

Data on weather conditions and spraying in Kien Hoa were analyzed

in a manner similar to that employed in Long Khanh. Matrices were set up which linked the gallons of herbicide used in the Province with the wind directions and the wet and dry seasons. Since no climatological station recorded weather data in Kien Hoa, use was made of weather information from adjacent Vinh Long Province on the western border adjacent to Kien Hoa.

During October, November, December and January, the surface winds are generally from the North and Northeast. In February, March and April the wind comes from the East-Southeast and the Southeast, and during May through September the wind comes from the West-Southwest and West.

Between 1965 and 1971, approximately fifty percent of all recorded spraying was done when the winds were from the West-Southwest or West. See Table III - 7. This would mean that if winds were strong enough, spraying done in the southern portion of the Province, especially Thanh Phu, would drift in the direction of Ba Tri and Giong Trom Districts. About thirty-four percent of the spraying occurred when winds were from the North-Northeast, but this was primarily between 1965 - 1967 in the three coastal districts, where such a wind would tend to carry a drift toward the ocean.

Kien Hoa has its wet season during the Southwest monsoon which usually arrives in mid-May and lasts into October. This is followed by the Northeast monsoon which brings dry air during October-November through March.

According to the official spray records for 1965 - 1971, slightly over fifty percent of all spraying in Kien Hoa was conducted during the dry season--the period when effects of exposure are reportedly the most severe for plants. See Table III - 8.

Table III--7 WIND DIRECTION AND SPRAYING IN GALLONS  
1965--1970

Kien Hoa Province					
Year	North Oct, Nov, Dec, Jan	SE/SW Feb, Mar, Apr	N/SW/W May, Jun, July, Aug, Sept	Total	
1965	64,750 (100%)				
1966		3,000 (35%)	82,150 (96%)	85,150	
1967	28,800 (36%)		50,175 (64%)	78,975	
1968	3,000 (14%)	17,750 (86%)		20,750	
1969		22,000 (85%)	4,000 (15%)	26,000	
1970		1,310 (100%)		1,310	

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Table III-- 8 DRY AND WET SEASON SPRAYING IN GALLONS

Kien Hoa Province

<u>Year</u>	<u>Wet Season</u>	<u>Dry Season</u>	<u>Total gallons dropped</u>
1965		64,750 (100%)	64,750
1966	82,150 (96%)	3,000 (4%)	85,150
1967	50,175 (63%)	28,800 (37%)	78,975
1968		20,750 (100%)	20,750
1969	4,000 (15%)	22,000 (85%)	26,000
1970		1,310 (100%)	1,310

Conflicts between data obtained from rural inhabitants and information about the official spray missions were also evident in Kien Hoa. Between the years 1965 - 1971 there were 14 cases in which village inhabitants reported herbicide effects yet official records indicated that no missions had been flown within ten kilometers. Indeed, in most cases spray runs were considerably farther than ten kilometers from these villages. As in Long Khanh, the effects cited could have been linked to spraying in adjacent provinces but, as already explained, we did not plot spray missions for the neighboring province. It is also possible that plant damage might have been the result of disease or pestulance.

Also in Kien Hoa we found that spray runs had been flown within ten kilometers of villages we studied and none of our respondents reported spraying effects. We found that between 1965 and 1971 there were 27 cases of this type. On the other hand there were 25 cases during that period in which respondents reported witnessing herbicide effects and spraying was conducted within ten kilometers of the village.

In the appendix to this chapter appears a condensed summary of the information on spray mission flight paths in Kien Hoa and the locations of people interviewed. It was prepared for Part A of the report on the Committee on Herbicide Effects in Vietnam.

### III. Binh Hoa Refugee Village, Binh Duong Province

The study of Binh Hoa Village dealt with spraying in a much more limited way than was the case in each of the province studies. Focus was on spraying in the Years 1965 - 1966, and on only one part of the Province. This was an area (about 20 kilometers by 20 kilometers) located along the

western border of Binh Duong, adjacent to Hau Nghia Province, which once encompassed the three villages of Thanh Tuyen, Phu My Hung and An Nhon Tay.

Before 1967 these three villages were located on the perimeter of the jungle stronghold of the National Liberation Front, known as the "Iron Triangle", and were considered to be under National Liberation Front control. In 1967 the inhabitants of these villages were forcibly regrouped by "Operation Cedar Falls" to new homes in what is now called the village of Binh Hoa in Lai Thieu District. Official U.S. reports written in 1967 indicated that prior to removal the villagers had experienced heavy damage to their crops through spraying during 1965 and 1966.

In 1972 individuals selected from over one hundred families were interviewed in Binh Hoa Village about the effects of spraying when they lived in their old hamlets. Seventy percent of this sample had lived in Thanh Tuyen Village, while the remainder came from An Nhon Tay and Phu My Hung. The respondents told of spraying conducted over crop lands and populated areas, particularly in 1966.

As in the other two provinces, the data on spray missions in 1965 - 1966 were plotted for Binh Duong and reports were studied to draw out the details of observed spraying and drift. The spray overlays showed that flights were made very close to each of the villages concerned. For Thanh Tuyen measurements were made using the hamlet of Ben Suc as the center point. No fewer than fourteen flights were recorded as having been flown within 5 kilometers of this place during 1966. Phu My Hung and An Nhon Tay also experienced a number of flights within the 5 kilometers of their most populated hamlet. Table III - 9 presents for each village the distances and number of flights shown at those distances for the years 1965 and 1966.

Table III-9 Number of Spray Runs and Distance From Village Centers

Binh Duong Province		2-5	5-10	10-15	15-20
-Village - 1965	-- 0-2				
Thanh Tuyen	0	1	5	2	5
Phu My Hung	0	0	6		2
An Nhon Tay	0	0	0	0	6
1966					
Thanh Tuyen	2	12	4	0	0
Phu My Hung	1	11	10	0	
An Nhon Tay	4	2	3	2	

III-26

III-26



Most respondents from these villages reported that the damage to their crops was from direct spraying and not from drift. About seventy-five percent of the respondents stated that they had seen the planes dropping the spray in the immediate vicinity of their village. About twenty percent saw spraying done over the nearby forests and the remaining five percent said they saw nothing.

Because of the limited nature of the data available for the Binh Duong site, no attempt has been made to assess the effects of wind or the implication of dry and wet season spraying.

#### IV. Conclusion

In Long Khanh most of the communities in which people believed they had been exposed to herbicides were at some distance from the actual spray runs. When wind and season are taken into account, it seems probable that in most instances the beliefs of villagers and local and provincial officials are mainly based on experience with the consequence of wind drift.

In Kien Hoa and the refugee village of Binh Hoa most people believed that their fields had been directly sprayed. Official information about spray runs tends on the whole to confirm this. Degree of exposure varied in the different villages surveyed, those under National Liberation Front control having apparently experienced more intensive spraying than the rest.

## V. Appendix

### Data Used:

1) Spray Mission Log: A detailed log of all spray missions was maintained by MACV and was placed on computer tape (HERBS tape) for our use. The tape contained such information as; date of flights, gallons dropped, coordinates of flight, direction, hits by ground fire and other information. Printouts of essential mission characteristics were obtained for each of the provinces studied along with data on adjacent provinces where applicable.

2) Spray Overlays. From the HERBS tape, DMA/MACV-Saigon prepared by computer map overlays of all spray missions conducted from 1966 - 1971 in Long Khanh and Kien Hoa.

### Procedures:

1) Check for Errors: A double check of the computer overlays indicated that spray mission flight paths had gone over major population centers particularly in Long Khanh. Our own experience in Long Khanh told us that while the routing of planes may have been over population areas, no actual spray runs had been flown over these areas. To check this discrepancy, new overlays were prepared, plotted by hand on acetate using a 1:50,000 scale map of both provinces. A careful examination was made of the mission printout obtained from the HERBS tape. We found that some flight data was misarranged on the printout causing the coordinates of certain flights to be out of order. This had apparently resulted in the computer plotting lines which connected the starting and completion points of different spray missions. In the case of Long Khanh and Kien Hoa, this produced some unusually long flight paths sometimes stretching across the entire province. By rearranging the flight coordinates in their proper order, we obtained a

more reasonable pattern of spraying in both provinces which did not go over populated areas under Saigon government control. The Long Khanh overlays were further checked for accuracy by comparing them with a spray overlay prepared by Dr. William Thomas.

2) Measurement of Distances: for Long Khanh, rough measurements were made to determine the distance from recorded flight paths (a line drawn between coordinate points) to the approximate population center of the villages. A drafting compass was used to inscribe on the acetate overlays circles of various radii (5, 10, 15, 20 kilometers) centering on the villages. Rough measures were made for the spray flights passing within 20 kilometers of the villages in the province. A slightly different technique was applied to the new overlays made for Kien Hoa. Because of the difference in our geographical coverage and the comparatively fewer spray missions in Kien Hoa, rough measurements were made from the geographic center of each village studied to the closest point of each spray run.

Further Information about Long Khanh:

The following five tables (A-E) give a year by year listing for all 19 villages in the province showing the number of separate missions flown at various distances from the population centers. While one flight may cover a single flight path running from 5 to 20 kilometers from the village, only the nearest portion of that path is counted. The number of separate missions flown within a 20 kilometer range of each village can be found by summing for each year across distances.

A Summary Statement About Kien Hoa:

For Kien Hoa it was possible to compare the HERBS tape data with the locations of people who were interviewed. The purpose of this was to

estimate the extent to which first hand observation could have been the basis for the information reported to us. Table F show the HERBS information on missions flown within one kilometer (0.6 mile) of hamlets in villages where interviews were conducted. A hamlet is a smaller administrative unit than a village, and in a densely populated area such as Kien Hoa it is reasonable to assume that what occurs in one hamlet is known to most villagers. Thus, it can be seen that in eight of the 26 villages studied there is evidence of close proximity to flight paths. Nine other villages studied were in a 3 kilometer (1.8 mile) range. Thus in about two-third's of the areas where interviewing was conducted it was likely that people had first hand knowledge. In four of these villages the interview data is supplemented by aerial and ground photographs.

Table III--A Number of Aerial Spray Missions and  
Approximate Distance to Village

Long Khanh Province - 1965

Village	Distances in Kilometers				
	0-2	2-5	5-10	10-15	15-20
Xuan Loc*					
An Loc					
Tan Lap					
Dau Giay					
Hung Loc					
Hieu Kinh*					
Thoi Giao					
Cam Tan (ND)					
Cam Ly (ND)					
Gia Ray (ND)					
Fan Truan		3		1	5
Dirh Quan					
Fuong Tho*					2
Dong Hiep					
Gia Kien		2		3	6
Gia Tan		2		3	5
Binh Hoa				2	7
Binh Loc (ND)					
Ben Nam*		2		7	1

Number of gallons dropped = 60,900

Number of sorties flown = 26

(ND) No data collected from these villages.

\*Respondents from this village reported effects from herbicides for this year.

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Table III-- B Number of Recorded Spray Missions and  
Approximate Distance to Village

Long Khanh Province - 1966

Village	Distances in Kilometers				
	0-2	2-5	5-10	10-15	15-20
Xuan Loc*			4	4	4
An Loc			4	4	1
Tan Lap				4	1
Dau Giay					0
Hung Loc*					5
Hieu Kinh			4	2	4
Thoi Giao				5	4
Cam Tam					4
Cam My					4
Gia Ray	5	1	4	0	0
Han Thuan					5
Dinh Quan			5	1	13
Phuong Tho*			0	0	2
Dong Hiep			5	1	13
Gia Kien*			0	4	10
Gia Tan			3	5	19
Binh Hoa			0	30	18
Dinh Loc			4	1	4
Ben Nam			0	30	10

Number of gallons dropped = 214,900

Number of sorties flown = 76

\*Residents from this village reported effects from herbicides for this year.

Table III-- C Number of Reported Spray Missions and  
Approximate Distance to Village

Long Khanh Province - 1967

Distances in Kilometers

Village	0-2	2-5	5-10	10-15	15-20
Xuan Loc*					4
An Loc					
Tan Lap					0
Dau Giay					0
Hung Loc*					8
Hieu Kinh*			4		0
Thoi Giao					4
Cam Tam					
Cam My			3		1
Gia Ray					4
Han Tamam					20
Binh Quan*		25		42	42
Phuong Tho*		1	6		27
Long Hiep*		25		42	42
Gia Xien*				5	35
Gia Tan*		3		25	19
Binh Hoa		1		41	15-20
Binh Loc					
Ben Non				41	60+

Number of gallons dropped = 1,015,275

Number of sorties f.o.w. = 298

\*Respondents from this village  
reported effects from herbicides  
for this year.

Table III-- D Number of Recordal Spray Missions and  
Approximate Distance to Village

Long Khanh Province - 1968

Village	Distances in Kilometers				
	0-2	2-5	5-10	10-15	15-20
Xuan Loc*			8		13
An Loc*					7
Tan Lap					3
Deu Giay					
Hung Loc					8
Hieu Kinh*		1	19		23
Tron Giao*					14
Can Tam					
Cam My				12	16
Gia Ray	2	7	0	3	15
Han Thuan					
Dinh Quan*			13	19	
Phung Tho*		2	8	12	
Dong Hiep*		2	11	7	
Gia Kien*					6
Gia Tan*					6
Binh Hoa*				8	9
Binh Loc					3
Ben Xom*					9

Number of gallons dropped = 262,130

Number of sorties flown = 60

\*Respondents from this village reported effects from herbicides for this year.

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Table III-- E Number of Recorded Spray Missions and  
Approximate Distance to Village

Long Khanh Province - 1969-1970

Distances in Kilometers

Village	0-2	2-5	5-10	10-15	15-20
Xuan Loc*					
An Loc*					
Tan Lap					
Dau Giay*					
Hung Loc*					
Hieu Ninh*					
Tran Gio					
Cam Tan					
Cam My					
Gia Ray					
Han Truan*					1
Danh Quan					4
Phuong Cho*					
Dang Miop					4
Gia Nhon				1	2
Gia Tan*				1	2
Danh Loc*				3	12
Danh Loc					3
Ban Nam*				5	13

Number of gallers dropped = 86,600

Number of sorties flown = 19

\*Esports from this village reported effects from herbicides for these years.

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Table III--P

Herbicide Missions in Relation to the Location of Hamlets  
in Kien Hoa Villages Where Data Were Collected  
[Using a 1 kilometer (0.6 mi.) Range]

Village	Hamlet	UTM Coordinates of Village/Hamlet	Date of Mission	Agent	Quantity (gal.)	
Phu-Tuc	Phu-Xuan	XS 300308/	1 Apr 1968	Orange	2000	
		XS 370395		Orange	2000	
Tuong-Da	An-Loc	XS 425385	10 Apr 1968	Orange	6000	
	An-Dinh	XS 442375	1 Apr 1968	Orange	6000	
Thanh-Trieu*	Phuoc-Thanh	XS 400380	10 Apr 1968	Orange	6000	
Thanh-Phong	Thanh-Loi	XR 835940	24 June 1966	Orange	2000	
	Thanh-Loc	760863	6 June 1966	Orange	2000	
	Thanh-Phuoc	770880	"	"	"	
	Giong-Dai	787904	"	"	"	
	Dai-Nhon	790917	"	"	"	
	Thanh-Loc	760863	27 May 1966	Orange	4900	
	Thanh-Hoa	760866	"	"	"	
Giao-Thanh*	Giao-Thanh	XR 767949	2 June 1966	Orange	4000	
		Giao-Hoa Cho	762934	"	"	"
	Giao-Thoi	XR 817937	23 May 1966	Orange	3700	
		Giao-Thanh	767949	"	"	"
		Giao-Binh	797950	"	"	"
	Giao-Tan	XR 753855	27 May 1966	Orange	4900	
		Giao-Hoa B	760913	"	"	"
		Giao-Loi	790958	"	"	"
Giao-Hoa B	XR 768913	6 June 1966	Orange	2000		
	Giao-Binh	797958	"	"	"	
Giao-Thanh	XR 767949	22 June 1967	Orange	2790		
My-Thanh	Cho-Hanh-Sao	XS 593300	1 May 1969	Orange	4000	
An-Nhon*	An-Binh A	XR 735941	22 June 1967	Orange	2790	
	An-Dinh	744923	"	"	"	
	An-Hoa	741934	"	"	"	
An-Binh B	XR . 050	12 June 1967	White	2400		
Chau-Hoa	Phu-An/P.-Thuan	XS 634302	25 Apr 1966	Orange	3000	
	Phu-Hoa/P.-Tri	XS 640294	"	"	"	
	Thoi-Hoa/T.-Tri	650286	"	"	"	
	Phu-An/P.-Thuan	XS 634302	13 Nov 1967	White	2000	
	Phu-Hoa/P.-Tri	640294	"	"	"	
	Phu-An/P.-Thuan	XS 634302	16 June 1967	Orange	6250	
	Thoi-Hoa/T.-Tri	650286	"	"	"	
Thoi-Thuan	658273	"	"	"		

Map coordinates are for each hamlet.

\*Villages for which HFPDS tape, aerial photos, ground photos and data collection on the ground are coordinated.



#### SECTION IV. BELIEFS ABOUT EFFECTS ON PLANTS AND ANIMALS

##### Introduction

This chapter is concerned with Vietnamese beliefs regarding the biotic effects of herbicides. It follows logically the previous chapter describing exposure in the two provinces and one refugee village which are the subjects of this study.

In most cases we are unable to gauge the validity and accuracy of the belief patterns. In some instances, however, it is possible to make comparisons with knowledge based on experimental studies, and in others, data from multiple independent sources can be assembled to produce evidence for or against a particular belief. Where these matters appear to be important, we shall comment in the course of the reporting. In general, the behavior of the people interviewed, together with the content of what they said, gave us the impression of frankness and an effort to be accurate.

It should be noted that the wording of the descriptions of biotic effects are translated and summarized from comments by farmers and provincial officials who have little acquaintance with botany and physiology. The terms we have chosen are selected to represent the layman speaker's meaning and not to fit scientific conceptions. There are numbers of places where it would be appropriate to insert the word "sic."

General references are made in this section to the number of reports on certain crops obtained during interviewing. Such do not necessarily indicate accuracy of data, but do suggest by their variation the relative

economic importance of the crops and the extent of their production.

#### Effects on Vegetation

##### Fruit

In all areas studied, herbicidal damage to fruit trees was undoubtedly the most commonly reported, and the item about which there was the greatest consensus. The resultant losses also appeared to cause the most hardship and create the most complaints.

A number of people believed sensitivity to herbicides to be associated with "the amount of sap" a given type of tree contained, offering this as a rough rule of thumb by which one could predict how sensitive a particular type of tree would be. "Amount of sap" apparently referred to evident succulence.

Papaya was reported to be the most sensitive of all fruit trees. Many farmers believed that a very small amount of herbicide spray carried by the wind could cause death to this tree. Damage was reported to be 100% in affected areas. It was reported that after exposure to herbicides, the tree usually died from the top down. The leaves frequently turned red, became dry as if burned and fell from the tree. Fruit was seldom produced and there was no recovery to the tree.

Coconut trees were believed to be less sensitive to herbicides than papaya, but exposure was said to have had some effect in all cases. Such reports emanated from both provinces and the refugee village, but reports from Kien Hoa were considerably more numerous in keeping with the fact that this Province yields at least 50% of the coconut production for the entire country. Losses up to 100% were reported from some areas in Kien Hoa. The

effects were believed to vary according to exposure from direct spraying or from wind drift. Respondents said that trees sprayed directly died within one or two months, first taking on a burned appearance and losing all foliage. After a year or more, trunks rotted and sometimes fell to the ground.

The effects of herbicide drift upon coconut trees were typically described in the following manner: the young fronds dried out and fell. This was followed by older fronds and bunches of coconuts dropping from the lower portions of the tree. All this occurred from three to ten days after exposure. Certain trees were said to have acquired an unusual bend in the upper portion of the trunk. Sometimes after one or two years these trees would begin to grow again and the trunk would straighten up, but with the bend still visible, often with a large black scar near the bend. Reports varied regarding the productivity of such trees in subsequent years. Some trees were reported to bear no fruit, while others produced a non-edible fruit containing no liquid and only a thin layer of meat. There were a few reports of slightly affected trees regaining normal productivity or being altered only slightly in terms of their growth pattern.

Jackfruit trees were believed to rank second only to papaya trees in sensitivity. Most respondents thought that spray drift was sufficient to cause death to the trees, although one person held a different view and said that only direct spraying or a very heavy concentration of drift could destroy the tree. Reports of the extent of damage in affected areas ranged from 50 to 100 percent. No recovery of affected trees was reported.

Banana plants were thought to be less sensitive than papaya and jackfruit, but could be killed by drift as well as by direct spraying. In Kien Hoa, most

respondents believed that death came from one to three days after exposure, while in Long Khanh Province the reported time between exposure and death ranged from one to fifteen days. There were reports of plants affected by drift which did not die, but which produced abnormal fruit, commonly described as large, deformed, less sweet, and having an inferior taste.

Respondents from one village in Kien Hoa told us that they grew a variety of banana called "Xiem" which normally ripened in about one month. When sprayed, these bananas were said to have ripened in three days, were twice their normal size, and did not have the usual sweet flavor.

Respondents from the refugee village (Binh Duong Province) said that after an unspecified length of time the plant would break in half and fall to the ground. This occurred even when the plant was still green and alive. There were also reports from Kien Hoa and the refugee village of a normal fruit being produced by suckers growing from the roots of the older trees which had died from spray. In the village these new plants were said to grow better than the older plants, while in Kien Hoa one respondent claimed that the new fruit was not as tasty as before. Estimates of damage to trees in affected areas ranged from 40 to 100 percent.

For papaya, coconut, jackfruit and banana plants a very large number of reported effects were amassed from many different communities, indicating belief in serious damage. Other varieties of fruit, however, were mentioned less often and, when mentioned, the effects seemed minor.

Mango trees were reported in some cases to have been killed by spray and, in other cases, to have continued to live but to have failed to produce fruit after exposure.

Orange trees were reported to be sensitive to herbicides by only two respondents (one in Long Khanh and one in Kien Hoa). A district agricultural cadre was uncertain about this. He thought herbicides might have affected orange trees, but believed that much of the loss attributed by the owner of an orange grove to herbicides was, in fact, due to water which had drowned the roots.

Durian and rambutan trees were reported as affected in the refugee village and in Long Khanh. Those reporting thought that the trees, like most fruit trees, died from the top down, with the leaves becoming dry and red. The fruit was said to swell to abnormal size or lose "all of their liquid." One interviewee in Long Khanh said that from a distance the rambutan tree looked normal, but, when the fruit was lightly squeezed, a fluid was emitted and there was no flesh inside.

Tamarind, milkfruit and custard apple trees were cited by a few respondents as having suffered severe damage, but they gave no details.

Guava trees were reported as slightly affected.

Strawberries were believed to be severely affected.

Pineapples were thought to grow larger but to be less sweet.

Star fruit trees, lemon trees, and balloon vines were reported to be unusually resistant to the effects of herbicides by one respondent. In general, fruit trees which bear "sour" fruit were said to be among those trees least sensitive to herbicides.

#### Field Crops

Rice as the staple grain crop is grown under a wide range of conditions, according to different methods of cultivation, and with various times of

planting and harvesting. Beliefs about the effects of herbicides reflected this complexity, and a full analysis of the many variables involved would exceed our capabilities.

In Long Khanh Province where data were gathered from fifteen out of a total of nineteen villages, respondents from only five villages reported rice to have been affected by herbicides. Two additional villages were cited in official province agriculture reports as having been affected. In all these villages reports of damage to rice were restricted to the years 1967, 1968 and 1971. On the other hand, reports from these same villages describe damage to other crops (especially fruit trees and beans) in other years as well. While specific information on government control is not available for 1967, it is quite probable that the rice fields of at least four of the seven villages reporting rice damage in 1967-68 were located in contested areas. In one instance reports from two neighboring villages in one district stated that herbicide damage was heavy in 1968. Respondents from one village described damage to most crops including rice, while respondents from the other village reported damage to the same crops, but explicitly stated that rice had not been affected. Examination of spray missions conducted in the vicinity of both villages indicates that some differences did exist with regard to proximity of spray runs and possible degree of exposure (as measured by the number of spray missions and distance between the run and the village).

There was consensus among respondents in Long Khanh that the stage of plant growth at the time of exposure was crucial in determining the effect



of herbicide upon rice. They believed that if exposure occurred while the rice plant was flowering ("ra bong" - which we understood to mean for rice at the time of shedding pollen), damage was said to be severe with losses running as high as 70 percent. Exposure before or after that critical period was thought by many respondents to have little or no effect. It was reported that when rice was exposed to herbicides during the "ra bong", either no grains would be formed or the grains would in general be so small that harvesting was not economically feasible. Some plants were said to bend over, grow parallel to the ground, and then die.

Interviewing in Kien Hoa was done on a much more selective basis because of the nature of the spraying (see Chapter III, Section 2), the security conditions, and the existence of a large number of villages (over 100). Work was confined to 26 villages located in six of the Province's nine districts. Respondents reporting rice damage came from eleven different villages with at least one village from five of the six districts covered. It is perhaps significant that 10 of the 11 villages reporting rice damage were under National Liberation Front control when the spraying occurred. Unlike the Long Khanh respondents, those in Kien Hoa had a marked tendency to believe that herbicide would damage rice regardless of its stage of development. Some people thought damage was more severe if the rice was sprayed during the "ra bong" stage. It was also believed that direct spraying would kill the plants outright. The affected rice stalks were reported to turn yellow, become dry, then die within a week after exposure. On the other hand, several respondents indicated that damage to rice was usually marginal, particularly if the herbicide was carried by the wind.

One respondent in Kien Hoa reported that after the rice in his village had been damaged by herbicides, farmers planted another crop several months later. Rice stalks of this crop were much greener and higher than usual, signalling a bumper crop. At harvest time, however, many plants had only small grains or no grains at all, and the yield was reduced to only about one-quarter of a normal harvest. The following crop produced about one-half the normal yield, and it was not until the third crop following the spraying that the yield returned to normal.

The respondents in the refugee village believed in effects similar to those reported from Kien Hoa, namely that rice is affected anytime it is exposed. Rice sprayed prior to "ra bong", they said, did not develop grain; if exposed after this stage, the grain still might not appear, or if it did, the size was never normal.

Soy (dau nanh), black (dau den) and mungo (dau xanh) beans were all thought to be similarly affected, and in no cases were beans reported as resistant to herbicides; indeed, some respondents believed them to be the most sensitive plant. The Province Annual Agricultural Report also mentions soy beans as being most sensitive.

Damage was reported to be rapid. The affected plants were described as abnormally twisted, drooping and with dried looking leaves; in some cases, the plants looked normal but simply failed to produce any beans. Estimates of damage ranged from 50 to 100 percent. There were few reports of damage to beans in Kien Hoa and the refugee village where they are of minor economic importance.

Manioc was reported to have been seriously damaged in Long Khanh and in the refugee village where it had moderate economic importance and was

grown for home consumption as well as cash. In Kien Hoa it is grown only for home consumption and only a few respondents mentioned damage. Plants exposed to herbicides were described as being stunted and having dry and red leaves. According to the people in Binh Hoa, the root of the manioc plant either did not form or never reached a normal size and sometimes it would rot. Respondents also noted that the flesh of the plant looked black and was inedible.

Peanuts were mentioned by numerous respondents in Long Khanh Province as a crop affected by herbicides, but in no case was damage described as extensive or serious. Some respondents noted that the effects of exposure depended upon the stage of plant growth. It was believed that if the plant were exposed prior to peanut formation, it was likely to die within a few days, with loss of leaves and general drying up. If contact occurred after the nut was formed, several variations in growth were reported as taking place: 1) the shells became abnormally large, but no other effect, and 2) the large shells were accompanied by abnormally small peanuts. Reports from respondents in the refugee village are nearly the same as those from Long Khanh, with the exception that there were some reports of abnormally large shells with no peanuts at all.

Peanuts are not commonly grown in Kien Hoa and were not mentioned by our respondents there.

Sweet potatoes were reported by individuals in both the refugee village and in Kien Hoa to have been damaged. The descriptions of effects were similar to those for manioc. In addition, there was mention of the leaves of the plants becoming dry and turning red, and sometimes the potato was not formed. Potatoes which did form were reported to have a loose

outer skin as if already cooked, and they were considered inedible.

A number of other crops, grown for home consumption as well as cash, were mentioned by a small number of respondents as having been affected in some manner by herbicides. We shall list these simply by name: swamp cabbage (rau muong), squash, hot pepper, citronella and tobacco.

Crops and other plants reported to be resistant are: corn, coffee, sugar cane and bamboo.

#### Timber

Loggers and sawmill operators as well as district and provincial water and forestry officials were interviewed about the effects of the spraying upon the forests in Long Khanh. Estimates of damage to the major forest areas of Dinh Quan District ranged from 15 to 50 percent, with the lower estimate generally given by civil servants and the higher estimates given by private citizens associated with logging. One logger described several areas approximately one kilometer wide and 10 to 20 kilometers long as being completely destroyed.

Herbicide damage was mentioned as being a key problem to loggers and sawmill operators. Loggers noted that trees killed by herbicides were a dangerous hazard to movement in the forest. One sawmill operator stated that timber affected by spraying would splinter and fly apart when going through the saw. We were told that this led sawmill operators to refuse to purchase such logs.

Loggers believed that the taller trees were affected first and these formed a shield for the shorter trees, thereby reducing to some extent the amount of spray received by the shorter trees. The leaves were said to react first to the spray, taking on a burned appearance and then falling

within three to four days. Consensus was that depending upon the size of the tree, it usually took from six months to two years for it to die.

Reports on natural reforestation could only be obtained from the loggers since security conditions prevented government officials from travelling into the wooded areas. According to most loggers, reforestation was not taking place in areas cleared by spraying. Scrub trees, bamboo and other vegetation were described as rapidly taking over such land, thereby preventing the re-growth of timber trees. One logger reported that tree seedlings of the same type found in the mature forests were sprouting, but he felt it would be at least fifty years before they would be ready to cut.

No less than six hours were spent by the members of our research team in helicopters flying over sprayed areas in Long Khanh. From the air, sprayed tracts were still visible and the grey-white tops of tall dead trees could be seen in many parts of the Province. Only a few completely cleared or barren pieces of land were spotted. Some of these were obviously made by loggers as part of their operations. Repeated flights were made over several sprayed tracts in an effort to determine if vegetation was growing. It was obvious that if vegetation and trees had been destroyed by the spraying, some sort of revegetation was taking place.

#### Rubber

Specific information related to the effects on rubber trees was obtained from plantation managers, province agriculture cadre and officials, as well as rubber tappers. In addition, the researchers made personal observations

in the field.

The informants all believed that plantations in Long Khanh had suffered damage from herbicide drift as well as direct spraying. Effects of exposure were said to vary by intensity of the spraying and the age of the tree. Young trees, under six years, were completely defoliated and died slowly. Some survived, but growth was not uniform. In particular, tree diameters were smaller than usual and little or no rubber could be collected. Trees estimated to be between eight and fifteen years old were reported to be more resistant than the younger trees. Surviving trees showed a decrease in latex production. It was estimated that six years would be required before these trees regained a normal pattern of growth and level of production.

Trees over fifteen years of age were described as being most resistant, but their production of latex was reduced by an average of 40-50% for a period of several years. When older trees were exposed to spraying, the leaves became dry and fell off and limbs at the tops usually died too. These trees were observed to show growth again after a relatively short period.

The rubber plantation officials stated that the latex production of affected trees was reduced for some years, while the Province Agriculture Chief maintained that trees were only defoliated and that latex production was not reduced beyond one season.

One of the research team was taken by a rubber plantation manager and shown one rubber growing area said to have been sprayed directly with herbicide in 1969, and another area which was said to have been damaged by drift. (It must be noted that both locations were pinpointed on a 1:50,000 map and at a later date compared with spray-map overlays. It was found that no flights were ever recorded as flying over the area claimed to have been sprayed

directly. Both areas, however, were within the range of drift (10-15 kilometers) as commonly reported by most respondents in the province.)

The site of the rubber plantation said to have received direct spraying was a relatively level plot of land estimated to be 50 hectares in size. At the time of the spraying the area was planted in rubber trees slightly over two years of age. The spray was described as killing all of the trees on the plot with the exception of a small stand of trees (5-8 hectares) located in the southeast corner. The plantation manager did not know exactly why these trees had survived, but he thought it was related to the flight path of the planes and the fact that these trees were planted at a later date and were shorter than the other trees. This, he speculated, resulted in the taller trees shielding the smaller ones and thus saving them. These trees appeared normal, except for some on the perimeter which had trunk diameters unlike the rest.

The plantation manager indicated that after the spraying the Americans arrived and established a fire base in the area where herbicide spraying had killed all the trees. In August, 1972, remnants of this base (rotting sandbags, shell casings and other debris) were observed.

After the fire base was abandoned, the area was again replanted in rubber trees. However, some stumps of rubber trees still remained in one section of the field along with a few stumps 3-4 feet high, bearing shoots but no main branches.

At the second site (said to have been damaged by drift), rubber trees were examined by the researcher and officials. All the young trees were reported to have been planted at the same time, yet most of the trees had different trunk diameters. These diameters appeared to vary in size from about three inches to as much as six to eight inches. No pattern in the variation in trunk diameter was discernable.

### Effects on Soil

Opinions regarding specific effects of herbicide on the soil varied in the two provinces and refugee village, but there was consensus that there were no prolonged residual effects. A slight majority of those interviewed in Long Khanh maintained that no residual effects at all were observed.

Others claimed that poor crops did occur in the years immediately following spraying because of something left in the soil. A substantial majority of the respondents in Kien Hoa reported no prolonged effects and that crops were normal in the years following herbicide exposure. One respondent, however, contradicted this.

Those interviewed in the refugee village were asked to provide more details about recovery than was the case in the other two provinces. They indicated that no permanent loss of soil fertility was observable, but that a waiting period was sometimes necessary before replanting. Estimates of the necessary time ranged from none at all up to one year. A few respondents claimed that crops grown on herbicide exposed soil did not grow so well as before, while a few others thought that crops grew better. When asked if crops could be replanted, about 60 percent said yes, most stating that planting could be started anytime from two to six months after spraying occurred.

### Effects on Animals

#### Poultry

It was the consensus of the respondents in both provinces and the refugee village that poultry had been affected by herbicides. Some individuals believed that exposure to spray alone was enough to cause illness or death, but most thought that poultry were affected only after



consuming feed or water contaminated by herbicides. Once affected, however, the poultry would eventually die. Only a few cases of recovery were mentioned.

Several officials at province, village and hamlet level in Long Khanh and Kien Hoa voiced reluctance to attribute death solely to herbicides. They said that similar poultry deaths had occurred before and after the period of herbicide use, and so they could not be certain about the role of herbicides.

Ducks were reported to be more affected than chickens and respondents in Long Khanh and Kien Hoa thought that this occurred because ducks were allowed to swim and feed in ponds and rice paddies which were likely to have been sprayed. Chickens, on the other hand, were raised near the farmers' homes and were less likely to consume contaminated water and feed. A village chief in Kien Hoa informed us that teal (a type of duck) had died after exposure. This was unusual, he said, since unlike chickens and other ducks which had died before and after the spraying, the teal had died only after the spraying occurred.

While symptoms described as being associated with exposure varied by province, three symptoms were commonly cited. Within a few days, poultry would contract diarrhea, lose their appetites and appear sluggish. Poultry ingesting contaminated feed and water were said to die in about one week. Poultry which had spray particles fall directly on them were described as walking about as if "drunk." Less frequently cited symptoms were: scratching at skin, cracked skin, loss of feathers, vomiting blood, shortness of breath and white stools.

### Pigs

As in the case of poultry, the reports on pigs from Long Khanh, Kien Hoa and the refugee village tended to be quite similar. We were informed that some pigs died and others only became ill for a short time. Resistance was thought to be related to physical condition and age. The older and stronger pigs were said to be less affected than the young and weak.

Three symptoms were commonly cited by respondents in all three areas: vomiting blood, loss of appetite and diarrhea. These symptoms were believed to appear within several days of the ingestion of contaminated material. Some pigs were reported to have died three to four days after such ingestion. Two other symptoms reported only in Kien Hoa were: cracked skin with watery emission, and excessive salivation.

A few village officials stated that death could not be positively attributed to herbicides since prior to any spraying pigs had also died. At that time the cause of death was attributed to a sensitivity to the weather. After herbicides became known, all deaths were blamed on the spraying.

Respondents in Gia Kien and Gia Tan Villages of Long Khanh Province, reported relatively heavy losses and believed these due to pigs killed through eating herbicide infected food.

### Cattle and Water Buffalo

There was general agreement in the areas we studied that cattle and water buffalo were seldom affected by herbicides, but a few cases of illness and death were reported. When either occurred, it was attributed to the ingestion of herbicides either in food or water or both. These animals were reported to show a loss of appetite and a reduction in weight, as well as an appearance of sluggishness and "laziness" for some unspecified time.

In Kien Hoa several farmers stated that the bellies of cattle were swollen after the spraying. This was attributed to the eating of contaminated grass. Farmers from one village in the same Province reported that the cattle raised in this village suffered from detached hoofs. They maintained that after the cattle had walked in grass or water sprayed with herbicides, the hoofs became detached from their feet. This took several days to occur. According to the people such an affliction had never happened before the spraying.

Respondents from Long Khanh and the refugee village maintained that buffalo and cattle had died after being directly sprayed.

#### Insects

Only few reports of effects on insects were obtained in Long Khanh, Kien Hoa and the refugee village. Those responding noted that the spraying usually killed the insects, especially those in the rice paddies. A number of people believed that while insects died at the time of spraying, they later returned in greater numbers.

#### Effects on Aquatic Life Forms

No one interviewed in Long Khanh Province reported that fish or other aquatic life forms in rivers, rice fields or ponds were affected by herbicides. Opinion among the refugees was divided between those who did not see any effects and those who said that fish had died. Affected fish were usually described in terms of size, not species, although one respondent named the following as being affected: trach (fresh water, eel-shaped fish), chep (carp), loc (fresh water fish usually found in rice paddies), long-tong

(fresh water fish shaped like a smelt but smaller), tom (shrimp) and oc (a snail which lives in rice paddies).

In Kien Hoa, fishermen from several villages in two districts bordering on the South China Sea were intensively interviewed for their ideas on effects. Most of those who fished in the sea agreed that herbicides had not affected fish. One fisherman did inform us that he had seen dead fish floating near the shore several hours after he had witnessed spraying in the vicinity. One chief of a fishing village commented that after spraying in 1965 about 50 percent of the salt water fish, crab and shrimp disappeared.

Fishermen who fished the rivers and smaller tributaries reported that immediately following any spraying many "finger size" fish, mullet and keo (fresh water fish, long body), were found floating on the surface of the smaller streams. A few dead fish were reported floating in the larger rivers several days after the spraying and one fisherman believed that after spraying, certain fish suddenly disappeared from the river. These were identified as gianq, rua, be and theo.\* The dead fish in the river were believed to have been killed by eating contaminated vegetation. One village chief stated that he had seen fish ponds in which dead fish were floating about one or two days after spraying.

Most of the fishermen interviewed believed that fish living in the sea and large rivers were less affected because the greater quantities of water would dilute the herbicides.

One farmer thought that fish and shrimp increased after spraying. He

\* We are uncertain about the description of these fish due to local variations in the terms for them.

attributed this to an increase in the food supply occurring when sprayed dead plants fell into the water.

### Conclusions

With regard to plants, there was general belief in the areas studied that papaya and beans are exceedingly sensitive to herbicides, and that coconut, jackfruit, bananas, manioc and sweet potatoes are highly susceptible. Other plants were considered sensitive and as commonly damaged, but at a lower level of susceptibility compared to those mentioned above.

Star fruit and lemon trees and balloon vines are believed to be highly resistant.

Rice is a special case with considerable range of belief about it. In general, most people believed it could be badly damaged during the pollen stage, but there was much less agreement about susceptibility at other stages. People in Kien Hoa and in the refugee village, for the most part, believed it could be damaged anytime.

We did not get expression of belief from people generally about timber and rubber. It seems evident that much timber has been destroyed, but that the matter is more equivocal with regard to rubber.

There appears to be a general belief almost everywhere that herbicides do no lasting damage to the soil, nor to fish in the large rivers and sea.

With regard to poultry, there is a common belief that chickens and ducks can become ill and die from eating food contaminated with herbicides. There is a similar belief about pigs, but they are thought to be less often affected. Cattle and water buffalo are believed to be affected only rarely.

## SECTION V. ECONOMIC IMPLICATIONS FOR AGRICULTURE

### Introduction

The results of our economic analysis are presented in two parts. The first part, Agriculture Productions and Herbicide Use, provides the reader with general findings for the provinces of Long Khanh and Kien Hoa, identifying those crops which suffered declines in production over time, possibly attributable to herbicide spraying. These findings were reached after data were examined for fluctuations in the agriculture statistics and any changes were compared to reports of damage by herbicide, particularly reports found in official records and in interviews with local officials. Also included is a series of four case studies of certain crops which appear to have had production trend changes linked to herbicide damage.

The second part, Economic Welfare, elaborates aspects of the information presented in part one in order to place in perspective the meaning of economic loss to different segments of the rural society and to provide some insights to the role herbicides may have played in the economic changes affecting these people. Three case studies are presented. The first covers the impact at the province level. The second examines the short term impact on households representing different economic levels (i.e., tenant farmer, small owner-operator) and the third discusses the situation of a specific producer -- the coconut grower in Kien Hoa Province. These studies are followed by comments related to the economic implications of the spraying at the national level.

The major problem we have faced in analyzing our economic data

was that of determining the individual impact of bombing, military operations, artillery, plowing, herbicide spraying, etc., on crop production. The existing data does not allow us to disentangle, with much precision, the effects of herbicide spraying from the various other factors coming to bear on production. We could not ignore, however, the fact that herbicidal damage was reported by officials and farmers as a significant casual agent in reducing production of certain crops. Therefore, we have confined our exploration of the subject to only those cases in which herbicide was "officially" reported to have been a contributing factor to the decline in production of certain crops.

The quality of the data on this subject varies considerably and allows us to examine the economics of the spraying in only the most rudimentary manner. Our data on production and herbicide effects are most complete for Long Khanh, where we obtained the annual agriculture reports (1964 - 1971) prepared by the province agriculture office. These reports were narrative and statistical in content. To these are added the national production records prepared annually by the Ministry of Land Reform, Agriculture, Fishery and Animal Husbandry Development in Saigon. We also had numerous interviews with officials and farmers in the province.

In the case of Kien Hoa we are much more limited since we can only rely on data extracted from the Ministry's yearbook and our interviews. In addition, between 1964 and 1972, large portions of the province were under the control of the National Liberation Front. One RVN official in Kien Hoa noted that in 1967 nearly sixty percent of the hamlets in the province were under NLF control and in December 1968, U.S. officials in Kien Hoa estimated that half of the population was living in NLF territory.

These facts raised questions of whether or not statistics provided in the Government of Vietnam's records include cultivated land and production under NLF control.

According to the Ministry's Agricultural Statistics Yearbook, "production and movement not subjected to the government control are not reported" in the book. If this is true, NLF land and production would not be included. USAID personnel, on the other hand, stated that the Agriculture Economics and Statistics Service had instructed Province Chiefs to include cultivated land in NLF territory in the provincial agriculture report. The response to this instruction was said to vary by province.

Based on what we know of territorial control by the Republic of Vietnam in Kien Hoa from 1964 to 1972, the statistics for crops appear to include land under the National Liberation Front. For example, RVN statistics show that the number of hectares of land in coconut remained steady at 20,000 hectares even during the years 1966 - 1969 when a substantial portion of coconut land was not under RVN control. Even if RVN records in Kien Hoa did include land under NLF control, there is no sure way of determining production in those areas. In the case of coconut, some estimates could be reached since farmers stated that they were allowed to harvest trees in NLF territory and to sell the nuts at the RVN markets. Most estimates, however, were actually arrived at through the process of predicting an average yield per hectare. There was practically no way that production from NLF controlled land could be checked by RVN officials.

Production in NLF territory is particularly important in Kien Hoa since spray map overlays show that flights were made over or close to villages controlled by the NLF. Respondents to our interviews who once



lived in NLF villages, stated that heavy crop damage was caused by herbicide in their villages. It is quite probable that spraying caused more damage to cultivated land under NLF control than under RVN control and that the degree of loss on the NLF side may never be known.

## Part I. Agriculture Production and Herbicide Use

### A. General Province Findings

Using data from the Long Khanh Annual Agriculture Report for 1967 an analysis over time was conducted of hectares planted, total production and yield per hectare for each crop. In general, most crops fluctuated between 1964 and 1966, but in 1967 practically all crops showed declines in that year. From 1968 to 1971 most crops showed steady increases in production, productivity and hectares planted.

A closer examination of the 1967 province report on agriculture statistics showed that more than eleven (11) different crops experienced declines. These were rubber, rice, soybeans, manioc, bananas, fruit trees (papayas, jackfruit, milkfruit, rambutan, etc.), tobacco, mungo beans, sweet potato, peanuts and corn.\*

According to the report, 1967 was generally a bad year for all crops in terms of hectares planted and productivity.\*\* Three main reasons were cited for the reduction in land planted and productivity.

1. The take-over of land by ARVN and Allied/U.S. forces for military purposes.

\* Statistics are kept separately on bananas and fruit trees. Fruit trees is an aggregate category comprised of various types of fruit bearing plants.

\*\* This is consistent with a statement found in a document written by the the Province Senior Advisor for Long Khanh in December 1967. "The steadily improving economic situation suffered a considerable setback from a decline in crop productivity during the past rainy season".

2. The Rome plowing of land along highways.\*

3. The killing of crops by herbicide spraying.\*\*

The extent to which each of these factors contributed to the overall decline of agriculture production is not stated in the report; however, in some cases, a percent estimate of damage or loss attributable to herbicide is provided. From the statements made in the annual report, it would appear that the first two reasons cited above contributed primarily to a reduction in cultivated land while herbicidal damage tended to affect productivity more.\*\*\*

Other information extracted from our interviews and documents and CORDS documents from 1967 point to additional factors affecting production. The 1967 agriculture report noted that unusual rainfall patterns, high winds and insects adversely affected crops. Farmers interviewed in 1967 stated that security was sometimes bad enough to prevent them from going to their fields.

The subject of herbicide damage to crops was discussed in the Long Khanh Annual Agriculture Report for 1964, 1965, 1967, 1968 and 1970.

\* Rome plowing generally reduced the amount of land planted in rubber or other trees, but at the same time, the cleared land was often planted in upland rice or various secondary crops. This was particularly true in 1969 - 1970.

\*\* In 1967, the greatest number of gallons of herbicide was dropped on Long Khanh and the most missions were flown over the province.

\*\*\* According to 1967 interviews conducted by CORDS personnel, herbicide damage apparently influenced some farmers to stop planting certain crops. Farmers at that time stated:

"The defoliant has damaged our crops during the past years, so we are discouraged to plant or cultivate the crop. There are only a few types of crops such as rice and beans which we have planted. We have a lot of land uncultivated".

Damage was first reported to papaya in 1964 and was said to have caused farmers not to replant the fruit. In 1965, herbicide damage and a reduction in the available labor force were cited as the main reasons for a decrease in fruit production, especially papaya and banana. The 1967 report presented herbicide damage as one of three major factors contributing to an overall reduction in production that year. Seven crops were said to have been affected. Later, some of these will be examined in more detail. Herbicide was referenced only once in 1968 for damage to vegetable greens and once again in the 1970 report for damage to rice.

The 1967 province report named seven different crop categories as having been specifically affected by herbicide. These were: 1) rice, 2) rubber, 3) soybeans, 4) manioc, 5) banana, 6) fruit trees, and 7) tobacco.

Reviewing our 1972 interviews with farmers and officials, we found that herbicide damage was mentioned for years as far back as 1962 - 1963. In every year from 1962 to 1971 damage to certain crops was mentioned. While the number and types of crops listed each year varied, generally different types of beans and fruits were most frequently cited as having been damaged. With regard to 1967, farmers and officials listed the same crops found in the agriculture office report, except for tobacco, but including mango beans and peanuts.

Using the data available in the Ministry's yearbook, an over-time analysis was conducted of production, productivity and hectares planted in Kien Hoa. Only two crops showed declines between 1964 and 1970. Fruit trees showed declines in production and productivity for the years 1969 and 1970. Coconut production and productivity experienced similar declines in 1968, 1969 and 1970.

Checking this information against our interview data on herbicide damage, we found that farmers and officials reported more than nine different crops as being damaged between 1965 and 1970. These crop categories were identified as rice, coconut, fruit trees, bananas, sweet potato, taro, peanuts, areca, vegetable greens and manioc. These reports claimed that 1967 and 1968 were particularly bad years for herbicide damage to fruit trees, bananas, manioc and sweet potato. Damage to rice was mentioned in every year, with 1967 and 1968 having the most citations. The consensus among officials, coconut farmers and coconut mill operators was that damage to coconut trees was apparent as early as 1965, but it was not until 1968 that a decline in productivity was noticeable, and that this was followed by a sharp decline in coconut production in 1969 and 1970.

B. Selected Crop Case Studies

B 1. Rice

In terms of land use and production, rice ranks as the most important food crop grown in South Vietnam. Interviews conducted in Long Khanh and Kien Hoa suggest that rice was affected by herbicides, consequently a brief assessment has been made of the impact on rice production in these two provinces.

In the case of Long Khanh, data on rice have been drawn primarily from the annual agriculture reports prepared by the agriculture office for the years 1964 to 1970. We found that statistics for rice hectarage and production in Long Khanh, as presented in the national statistics prepared by the Ministry of Land Reform, Agriculture, Fishery and Animal Husbandry Development differed greatly with the provincial reports for certain years.

It was our own decision to accept the provincial figures rather than the national statistics as reflecting more accurately the actual situation. This decision was based primarily upon our appraisal of the competency of the province Agriculture Chief. The Agriculture Service Chief had been in his position for over eight years and proved to be a quite knowledgeable person about the provincial situation as well as agriculture. Considerable cross-checking of information provided by the Agriculture Chief indicated that a high degree of confidence could be placed in the reports emanating from his office.

According to the province reports for 1964 to 1970, rice production increased each year except in 1966 and 1967. In order to assess the difference in annual yield, a base mean was devised using the yield per hectare data for the years 1964 - 1970. Production in 1966 was 68 percent of the 1964 - 1970 mean and declined to an even lower figure of 42 percent in 1967. 1967 is not the only year in which the national statistics and province level statistics on rice differ, but it is the year when the difference is the most striking. National figures for Long Khanh in 1967 show that 4,000 hectares were planted in rice (wet and upland) and 8,800 tons of paddy rice (2.0 tons/hectare) were produced. Province statistics, on the other hand, show that approximately 4,900 hectares were planted and the yield was 3,800 tons of paddy rice (.7 tons/hectare) or 5,000 tons less than reported in the national statistics.

The Rice Situation - 1967\*

<u>Type of Rice</u>	<u>Area Planted</u>	<u>Production (Tons)</u>
Dry Rice	3,694 hectares	2,912 tons
Wet Rice	<u>1,231 hectares</u>	<u>970 tons</u>
Total	4,925 hectares	3,882 tons

From 1968 through 1970, rice production rose sharply to a level well above the production average for the 1964 - 1970 period. This increased production was attributable to the introduction of IR rice varieties which began in 1968 and the cultivation of new rice lands. Even with increased production, Long Khanh has never been a rice surplus province. The province reports point out that rice has been "imported" to meet local needs. Unfortunately, such "import" figures were not always included in the reports. This is true of 1967. Apparently, a general rule was followed in order to determine rice needs. Enough rice was to be brought into the province to provide 400 grams of milled rice per capita per day. This is about 150 kilograms of milled rice per year\*\* or 240 kilograms of paddy rice per person per year.

\* Translated from 1967 Long Khanh Annual Agricultural Report

\*\* Sansom (1970) cites a National Institute of Statistics survey in Saigon and six other areas in South Vietnam, conducted from April 1962 - March 1963, which showed a daily per capita rice consumption of 318 grams in Saigon and 440 grams in the rural areas. Robert L. Sansom. The Economics of Insurgency in The Mekong Delta of Vietnam. MIT Press, Cambridge, 1970.

The Long Khanh Annual Agriculture Report for 1967 and 1970 are the only reports which specifically mention the effect of herbicides on rice. They state that in 1967 rice crops were affected by "herbicide chemicals" and the damage ranged from 30 to 100 percent. Rice productivity was reported to have dropped sharply and several cases were presented as examples. Hieu Kinh village reportedly suffered a 90 percent decline in production. The rice was said to have been exposed during the plants' "pollen formation stage". Rice grains were described as smaller than usual and often shriveled. Some plants never formed grains at all. Bao Ham hamlet (Ham Thuan village) was said to have experienced a greater than 60 percent loss. Yield per hectare was placed at an average of 400 kilograms. Normal yield was usually between 2000 and 3000 kilograms per hectare.

Our own interviews and the interviews conducted in 1967 by CORDS personnel were checked for reports of rice damage. CORDS' documents dated December 1967 present a number of quotes from Long Khanh farmers in which they state that rice was affected by the spraying. Our own interviews mention rice damage, but no respondents from the villages named above gave 1967 as a year when herbicide affected rice. Some reports by farmers of rice damage in 1968 were probably related to the harvest of the 1967 crop since some farmers actually harvested in early 1968 crops which were planted in 1967.\*

While it can never be proven conclusively that herbicides affected rice production in 1967, there is considerable evidence which suggests

\* Agriculture records for rice, however, apply to the year in which the rice was planted, not harvested.

that it did. Provided below is a brief account of what we were able to learn from our respondents and official documents:

- 1) In 1967 the greatest amount of herbicide was dropped on Long Kharh. A total of 1,015,275 gallons of herbicide was dropped. The three months of heaviest deposition were October (208,710 gallons), November (199,875 gallons), and December (92,900 gallons).
- 2) Areas sprayed in 1967 were primarily to the north of land cultivated in rice. During October, November and December, surface winds in Long Khanh were from the north (at an average of 8 kilometers/hour) blowing toward the rice fields.\*
- 3) Approximately 75 percent of the rice land in 1967 was planted in upland (dry) varieties and the remainder in local (wet) rice varieties. If planted at the regular time, the upland rice reaches the pollen formation stage at some point between mid-October and mid-November. The wet rice varieties would reach pollen formation stage between mid-November and mid-December.
- 4) The 1967 agriculture report and reports by farmers indicate that the rice yield was very low and that plants either had no grain or the grain was shriveled and smaller than usual.

This particular phenomena is likely to occur if the rice is

\* According to Joint Munitions Effectiveness Manual (December 1971), "sufficient amounts of agent to damage crops have not been found to drift more than one-half (1/2) mile from the release point in the upwind or crosswind directions. However, substantial drift may occur downwind from the release point". Downwind is the key word here.



exposed to herbicide during the pollen formation stage.\*

While a meaningful analysis of the impact of herbicides on rice production in Kien Hoa cannot be made since most of the necessary information is not available, a few comments should be made on the subject.

Agriculture statistics in the Ministry yearbook showed that figures for land cultivated in rice fluctuated for various years between 1963 and 1970. Rice hectares declined considerably in 1966 and 1967, but began to increase from 1967 to 1968 on. Dips in production usually corresponded to periods of reduced land cultivation. A significant increase in rice production occurred in 1967 and 1968 probably as a result of the introduction of some IR rice varieties. When the changes over time of rice hectarage are compared with the general flow of the politico-military situation in the province over the years, it is possible to discern a rough correlation between hectarage recorded and territory controlled. The decline in hectarage in 1966 and 1967 coincides with the push at that time by the NLF to take over hamlets. This movement, begun in 1964 - 1965, gained momentum in 1966 and reached a peak in 1967 and early 1968. In the Spring of 1968, RVN forces began their Accelerated Pacification Campaign and gradually gained territory.

Herbicide damage to rice was reported by officials and farmers for every year from 1963 to 1971. The years of most frequent citation were 1967 and 1968. A unique characteristic of the reports on rice damage was the unusually high number of villages in which rice was said to have been damaged

\* See M. G. Srivastava, "Effect of Hormone Herbicides on Paddy"; Proceedings of the Institute of Sciences of India, Vol. 24B, No. 5, 1968.

when the village was under the control of the National Liberation Front. In Kien Hoa, we collected information on 26 villages. Fourteen of these villages had been under NLF control for one or more years between 1964 and 1971. A total of 11 villages were reported as experiencing damage to their rice crops and of these 11, 10 had experienced damage while under NLF control.

While it is possible that rice land under NLF control was included in the RVN agriculture statistics, it is doubtful that decreases in rice production from NLF land would have been recorded in the RVN statistics.

It is quite probable that these losses will never be known.

B 2. Soybeans

Soybeans are grown in over half of the 45 provinces in South Viet-Nam. Long Khanh Province has accounted for nearly 50 per cent or more of the national total output between 1964 and 1971. The soybean crop is important to Viet Nam because the beans are a prime source of protein supply.

The province agricultural reports place the productivity of soybeans in Long Khanh at its highest in 1966 (1.3 tons/hectare) and at its lowest in 1967 (.3 tons/hectare). Production in 1970 was up to 1.2 tons/hectare. As is found for most other crops in Long Khanh for 1967 there was a marked decline in land planted and in production. The 1967 report attributes this decline directly to heavy damage caused by herbicides. The report described soybeans as being particularly sensitive and that entire fields were completely destroyed by the spraying. It added that the average yield per hectare in 1967 varied between 300 and 700 kilograms as compared to 2,000 kilograms in 1966.

Another aspect to the effects of herbicides was the possibility that farmers would shift to crops thought to be less sensitive to herbicides. Interviews conducted in 1967 by CORDS personnel with farmers from Long Khanh quote a number of farmers as expressing a reluctance to plant soybeans again. In our own interviews in 1972, respondents from several villages stated that farmers shifted from planting soy beans to planting corn or other crops thought to be resistant to herbicides.

This information was checked against the province agricultural records for 1968 and it was found that the amount of land planted in soybeans increased by about 500 hectares. There was no significant increase in the number of hectares planted of any other crop. It is possible that farmers shifted hectarage to several other crops. In that case the shift would have been less noticeable. It is also

conceivable that the number of hectares planted in soybeans in 1968 would have been greater if herbicide had not affected the 1967 crop.

Overall it would appear that the decline in soybean production experienced in Long Khanh in 1967 did influence national output, but only for that year. As province production increased in the years 1968-1972, so too, did national output.

Soybeans are a very minor crop in Kien Hoa consequently no effort was made to examine any effects on production possibly resulting from herbicide spraying.

### B 3. Fruit

Long Khanh and Kien Hoa are not major fruit producing provinces, however; within each province the total number of hectares planted in fruit ranks high in comparison to other crops. Long Khanh farmers grow no less than ten different types of fruit: banana, papaya, mango, durian, rambutan, jackfruit, orange, lemon, mandarin and pomelo (grapefruit). Several of these fruits, such as banana and papaya are raised primarily as cash crops.

The Long Khanh agriculture reports discuss banana and papaya as fruit trees even though they are considered to be pseudo-stems. In addition, statistics on banana and fruit trees are recorded separately. After 1965, the statistics on hectareage and production of fruit trees were aggregated, consequently it is impossible to determine from the records the proportion of land and production for each type of fruit. Through interviews with farmers, agriculture cadre and village officials in Long Khanh, we were able to roughly estimate the breakdown. According to our interviewees nearly 60 per cent of the fruit trees planted were papaya. This was generally true up to 1969.

Agriculture statistics from the province records for the years 1964 - 1971 show that fruit production reached high points in 1964 and 1966 when a little over 830 hectares were planted and production stood at 11,547 tons for 1964 and 10,790 tons for 1966. The single most important feature of fruit production during this period is the drastic reduction in productivity - yield per hectare - experienced by fruit growers in Long Khanh during 1967, 1968 and 1969. Yield per hectare dropped from 13 tons in 1966 to 1.5 tons in 1967 and remained at 2.0 tons in 1968 and 1969.

Respondents in Long Khanh informed us that heavy losses were suffered by papaya growers in 1967, 1968 and 1969. Rambutan, jackfruit, mango and durian were also mentioned as being damaged. The 1967 province report related that

fruit production was down, but it did not say by how much. It did add that 30 per cent of the fruit trees in the province had been lost because of the spraying.

It is impossible to calculate precisely the loss in income suffered by the farmer during the low years of fruit production simply because we do not have the exact data.

Farmers in Kien Hoa raised fruit for cash as well as local consumption. Land planted in fruit trees ranks fourth in total hectareage behind rice, coconut and bananas. Kien Hoa records list coconuts, bananas and fruit trees separately and like Long Khanh, all the statistics on fruit trees are aggregated. Over a dozen varieties of fruit are grown: rambutan, durian, milkfruit, jackfruit, guava, papaya, custard apple, mango stein, lemon, grapefruit, mandarin, orange and areca nut (called a fruit in Kien Hoa).

Agriculture studies in the Ministry Yearbook revealed that Kien Hoa fruit farmers experienced a two year period in which productivity dropped by 60 per cent. The number of hectares planted in fruit trees in 1968 - 1970 differed by only 5 hectares, yet productivity dropped from 6.7 tons per hectare in 1968 to 2.8 tons in 1969 and 1970.

Farmers and officials reported fruit trees damaged by herbicides in every year from 1964 to 1971. Damage was most frequently cited for 1967, 1968 and 1969. Losses for these years were said to be heavy.

Evidence from Kien Hoa and particularly Long Khanh suggests that herbicide spraying was responsible for damage to fruit trees and that such spraying probably contributed to the decline in production experienced by farmers in the two provinces. The evidence also suggests that the duration of impact upon provincial production is longer than that resulting from seasonal crop damage since fruit trees normally take longer to develop and bear fruit. Once trees are killed or heavily damaged, it would

generally take more time than  
one growing season before production resumed. In the case of these two  
provinces, the period of low production lasted for more than one year.

#### B 4. Coconuts

Coconut trees are grown in two of the Republic's three major geographic regions, but 90% of the land planted in coconut is located in the seventeen Mekong Delta provinces. Of these provinces, Kien Hoa produces over 45% of the delta's output. Outside of the delta, only one province in the Central lowlands, Binh Dinh, produces a large number of coconuts. Binh Dinh's annual output has never been more than one-quarter of Kien Hoa's annual production. Information obtained from interviewees and records indicate that at one time Kien Hoa produced some 80 million coconuts a year or roughly 50% of the nation's total output.

There are three varieties of coconuts common to the delta region: Thailand coconuts (dua Xiem), common coconut (dua ta) and a variety known in Vietnamese as Dua Gan Quan which has a yellow colored nut that is considered the best of the three varieties. Trees generally begin to bear fruit some four or five years after planting and fruit is produced throughout the year. Some growers reported that the best harvest time for coconut in Kien Hoa was from December to June. During the other months coconuts are picked, but the number is said to be less. The number of nuts produced by each tree increases as the tree ages. A maximum of five to ten nuts are produced each month after twenty years. After thirty years a tree's productivity decreases somewhat but nuts are still produced until it dies. Coconut trees have been known to live for over eighty years. They are normally grown near a good source of water which, among other things, facilitates the annual packing of mud around the tree's base.



Coconut farmers interviewed in Kien Hoa worked holdings as small as 1.2 hectares and as large as 10 hectares. Farmers tended to plant 200 to 300 trees per hectare. Coconut growers do not plant coconut trees of the same age in one garden. They usually grow young trees between the older ones so that once the old trees cease bearing fruit, the younger trees are usually ready to bear. This particular feature of the cultivation was credited in Kien Hoa with saving many trees from damage by herbicides. Growers stated that the taller, older trees tended to protect the shorter and younger trees. Estimates of monthly yield ranged from 4 to 10 nuts per tree. Most stated that a one hectare plot would yield around 1000 coconuts per month.

The importance of the coconut to the rural Vietnamese becomes readily apparent when the uses of the tree and the nut are examined. The husk of the coconut is used for fuel while the nut portion yields not only the coconut meat, but also the milky substance within the shell. The milk is used as a drink or flavoring and the meat portion of the nut is eaten as food, or is sometimes used as bait by fishermen. When the coconut meat is dried (copra) and pressed, it yields an oil which is used for cooking and the production of homemade soap. Coconuts not used for family consumption or local use are sold to mills which process the nut into copra, oil and shredded (dry) coconut. The oil is sold to commercial firms in Saigon which produce cooking oil and soap. The dry shredded coconut is most often sold to the local feed shops, where it is mixed with bran and sold to farmers for hog and poultry feed.

Parts of the tree are also used. The roots can be used to make medications and that portion of the tree called the "heart" is edible. The wood of the tree is used in house construction and for furniture and other household items including shoes. In addition the coconut frond is

used as thatch.

Sometime during the 1930's the French introduced coconut to Kien Hoa with the intention of making it a major crop. The French apparently found that even though two thirds of Kien Hoa was seasonably affected by salt water intrusion, the coconut tree survived and flourished there. Coconut was considered to be a lucrative crop since the husk, copra and the oil could all be sold. In the early 1940's the French built a factory in Ham Phuoc village which processed the nut for its oil and copra. By the 1950's nearly 22,000 hectares were planted. This was said to be approximately half of the province's productive land at that time. Land devoted to coconut was said to be worth roughly three times the same amount of land planted in rice (at that time double and triple cropping of rice was not practiced).

It is significant to note that during the first Indochina War, the Viet Minh established several base camps in Kien Hoa. These camps were usually located in the large coconut groves since the trees provided excellent concealment and protection as well as food for the troops. In the years following, the National Liberation Front took over many of the old base areas and established some of its own. In so doing, the coconut groves were once again being used by combat troops. The obvious significance is that military activity was often focused on terrain covered with coconut trees and therefore the trees were frequently exposed to situations in which damage could easily occur.

Official statistics on land planted in coconut and production in Kien Hoa presents a picture of relative stability between the years 1961 - 1967. During that time harvested land remained at about 20,000 hectares and production fluctuated between 55 and 80 million nuts a year.

In 1968, production and harvested land decreased by about 30-35%. Output and harvested land increased in 1969 and 1970, but yield per hectare was below the 1967 level - 25 per cent below for 1969 and 52 per cent below for 1970. In 1972 there were approximately 15,000 hectares of coconut land harvested and officials estimated that 5,000 hectares either had been destroyed or were located in areas which could not be worked because of security considerations.

While the figures appear to indicate that new land was opened to coconut in 1969 and 1970, we found that little if any land had been planted - or replanted - in coconut for sometime. Increased land was attributed to already harvestable land coming under the control of the Republic of Vietnam. Decreases were likely a combination of trees taken out of production and land lost to NLF control or considered to be in contested areas.

The fluctuations in the official figures for 1968 - 1971 tend to correspond to some degree with the information received in interviews with agriculture cadre, coconut farmers and coconut mill operators. However, we found that the statistics for 1965<sup>b</sup> - 1967 are somewhat misleading. According to what we know about the politico-military situation in Kien Hoa between 1965 - 1967, it is unlikely that the coconut lands were

not affected during the take over of large areas of the province, by the NLF at that time. The information we received from farmers and village officials suggests that coconut land listed as planted in the RVN records was not always under RVN control, but that the coconuts were being harvested and sold in the RVN markets. Coconut farmers who once lived in National Liberation Front villages frequently stated that the NLF would allow them to harvest and sell their coconuts and then the Front would tax the farmers' returns.

The major producing areas remain along the Southern part of the Province Road 26, along Province Road 175, on both sides of the Ba Lai River, in Binh Dai district and in the vicinity of Tan Loi Village, Ham Long District. Parts of Mo Cay and Huong My districts, the Huu Dinh area and locations near Quoi Son and An Phuoc villages are still producing.

At one time, at least five coconut mills operated in Kien Hoa. As of October 1972 only two mills continued operations. According to interviews with mill operators and official province records, mills ceased to operate because of a shortage of coconuts available for processing. Coconut production was said to have begun its decline in 1968.

Interviewees at all levels, from farmers to province officials, reported damage to coconuts beginning in late 1962 and extending into October of 1972. Damage was attributed to herbicide, military ground action, air bombing, clearing of land by government troops and general neglect of the trees. Herbicide damage was noted in various years from 1962 to 1972, but the most extensive damage was reported during the years 1968 through 1970. Damage incurred in 1971-72 resulted primarily from the clearing of land by government soldiers.

Examination of Vietnamese provincial production and land usage records indicated that losses were indeed sustained by coconut growers in this period but the extent of damage resulting specifically from herbicides was not apparent. From numerous interviews conducted with coconut growers and coconut mill operators a rough picture of damage was pieced together.

Most of those interviewed claimed that when their trees were directly sprayed losses were nearly complete, but if trees were exposed through drift the damage was at the 60 to 70% level. Direct spraying of coconuts was commonly reported to have occurred in NLF controlled territory. Most individuals agreed that 1969 was the worst year for spraying. However, it would appear that effects of the 1969 spraying carried over into 1970 production as evidenced by a US province report which stated that in 1970 production decreased by 40% to 50% because of defoliation.

Growers and mill operators agreed that production began to decline after TET of 1968, but it was not until 1969-70 that growers experienced significant reductions in yield which they attributed to herbicides. Growers were careful to distinguish loss resulting from spraying and that resulting from the clearing of land by government troops.

as also reported that herbicides caused a substantial decrease in the total number of hectares planted in coconut. Because of the long period of time taken for coconuts to reach maturity, coconut growers were reluctant to invest in replanting of coconuts for fear of new herbicide operations. Other growers who refused to grow coconuts after 1967 did not return to coconuts until 1970 or 1971. The reported drop in hectareage by interviewees corroborates information found in the National Agricultural Statistics Yearbook as seen in Table V-1.

Because Kien Hoa accounts for at least 45 per cent of Viet Nam's coconut output, most changes in output and hectareage harvested at province level are also reflected in the national statistics on coconut. This also applies to coconut by-products, particularly copra.

Examination of statistics for coconuts produced and the export/import of copra are quite interesting since Viet Nam changed from a copra exporter to a copra importer at the same time that Kien Hoa began to experience reductions in its coconut production. Between 1961 and 1967 Viet Nam exported copra cake. Exports reached a peak in 1965 of 8,856 tons and by 1967 had fallen to a low of 100 tons. In 1968, Viet Nam began to import a substantial quantity of copra cake and by 1970 was importing 4,068 tons - a little more than it had exported in 1963. Viet Nam in 1970, was not only importing copra cake, but it was paying more for the imported copra than it had made from exporting its greatest quantity of cake in 1965. In 1965 8,856 tons of copra valued at over 18 million piastres was exported while in 1970 Viet Nam imported half that quantity and paid almost 47 million piastres for it.

The data on coconut production at the province and national level is strong enough to suggest the following:

- 1) Herbicide was probably the most significant factor affecting the production of coconuts for 1969 and 1970.
- 2) Reduced production in Kien Hoa also means a reduction in the Nation's total output for 1968 to 1970.

3) Reduced production appears to be related to the shift from copra exporting to copra importing which began in 1968.

Table V-1

NATIONAL COCONUT STATISTICS										
ITEM	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
1,000 nuts NUTS PRODUCED	153,420	168,528	146,405	140,875	147,330	129,460	130,500	110,705	98,545	118,450
HECTARE	42,340	43,420	43,830	41,580	40,390	39,015	38,110	29,905	32,985	32,250
NUTS PER HECTARE	3,623	3,881	3,340	3,388	3,647	3,318	3,424	3,701	2,987	3,672
COPRA CAKE EXPORTS (TON)	2,952	4,591	4,051	5,362	8,856	6,355	100	-	-	-
COPRA CAKE IMPORTS (TON)	200	11	1	-	100	3	3	771	1,965	4,068
1,000 Piasters VALUE OF CAKE EXPORT	5,320	8,600	9,995	12,686	18,322	22,235	536	-	-	-
1,000 Piasters VALUE OF CAKE IMPORT	224	22	2	-	114	76	76	9,089	22,427	46,879
PRICE PER TON OF CAKE IMPORTS	1,120	2,000	2,000	-	1140	25,333	25,333	11,788	11,413	11,523
PRICE PER TON OF CAKE EXPORTS	1,802	1,873	2,467	2,365	2,068	3498	5,360	-	-	-
KIEN HOA COCONUT STATISTICS										
1,000 nuts NUTS PRODUCED	70,000	80,000	55,000	58,000	68,000	60,000	65,000	42,600	31,400	31,500
HECTARE	20,000	20,000	20,000	19,880	20,000	20,000	20,000	12,000	15,000	15,000
NUTS PER HECTARE	3,500	4,000	2750	2,917	3,400	3,000	3,250	3,550	2,093	2,100



### C. Conclusions to Part I

A. At the province level, the impact on production was both short and long term in duration. Our data strongly suggests that heavy herbicide application combined with war damage and bad weather resulted in measurable reductions in Long Khanh in 1967. The case of Long Khanh in 1967 is clearly atypical since during the years 1968, 1969 and 1970, herbicide was also being sprayed on the province and the production of almost all crops was on the rise in those years. A reduction in production lasting more than one growing season was visible in the case of fruit trees in Long Khanh (1967 - 1969) and Kien Hoa (1969, 1970) and for the case of coconuts in Kien Hoa (1968, 1969, 1970). The impact on coconut production was probably the most significant because income loss tended to extend over a period of several years and resulted not only from direct damage to the trees, but also from a decline in coconut land value.

B. Based on the examination of crop production in the two provinces studied, little can be stated regarding the economic impact at the national level. In this study, the production of only two crops was found to be related to national production levels. These were soybeans and coconuts. The data suggests that the reduction in the production of soybeans in Long Khanh Province probably adversely affected the total national production for that year. Our findings on coconut production point toward a possible long term effect on the nation in terms of the availability of coconut products for internal consumption and for export. Here too it must be stated that herbicides alone were not responsible for the losses sustained, but they certainly contributed along with damage due to war and natural causes.

Summarized below is the information on the impact at the province and national levels by duration and type of crop affected.

SHORT TERM (One Growing Season)

Province Level

Rice - (Long Khanh 1967 and possibly Kien Hoa)  
Soybean - (Long Khanh 1967)  
Manioc - (Long Khanh 1967)  
Banana - (Long Khanh 1967)  
Tobacco - (Long Khanh 1967)

National Level

Soybean - (Long Khanh 1967)

LONG TERM (More Than One Growing Season)

Province Level

Fruit Trees - (Long Khanh 1967, 1968, 1969;  
Kien Hoa 1969, 1970)  
Coconut - (Kien Hoa 1968, 1969, 1970)

National Level

Coconut (Kien Hoa 1968, 1969, 1970)

## Part II. Economic Welfare\*

### A. Orientation

This section attempts two tasks: first, to estimate the piaster value of the loss output by combining price estimates with the output effects of the previous section; and, second, to interpret a given piaster loss in terms of economic welfare. Our focus will be on relative rather than absolute loss. This provides a meaningful standard of comparison as well as reducing the distortions induced by imperfect data. Our questions will be of the form: "By what percentage is the standard of living reduced from that which might have prevailed in the absence of herbicides?"; "How critical is this loss?"; "Does it represent foregone luxuries or does it drive individuals below the subsistence level or into debt?".

In judging welfare changes we must not neglect the compensating effects of induced economic activity--farmers affected by herbicides may find alternative employment, shift to animal husbandry, borrow, receive relief and foreign aid, etc. Such secondary-offsets reduce the primary impact. On the other hand, the net result of these two factors is magnified by a tertiary multiplier effect--reduced farm output affects retailers and wholesalers of farm output as well as sellers and producers of consumer goods and services.

A given absolute loss may have a very different impact upon economic welfare depending upon its distribution. We must therefore pay separate attention to the national, provincial, village and household levels. For the household, a given burden has very different implications depending on whether it falls on laborers, tenants, small owner-operators, large

\* This section was prepared by Leroy Jones.

owner-operators or landlords. In this regard it is crucial to distinguish between plantation crops (rubber and coffee), cash crops (soybeans, manioc) and crops which are both cash and subsistence (rice, fruit, vegetables).

A final distinction must be made as to whether the impact is short or long term. The majority of the crops affected are annuals and loss is limited to a single harvest. For the perennials--rubber, coconut and timber--the effect is spread over many years and a more complicated analysis is required. Rubber is a French dominated plantation crop, and timber is a commercial venture run from the towns. Since the focus of our research was on villages, effects on these two products will be dealt with in a rather perfunctory manner.

The effects on perennials will be illustrated by a case-study of coconut production in Kien Hoa. Provincial and household effects of losses of annual crops will be dealt with by intensive examination of Long Khanh Province in 1967.

A major caveat must be stressed at the outset: only "order-of-magnitude" answers will be attempted. Serious data limitations preclude definitive results and shift the method of inquiry from sophisticated economic analysis to indirect inference via judicious sifting of partial evidence.

The data limitations are of three sorts. First, there is a total absence of some economically relevant information: e.g., land-holding patterns and provincial income and income distribution in Long Khanh. Second, those statistical series which are available (prices, production, hectarage, etc.) are often most imprecise, with the possible exception of data relating to rice. Most importantly, it is simply impossible to factor out the

quantitative effects of herbicides from hectarage and yield reductions due to other war-related causes or to the natural effects of weather and insects. All of this is not to say that the quest is futile. It is merely to suggest that we shall have to remain agnostic on some issues and be content with rather general answers on others.

B. Illustrative Provincial Impact: Long Khanh

Long Khanh Province was among the most intensely sprayed regions of Vietnam, with 1967 the year of heaviest application.<sup>1</sup> It was the only year in which the official reports of the Provincial Agricultural Service list herbicides as a major influence on yields. It was also a year in which provincial agricultural output dropped dramatically. Long Khanh in 1967, then, is illustrative of extreme, rather than of average, provincial herbicide impact.

a. Value-Added in Agriculture

We first wish to determine the actual value of agricultural output and compare it with what might have been realized in the absence of war and natural disasters. A "Normal" value of output is compared with actual achieved output. This "Normal" value represents that return which would have been obtained in 1967 had record 1966 hectarage been planted and a mean 1964 - 1970 yield obtained. This is compared with actual achieved value of output and the loss attributed to either reduced hectarage or reduced yields. The results are summarized by crop in Table V-2. All recorded crops are included except rubber and 50 Hectares of "Cu San".<sup>2</sup>

Footnotes follow at the end of this chapter.

TABLE V-2

## ESTIMATED VALUE OF AGRICULTURAL OUTPUT IN

LONG KHANH PROVINCE, 1967

(In Thousands of Piasters)

Individual Crops	Expected Value of Output	Achieved Value of Output	Total Loss	Loss to Decreased Hectarage	Loss to Decreased Yield
1. Rice (unhusked)	193,868	51,732	142,136	72,547	69,589
2. Fruit	153,758	32,220	121,538	25,009	96,529
3. Mungo Beans	153,558	15,648	137,910	96,238	41,672
4. Soy Beans	122,051	52,600	69,451	-1,973	71,424
5. Manioc	115,120	12,616	102,504	63,538	38,966
6. Vegetables	73,274	2,060	71,214	64,927	6,287
7. Corn	58,894	20,790	38,104	29,245	8,859
8. Peanuts	45,153	7,776	37,382	20,858	16,524
9. Bananas	43,440	9,100	34,340	13,032	21,308
10. Coffee	40,903	57,001	-16,098	11,525	-27,623
11. Tobacco	19,320	36,700	-17,380	-33,102	15,722
12. Sweet Potato	16,897	804	16,093	13,441	2,652
13. Pepper	2,669	627	2,042	801	1,241
14. Sugar Cane	610	422	188	-91	279
Gross Value of Output	<u>1,039,520</u>	<u>300,096</u>	<u>739,424</u>	<u>375,995</u>	<u>363,429</u>
Less: Value of Intermediate Inputs	-175,375	-96,800	-78,575	-50,297	-28,278
Equals: Value added	<u>864,145</u>	<u>203,296</u>	<u>660,849</u>	<u>325,698</u>	<u>335,151</u>

This table has been produced by putting together pieces of information from a variety of sources and using them in the light of several assumptions. The bold figures have an air of undeserved certitude, without qualifying commentary. Therefore, to show how the table was constructed, one crop can be given as illustration. Let us take soybeans as such an example. In order to estimate the value (V) of the soybean crops in Long Khanh we need three components of data: 1) the hectares planted in soybeans (H), 2) the amount of soybeans harvested per hectare which is the yield (Y), and 3) the price of soybeans in the market where they are sold (P).

The reports of the Long Khanh Agricultural Service provide the number of hectares planted and the soybean yield given in milled tons. Thus, two components are available, and we have this information for 1964 through 1970. There are no data on the price of soybeans in Long Khanh prior to 1969. We need this information for 1967 if we are to estimate the effect of herbicides and other events that occurred that year. Examination of the monthly data for 1969 and 1970 show a natural lagged correlation between Long Khanh soybean prices and the price of soybean-paste in Saigon for which we do have data over a longer period of time. We therefore construct a Saigon soybean-paste price index and use it to project 1969 Long Khanh soybean prices back to 1967 and arrive at the estimate that soybeans cost 50,000 piasters per milled ton in Long Khanh in that year.

The expected value of soybean in Table V-2 consists of the computation of  $V=HYP$ , when H is the number of hectares planted in soybean in 1966 (2,845), and Y is the expected yield per hectare based on the mean yield of soybean from 1964-70 (.858 milled tons per hectare) and P is 50,000 piasters per milled ton. This equals 12,205,050 piasters or 122,051 in thousands of piasters as shown in the table. The achieved value consists

of the hectares planted in 1967 (2,891) times the yield for that year (.3638879\*) times the 1967 price of 50,000 piasters (=52,599,995) or 52,600 thousands piasters. The difference between the expected and the achieved is 69,451 thousand piasters which is shown as Total Loss.

The next task was to proportion the loss between that related to reduction in the number of hectares planted and that related to reduction in yield, the latter being the more important vis-a-vis possible herbicide effects.

Soybeans provide an unusual illustration in that the Long Khanh records show that there was actually a small increase in the number of hectares planted in 1967, and therefore the loss due to reduced hectarage is a negative value:  $dH(YP)$ , or  $(2,845-2,891) \times (.858 \times 50,000)$ , or  $-46 (42,900)$ , or  $-1,973$  thousand piasters. The decline in yield, however, is a positive value even though it is confined to the loss incurred on the achieved hectarage:  $dY(HP)$ , or  $(.858-.363) \times (2,891 \times 50,000)$ , or  $.4941121 (144,550,000)$ , or  $71,424$  thousand piasters (TP). Holding price constant, the Total Loss is composed of the yield term (71,424), plus the hectarage term (-1,973) which equals 69,451 thousand piasters. This approach gives, we believe, a reasonable approximation of the effect of 1967 events on the value of soybeans in Long Khanh.

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\* The calculations were done using a three digit number for the mean yield and a seven digit number for a specific yield. The reason for this is simply that some preliminary computation was done in Hawaii and the rest in Boston, and different conventions were used.



Given these qualifications, the table suggests that in normal times Long Khanh would have produced crops worth approximately 1 billion piasters (1,039,520 TP), but that in 1967 only one-third this amount was achieved (300,069 TP). Roughly half the loss was attributable to reduced yields (363,429 TP), and half to reduced hectarage (375,995 TP). Note that two crops--tobacco and coffee--actually increased in value (indicated by negative "loss" entries).

The gross value of output is not an indicator of welfare since it includes costs of purchased inputs such as seeds, fertilizers and insecticides. Netting out estimates of these input values leaves "value-added" which is a measure of monetary returns to labor (both explicit and implicit) and to the owners of land and capital. (Value-added thus corresponds to what is often called "Net" return and is simply the total revenue minus the cost of purchased inputs). Here the loss is even more dramatic, amounting to perhaps three-quarters of expected value, again with the loss attribution equally apportioned between reduced hectarage and reduced yields.

b. Role of Herbicides

We have already noted the impossibility of precisely identifying the quantitative role of herbicides in producing this loss. It is reasonable, however, to assume that herbicide effects were largely confined to yield reductions. Hectarage reductions were generally due to other war-related causes, primarily the insecurity of free-fire zones, military use of land, and Rome plowing. What portion of the yield loss is attributable to herbicides alone is unknown since 1967 was apparently a year of drought in Long Khanh (though not in the rest of the Republic). Since comparable yield losses due to weather and insects are historically recorded it is

conceivable that virtually none of the observed loss is due to herbicides. On the other hand, since the drought reported by the Agricultural Service was not severe enough to be identifiable in the records of weather stations in nearby provinces, it is also possible that most of the yield reduction is attributable to herbicides. All that can be said, then, is that reduced yields caused a direct loss of 35%-40% of expected disposable income (the 363,429 TP estimated as loss due to decreased yield is 38.8% of the expected value-added of 864,145 TP) and that provincial reports and interviews claim that herbicides were responsible for a major portion of this loss.

c. Provincial Income, Substitute Activity and the Multiplier

We now wish to examine the impact on total and per capita income to give some idea of the overall welfare loss. This is a particularly hazardous exercise at the hypothetical level since rural income studies for Viet Nam are virtually non-existent. However, some idea of the magnitudes involved can be derived under the following assumptions:

(i) Animal production: for RVN as a whole the value of animal production is roughly 65% of crops.<sup>3</sup> It is likely that Long Khanh is significantly lower than the average to begin with and that reduced crop output also reduces animal production because of lowered feed availability and earlier slaughtering.

We therefore arbitrarily assume value-added in animal husbandry to be about 40% of normal agricultural value-added.

(ii) Non-Agricultural Production: For Viet Nam as a whole, non-agricultural output is roughly twice that in agriculture.<sup>4</sup> Rural areas of course rely much more heavily on agriculture but

allowing for Long Khanh's high wage bill from timber and rubber, it is unlikely that non-agricultural value-added is less than that in agriculture as defined above. We illustratively assume value-added in agriculture equal to that outside of agriculture.

(iii) The only known attempt at estimating an expenditure multiplier for Viet Nam gives a figure of 1.82 nationally.<sup>5</sup> A provincial figure is naturally lower because of leakages into other areas, and we shall assume an illustrative value of 1.5. (This implies that a 100 piaster reduction in agricultural output induces a 50 piaster reduction in related non-agricultural activity).

(iv) Taxation: we ignore taxation since RVN taxation in rural areas is negligible. A study of 16 Delta Provinces showed that in 1967 total RVN taxation amounted to one chicken per capita.<sup>6</sup> NLF tax rates are extremely high (up to 35%) but the effective collection base in Long Khanh is unknown.<sup>7</sup>

Using these assumptions gives the results shown in Table V-3.

TABLE V-3

## ILLUSTRATIVE LONG KHANH DISPOSABLE INCOME - 1967

	<u>"Normal"</u>	<u>Achieved</u>
Value Added (million piasters)		
Crops	864*	203*
Animal Husbandry	346 <sup>1</sup>	300 <sup>3</sup>
Other	<u>1,210</u> <sup>2</sup>	<u>857</u> <sup>3</sup>
Total	2,420	1,360
Population	149,700	149,700
Per Capita Disposable Income (piasters)	16,166	9,085

- \* from Table V-2
- 1 = assumption i
- 2 = assumption ii
- 3 = assumption iii

Given our assumption, the absolute levels of these figures are probably low, and the cost is probably exaggerated since we have not made explicit inclusion of offsetting substitute activity. The results suggest a loss of disposable income on the order of 45%, of which half is attributable to yield reduction and some fraction of that to herbicides.

Are the above results plausible? A rough check is obtained by noting that the national average for per capita disposable income in 1967 was 19,000 piasters.<sup>8</sup> Assuming an urban income 50% greater than the national average, a rural average of 15,240 piasters is implied.<sup>9</sup> Farm income is naturally even lower, with Development and Resources studies putting it at 11,000 piasters in 1967.<sup>10</sup> This suggests that a normal harvest would have put Long Khanh above the rural average but below the national while the reduction resulted in a per-capita disposable income some 40% below the

rural average.

d. Welfare Implications

Does the loss described above represent a "critical" magnitude?

Comparison with the income studies (which will be described below) suggests that the approximately 9,000 piaster achieved disposable per capita income is roughly three times the subsistence level and that severe deprivation did not result on a province-wide basis.

An independent check on this conclusion is provided by inspection of per capita annual rice consumption in the province. This is obtained by converting provincial paddy production into its milled rice equivalent and then adding the substantial imports from out of province since Long Khanh is a rice deficit area. The resulting calculations appear in Table V-4.

TABLE V-4

PER CAPITA RICE CONSUMPTION

LONG KHANH

		<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
Long Khanh Paddy Output <sup>11</sup>	(1000MT)	12.5	13.5	9.5	3.5	13.5	12.5
Rice Equivalent <sup>12</sup>	(1000MT)	7.5	8.1	5.7	2.1	8.1	7.5
Imports <sup>13</sup>	(1000MT)	15.4	15.4	18.6	16.0	13.4	12.2
Total Available <sup>14</sup>	(1000MT)	22.9	23.5	24.3	18.1	21.5	19.7
Population (Thousands)		110.8	127.3	149.7	147.2	140.3	151.0
Consumption Per Capita (Kg)		208	185	163	128	152	130

Because of the cropping pattern in Long Khanh, the 1967 output of rice and several other crops affects consumption in 1968 so that the effects of reduced 1967 yields are felt in both 1967 and 1968 with the 1968 figure further reduced by the Tet Mau Than offensive. Taking the lowest figure

(1968) of 128 kilos per capita, and allowing for a 5% loss, means a per capita daily intake of 333 grams of rice yielding 1240 calories. This is low compared with the Vietnamese average (135-160Kg)<sup>15</sup> and with the RVN and NLF standard rations (150Kg)<sup>16</sup> but high compared to other Asian countries where the 1961-63 average was 115Kg.<sup>17</sup>

In sum, a severe loss in agricultural output resulted in a significant loss in disposable income and extensive belt-tightening but not, on the average, to severe deprivation. That the welfare loss was not greater may be attributed to the impact of the war in providing generally high agricultural prices and opportunities for non-agricultural employment.

e. Distributional Implications

The foregoing applies to the provincial average, but what about the extremes? Consider the plight of subsistence farmers in insecure areas or of slash-and-burn agriculturalists in the hills. Part of the reduction in output was a result of the r being driven from their homes. They became refugees and their loss was total. More germane to the present study is the effect on individual farm households, where loss was up to 80% of their crop. What is the impact of such a loss on tenant farmers or small owner-operators?

C. Illustrative Short-Term Household Impact: Long Khanh

We wish to examine the impact of decreased yields on the economic welfare of individual household units. We first define various prototype farming units and then examine the welfare effects of given reductions in productivity. Although the absolute magnitudes used are typical of Long Khanh in 1967, the relative effects are applicable to other provinces in other years. Ideally, we would also like to know crop distribution by farm size and tenure system. This would allow a statement as to how many

households might have suffered a given percentage drop in disposable income. In the absence of such data, we must be content with merely illustrating the effect on farmers who did suffer a given percentage loss, withholding judgement as to how many were in each category.

a. Prototype Farming Units

The welfare implications of decreased yields vary with the following factors:

- (i) Income level: the poor are less able to absorb a given absolute loss than the better-off. Accordingly, we will deal separately with the effects on farmers who under normal conditions would have been at the "subsistence" level and those who would have been at a "comfortable" level.
- (ii) Crop produced: Different crops vary in profitability, in the ratio of intermediate inputs to output and in the magnitude of lost yield. Sufficient data is available for only six crops--rice, sweet potatoes, manioc, mungo beans, peanuts and soybeans.
- (iii) Tenure form: for an owner-operator the whole loss in value added is concentrated on a single household, while for a tenant share-cropper, the loss is split between tenant and landlord households. For a fixed-fee renter or an owner-manager (utilizing hired labor) all the loss is concentrated on the owner of the organizing factor (labor in the first case, and land in the second) so that the relative effect is magnified. Fixed rental is not common in Long Khanh but we will consider each of the other three possibilities.

There are thus 18 prototype farming units combining the six crops and three

tenure farms. To illustrate different income levels, the calculations will be carried out for farms of one and three hectares. Households will be assumed to consist of seven members, the Southern Region's median.<sup>18</sup>

b. Crop Loss and Risk

Table V-5 shows the relative 1967 yield and the normal value-added percentage. Using soy beans again for the purpose of illustrating how the table was computed, it will be remembered that the expected soybean yield is .858 milled tons per hectare (this figure is the mean of yields for 1964-70 and we will call it the normal yield). The 1967 yield is .363+. The 1967 yield is therefore 42% of the normal yield. We estimate the normal disposable income from soybean by using studies carried out in the Southern Region. They indicate that the total revenue from one hectare owned by a farmer who plants it in soybean is usually 40,000 piasters and that the input cost for this is 12,500 piasters.<sup>19</sup> Thus normal value-added (or disposable income) is the total minus the inputs or the 27,500 piasters which will appear in the Table V-5. The Southern Region information is used because there is limited output price data for Long Khanh and no input price data. Rather than make piecemeal adjustments we decided to use the southern data as a coherent whole.



TABLE V-5  
CROP LOSS AND PROFITABILITY

<u>Crop</u>	<u>1967 Yield as % of "Normal"</u>	<u>Normal Value-Added Per Hectare (Piasters)</u>
Sweet Potatoes	22%	67,800
Manioc	24%	48,700
Mungo Beans	27%	41,100
Peanuts	31%	31,700
Soybeans	42%	27,500
Rice	42%	21,500

Note the striking inverse rank-correlation between the two series. The most profitable crops (on a per hectare basis) suffered the greatest reduction in yield. We will first attempt to explain this interesting empirical result and then point out its distributional implications.

Why would a farmer plant soybeans yielding 27,500 piasters per hectare rather than sweet potatoes yielding 67,800. One possibility is that he is economically irrational but a more sophisticated view takes risk into account. Thus a farmer would switch from soybeans to sweet potatoes only if the farmer had a higher expected value where expected value is crudely defined as the product of normal yield and the probability of achieving that yield. In equilibrium, then, simple microeconomic theory would predict that high-risk crops would show a higher normal return. This corresponds to the above results under either of two assumptions:

i. The 1967 crop loss was due to the natural factors known to the farmers and hence allowed for in their planting decisions, or

ii. Sensitivity to herbicides is directly correlated with susceptibility to normal weather and infestation loss.

Though the limited data precludes certitude, the second hypothesis seems likely for two reasons: first, the profitability ranking is uniform over time and space where herbicides were not a factor; and, second, as shown in Section V-A, the high-loss crops (particularly manioc) were described by our informants as being highly susceptible to herbicide damage. Thus it seems probable that normally risky crops were particularly susceptible to herbicides and that these were also the most profitable crops.

This result has distributional implications. It is well known that the rich bear risk more readily than those at the subsistence level. It follows that riskier crops were planted by the relatively well-to-do and that this class therefore suffered a larger percentage loss of income than the poor who chose more conservative cropping patterns.

c. Land Holding Patterns

The only available indicators of farm size and holdings in Long Khanh come from the Agricultural Census of 1960.<sup>20</sup> This gives the figures shown in Table V-6.

TABLE V-6

Farm Holding	1960 FARM SIZE	
	Southern Region	Long Khanh
Mean	1.7 Ha.	1.0 Ha.
Median	1 to 2 Ha.	1/2 to 1 Ha.

Nationally, the average farm size may not have shifted significantly between 1960 and 1967, but for Long Khanh such a generalization is impossible because new land was being cleared and total cultivated area more than doubled between 1960 and 1966. Further, the 1960 census gives no useable information on tenure status in Long Khanh since 93% of the holdings are listed unhelpfully as "other forms of tenure".<sup>21</sup> The most that can be said is that 1-2 hectare farm units are the most common, and tenancy is significant.

d. Impact on Prototype Farms

Before examining the results of the calculations, we need some means of relating disposable income to standards of living. Sansom's 1967 village study in Long An Province combines the NLF's hectarage based politic-economic ranking with his own income studies to suggest the indigenous ratings given in Table V-7.

TABLE V-7

INCOME LEVELS AND STATUS HOUSEHOLD<sup>22</sup>

## DISPOSABLE INCOME (Piasters)

Very Poor	Less than 10,000
Poor	10 - 30,000
Average	30 - 50,000
Above Average	50 - 100,000
Rich	More than 100,000

On this scale "subsistence" is somewhere in the 20,000 range for a family of seven. Reducing per capita rice consumption to 120Kg per year and buying the cheapest rice available would require approximately this amount.<sup>23</sup>

A "comfortable" level of income is defined by responses to the Stanford Research Institute's 1967 Hamlet Resident Survey which asked Southern Region farmers "how much land do you think is enough for your family to live on in an easily 'sustainable' way".<sup>24</sup> The modal response was 2-3 hectares and the median 3-4. Three hectares of paddy yields a disposable income of 65,000 piasters and we will define this as "comfortable". It lies in Sansom's "above average" range.

It will be recalled from Table V-3 that the achieved per capita disposable income in Long Khanh in 1967 was approximately 9,000 piasters. For a family of seven this is about 63,000 piasters, or as pointed out earlier three times the subsistence level. This province-wide figure does not, however, indicate the impact on different kinds of farmers.

We can now compare "normal" and achieved household income on the various prototype farm units as seen in Table V-8. Using soybeans again for illustration, we estimated earlier that the normal gross revenue from a one-hectare plot is 40,000 piasters and that the 1967 yield was

42% of the normal, or 16,800 piasters. What did this probably mean in terms of disposable income? We will assume that the farmer spent 25% less on input costs due to lower applications of fertilizer and insecticides in the later stages of production. Instead of spending the 12,500 piasters as required under normal circumstances in input costs mentioned earlier, he would have spent 75% of that, or approximately 9,300 piasters. Thus his disposable income in 1967 would have been 7,400 piasters, which reflects a 73% loss from his normal expectation of 27,500.

TABLE V-8

## ESTIMATED HOUSEHOLD DISPOSABLE INCOME IN 1967 FOR PROTOTYPE FARM UNITS (Plasters)

	1 Ha. (2.5 acres)		3 Ha. (7.5 acres)		% Loss of Disposable Income
	Expected	Achieved	Expected	Achieved	
<u>Owner-Operators</u>					
Sweet Potatoes	67,800	10,000	203,400	30,000	85%
Manioc	48,700	5,900	146,100	17,700	88%
Mungo Beans	41,100	6,600	123,300	19,800	84%
Peanuts	31,700	5,100	95,100	15,300	84%
Soybeans	27,500	7,400	82,500	22,200	73%
Rice	21,400	7,300	64,200	21,900	66%
<u>Owner-Managers</u>					
Sweet Potatoes	48,700	-1,900	146,100	-5,700	104%
Manioc	32,700	-6,100	98,100	-18,300	119%
Mungo Beans	23,600	-6,700	70,800	-20,100	128%
Peanuts	15,300	-8,200	45,900	-24,600	154%
Soybeans	9,900	-6,900	29,700	-20,700	170%
Rice	4,400	-6,500	13,200	-19,500	248%
<u>Tenants (Sharecroppers)</u>					
Sweet Potatoes	52,400	6,600	157,200	19,800	87%
Manioc	36,700	3,000	110,100	9,000	92%
Mungo Beans	30,300	3,900	90,900	11,700	87%
Peanuts	24,000	2,500	72,000	7,500	90%
Soybeans	19,500	4,000	58,500	12,000	79%
Rice	16,100	5,100	48,300	15,300	68%

Where the owner-operators are concerned, the loss is concentrated entirely in one household. Under these circumstances the loss of disposable income runs from 66% to 88% for different crops. A three-hectare rice farmer moves from a "comfortable" level of income (64,200 piasters) to the boundary of subsistence (21,400). A one-hectare rice farmer moves from "subsistence" (21,300) to "very poor" (7,300). At this level, starvation is unavoidable without alternate employment, borrowing, assistance from the extended family, or government relief. The more risky crops show even greater shifts: a "comfortable" sweet potato grower (67,800) is reduced to the very poor level (10,000). A "rich" manioc grower (146,100) moves below "subsistence" (17,700).

The owner-manager category fares even worse. Since they still incur labor costs in the early production stages, they uniformly receive negative income. Percentage losses run from 104% to 248%.\* This form of cultivation may be common among the riskier crops as it is practiced only by the more wealthy landlords. The welfare implications may therefore be relatively minor.

For sharecropping tenants, the story is similar to that of owner-operators in terms of percentage losses ranging from 68% to 92%. Being closer to "subsistence" to begin with, however, the welfare implications are greater. No one-hectare sharecropper would have realized more than

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\*There are no data on rents in Long Khanh. In the southern region rents vary from 15% to 25% of the gross revenue from a given farm plot. The estimates in Table V-8 are based on a 20% rent.

7,000 plasters and even on three hectares, all crops move below the "subsistence" level. Since sharecropping is common and most holdings fall below the three hectare level, this points to significant real deprivation inflicted upon individual Vietnamese. Since there are no data on the size and tenancy distribution in Long Khanh, we cannot say how many households suffered to this extent.

In order to give context to these figures regarding the possible impact on individual farmers, we draw on the interview materials from Long Khanh. For example the three comments to follow indicate how some farmers viewed the effects of herbicides:

"Life at that time was very easy. Even with no money there were trees at home and vegetables in the fields to eat. But around 1965-66 the fields and orchards were hit by bombs and herbicides causing destruction to everything."

"At home it was very happy for us. Everything was in surplus and fields were plentiful. But around 1964-65 fields were sprayed with herbicides and bombs were dropped causing total loss."

"At the present time we live day by day - there is not even a little left over. Trees are still suffering from the effects of herbicides. They are all dried up."

#### D. Impact on Coconut Producers in Kien Hoa

Assessing the impact on coconuts requires a somewhat different analysis from that used for annual crops since the loss extends over a series of harvests. Even more importantly, loss of outputs in the present or the threat of such loss may have a significant impact on new plantings and upkeep, and hence affect welfare for years in the future.

Unfortunately, it is particularly difficult to generalize about the economics of coconut production because of the marked differences in variety, age-composition, and resulting yield. National and provincial averages are most misleading, since variance is extremely



high. No study exists for Viet Nam, so we must rely on inferences from other Asian countries for data on costs of production and reasonable yield figures. These sources suggest that intermediate inputs are a minor factor in production costs (less than 5%), that labor costs are high relative to total revenue, and that peak per hectare yields are in the 8,000 nut per year range, with 5,000 to 6,000 nuts representing mean common cultivation practice.<sup>25</sup>

As noted in the first part of the section, much of the loss of coconut production was a consequence of direct spraying in NLF controlled areas, and the resulting loss was total. Of interest here is the effect of drift, where losses of 20% to 80% were reported. Respondents were unclear as to what portion of this loss was quantitative (fewer nuts) and what percentage qualitative (lower quality and price), but both effects were present. Areas suffering moderate drift damage were generally reported to recover in one to two years, sometimes even producing better than before the spraying.

Consider the impact on a one hectare owner-operator suffering 50% drift damage in 1968 and recovering to full production in 1971. Table V-9 summarizes the results in terms of total expected (i.e. "normal" household income) and achieved household income in constant 1967 prices. In order to make these comparisons over time, a price deflator is used which allows conversion from monetary to real income under conditions of inflation.<sup>27</sup> For example, the table will indicate that in 1969 the price of one coconut had risen to 23 piasters and the coconut grower was able to sell his reduced yield of 4200 nuts for 96,600 piasters. By this time the real value of this income is 62,824 piasters, or 65% of the money income. If however, the coconut grower had not experienced a reduced yield and had been harvesting the expected number of nuts

(the normal yield being taken at 6,000 nuts), his real income would have been 89,748 piasters in that year.

TABLE V-9

## ILLUSTRATIVE IMPACT OF DRIFT DAMAGE ON A ONE HECTARE COCONUT FARM

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>
1. Assumed % Loss	0	50	30	10	0
2. Yield (Nuts)	6,000	3,000	4,200	5,400	6,000
3. Price (Current Piasters) <sup>26</sup>	13.8	16.3	23.0	48.0	42.8
4. Achieved Money Income (Current Piasters)	82,800	48,900	96,600	259,200	256,800
5. Achieved Real Income (1967 Piasters) <sup>27</sup>	82,800	38,288	62,824	123,768	105,269
6. "Normal" Real Income (1967 Piasters) <sup>28</sup>	82,800	76,576	89,748	137,520	105,269

In terms of achieved real income (see Line 5 in Table V-9) a "very comfortable" household was moved into the "average" range initially, but recovered to "comfortable" the next year and was "rich" by 1970. The improvement in relative standing is of course the result of coconut prices rising more rapidly than the prices of other commodities. The implication is that while individuals may have suffered substantial yield losses, in the long run this was more than compensated for by rising coconut prices. This is not a surprising result. Much coconut land was taken out of production entirely, thus reducing supply, and driving up prices for those fortunate individuals who were still producing.

This is not the whole story, however, for even unaffected individuals were aware of the possibility that they might be hit by herbicides, military activity or confiscation in the near future. This possibility significantly reduced the expected yield from coconut lands and hence reduced the amount that farmers were willing to pay for the land. This explains the apparent paradoxical fall in the relative price of coconut land during a time of rising coconut prices.

Table V-10 gives some of the relevant empirical data:

TABLE V-10

FACTORS AFFECTING RELATIVE COCONUT LAND VALUES

GIONG TRON DISTRICT, KIEN HOA PROVINCE

	1964	1965	1966	1967	1968	1969	1970	1971
1. Real Value of Coconut Land (Thousands of 1964 Piasters Per Ha.) <sup>29</sup>	203	196	115	99	86	86	97	101
2. Real Value of Coconuts (1964 Piasters Per Nut) <sup>30</sup>	4.2	4.0	3.8	4.7	4.3	5.1	7.2	7.6
3. Value of Coconut Land / Value of Rice Land <sup>31</sup>	2.78	2.68	2.59	1.69	1.56	1.38	1.67	1.25
4. Rice Price Index <sup>32</sup>	100	114	190	350	331	544	690	792
5. Coconut Price Index <sup>33</sup>	100	115	183	330	390	557	1149	1094
6. Expected Yield Index <sup>34</sup>	100	96	97	64	48	48	34	33

Line 1 shows the fall in the real value of coconut land, relative to other consumer prices while line 2 shows the rise in the real price of coconuts. Line 3 gives the relative prices of rice and coconut land. Coconut land is traditionally held to be three times as valuable as rice land, and this corresponds to our 1964 figure of 2.78. By 1971, however, coconut land was only 1.25 times as valuable. Adjusting for the changes in relative output prices over the period (lines 4 and 5), we can calculate the decline in expected yield which would have produced such a change.<sup>34</sup> Line 6 gives the result which shows roughly stable expectations for '64, '65, and '66, with sharp drops in '67, '68, and continuing to a 1971 level one-third that of 1964. This does not say that actual yields dropped one-third, but that actual yields discounted by the probability of partial or total loss fell to one-third the 1964 level.

This is an important result since it suggests (and interviews confirm) that there was little incentive to replant coconut land or to invest in the extensive upkeep required to maintain optimal output. It is therefore predictable that coconut output will continue to decline until 5 to 7 years after the end of hostilities when newly planted trees come into production. There is thus a significant long-range impact on coconut production.

Regarding coconuts, we therefore conclude:

- i.) Many coconut producers suffered total losses.
- ii.) Those suffering drift damage were not severely harmed in terms of current income, thanks to generally rising prices.
- iii.) All producers, whether directly affected or not, suffered a decline in wealth due to a drop in the value of their land as coconuts became an increasingly risky crop.
- iv.) Unlike the annual crops, significant long-run damage was done to the coconut industry. This was not just because loss extended over several years, but, more importantly, because of the effects on replanting and upkeep.

It is again impossible to assess the precise role of herbicides as opposed to other military activity.

#### E. National Implication

This chapter has focused on herbicide impact in two provinces. A detailed study of national effects is beyond the scope of our research. It is possible however to present some information on rubber and coconuts.

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provide significant shares of the national output of these products, which are of particular interest due to their role in foreign trade.<sup>35</sup> We shall discuss these points after providing a frame of reference.

Consider first the national output trends for selected agricultural products, as shown in Table V-11.

TABLE V-11  
INDEXES OF AGRICULTURAL OUTPUT<sup>36</sup>  
(1959-60-61 = 100)

	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
Rice	106	99	89	96	89	105	117
Rubber	96	84	64	52	39	36	43
Coconuts	104	109	96	96	82	73	87
Corn	162	154	125	115	112	107	111
Sweet Potatoes	137	126	112	115	107	102	100
Manioc	132	108	128	120	120	107	99
Peanuts	153	136	144	141	134	144	135
Soybeans	146	158	277	207	273	218	273
Mungo Beans	170	169	205	284	190	166	158
All Plant Products	108	101	91	95	86	97	107

Rubber and coconuts are the crops for which there has been major sustained reduction in agricultural output during the war. Although total recorded coconut output in 1970

was only 14% below 1959-1961 levels, the reduction was entirely absorbed by exports which declined to zero in 1967 and was replaced by imports amounting to \$US 586,000 by 1971. As was explained above, this deficit is not likely to be quickly redressed given the effect of war on the age-composition of existing plantations. Although rubber was not studied in detail, both theory and interviews suggest an impact similar to that of coconuts. Output decline will not quickly be reversed. Similar considerations apply to timber although foreign exchange losses are of potential future exports rather than of resumed past exports.

The national import of these observations is suggested by examination of the following foreign trade statistics, as indicated in Table V-12.

TABLE V-12<sup>37</sup>

FOREIGN TRADE OF VIETNAM

(Thousands of U.S. Dollars)

	1955-1960 <u>Average</u>	1961-1965 <u>Average</u>	1966-1970 <u>Average</u>
Total Exports (Of which)	<u>68,068</u>	<u>57,403</u>	<u>18,499</u>
Rice	16,828	12,889	-0-
Rubber	43,712	34,908	12,651
Copra Cake	N.A.	1,569	-0- <sup>38</sup>
Coconut Oil	N.A.	N.A.	N.A.
Total Imports (Of which)	<u>232,362</u>	<u>292,183</u>	<u>545,434</u>
Rice	-0-	-0- <sup>39</sup>	100,198
Deficit	<u>164,294</u>	<u>234,780</u>	<u>526,935</u>

Note the major reduction in exports, and the role of rubber and coconut products. Note also the massive rise in imports made possible by U.S. direct aid, and by troop and official plaster purchases to meet local expenses. The resulting trade deficit of \$ US 500 million annually will require major structural reform of the Vietnamese economy in the postwar period. In so far as herbicides have reduced the export potential of coconuts, rubber and timber, the achievement of this goal has been retarded.

F. Conclusions to Part II

Data deficiencies preclude definitive detailed statements on herbicide impact. However, even allowing for wide margins of errors in our calculations, certain general conclusions seem warranted:

A. At the national level, the impact of herbicides lies in its long-run effects on the export potential of coconuts, rubber, and timber. This may to some degree retard post-war development and attainment of economic independence.

B. At the Provincial level, heavy herbicide application combined with war damage and bad weather resulted in measurable reductions in living standards in Long Khanh province in 1967. Even here, weather was a contributing factor and other war damage caused at least as much loss as weather and herbicides combined.



C. It is at the individual household level that herbicides become a significant problem. Some farmers were wiped out and even "average" yield losses reduced the "comfortable" to subsistence and drove "poor" and "average" farmers below the subsistence level. Generally, however, such economic loss translated into life-style adjustment rather than serious physical deprivation as the war-time boom provided alternative employment opportunities, and facilitated inter-family sharing.

Footnotes

- 1) Over the 65-70 period of herbicide usage Long Khanh received 10 % of the total herbicide volume. In 1967 Long Khanh was subjected to 21 % of the national total and (62% ?) of its own total.
- 2) An untranslatable edible tuber.
- 3) Development and Resources Corporation Agricultural Production Capability: A Preliminary Analysis of the Production Base in the Republic of Vietnam. New York: D & R, 1969, p. XV.
- 4) Pearsall, Edward S. and Petersen, Dietrich, Estimates of the National Income and Product of South Vietnam 1967-1969 Institute for Defense Analyses, (unpublished), Arlington, Virginia, March 1971, p. 56
- 5) Japan Economic Research Center, Economic Development of Southeast Asia -- A Review of Trends and Projections J.E.R.C. July 1969, p.p. 2.103-2.105.
- 6) Jones, Leroy, Quantitative Aspects of Legal Taxation in IVCT2: CORDS, IVCT2, 1969, passim.
- 7) Sansom, Robert L., The Economics of Insurgency in the Mekong Delta of Vietnam, The M.I.T. Press, Cambridge, Mass., 1970, p.221.
- 8) Calculated as the sum of personal consumption expenditure and household savings from Pearsall and Peterson (ibid) divided by population from Vietnam Statistical Yearbook, 1971. Seventeenth Volume, National Institute of Statistics, Republic of Vietnam. (henceforth identified as VSY)
- 9) Computed from 
$$\frac{Y_r}{N_r} = \frac{Y_t}{N_t} \frac{(1 - ab)}{(1 - a)}$$

Y = disposable income  
N = population  
Nt = national population  
r,u,t = subscripts rural, urban,  
and total (national)  
quantities  
b = assumed ratio of urban to  
national per capita income
- 10) The Postwar Development of the Republic of Vietnam: Policies and Programs, Volume 2, Joint Development Group, New York, March 1969, p. 223.
- 11) Long Khanh Provincial Agricultural Service Annual Reports.
- 12) Assuming a standard milling factor of .60.

- 13) VSY, 1971, p. 27.
- 14) VSY, 1971.
- 15) Computed from Agricultural Statistics Yearbook, Agricultural and Economic Statistic Service, Saigon, 1970 (henceforth, ASY)
- 16) GVN standard as reported by Long Khanh Agricultural Service. NLF tax exemption figure from Sansom, op. cit.
- 17) Development and Resources Corporation, Export Prospects for Vietnam, Volume I, Republic of Vietnam, December 1969, p. 39. Unweighted average for Burma, Cambodia, Taiwan, Thailand, Ceylon, Indonesia, Malasia, Pakistan and the Philippines.
- 18) Stanford Research Institute Land Reform In Vietnam, Draft Final Report, Menlo Park, 1968, Vols. IV, V, and appendix, "The Hamlet Resident Survey"
- 19) Development Resources Corporation Agricultural Production (Mekong Delta Development Program Working Paper MD-7) New York: D & R, 1969.
- 20) Republic of Vietnam Agricultural and Economic Statistics Service Report on the Agricultural Census of Vietnam 1960-1961. Saigon: A.E.S.S., 1966, 25-26.
- 21) Republic of Vietnam Agricultural and Economic Statistics Service Report on the Agricultural Census of Vietnam 1960-1961. Saigon: A.E.S.S., 1966, p. 27.
- 22) Sansom, op. cit., p. 200.
- 23) See section V - II - B - d for caloric implications
- 24) Stanford Research Institute Land Reform in Vietnam, Draft Final Report, 1968, p.p. A-43 and Table 195.
- 25) United Nations Economic Commission for Asia and the Far East, The Coconut Industry of Asia. New York: U.N., 1969, passim.
- 26) 1969-1970 coconut prices from ASY 1970, chained back to 1967 by coconut price index from VSYS, 1971, and forward to 1971 from Monthly Agricultural Statistics Bulletin.
- 27) Price deflator is Saigon Working Class Consumer Price index without rent from VSYS '71 (Henceforth SWCPI).
- 28) Deflated by SWCPI.
- 29) Report of Giong Trom District Administrative Service. Average of 3 grades for both rice land and coconuts with correction for obvious typographical error in 1966. Deflated by SWCPI.
- 30) Deflated by SWCPI.

31) Same as footnote 29.

32) VSY, 1971.

33) VSY, 1971.

34) Land values represent the discounted present value (PV) of expected returns:

$$PV = \frac{TR_t - TC_t}{(1+i)^t} \quad \text{where} \quad \begin{array}{l} TR = \text{Total Revenue} \\ TC = \text{Total Costs} \\ i = \text{Discount Rate} \end{array}$$

If the net return stream is constant and we discount to infinity, this simplifies to:

$$PV = \frac{TR - TC}{i}$$

Using 'r' to index rice, 'c' to index coconuts and defining 'a' =  $\frac{TC}{TR}$ :

$$\frac{PV_r}{P_v c} = \frac{P_r Y_r (1-a_r)}{P_c Y_c (1-a_c)} \quad \text{where } P = \text{output price} \\ Y = \text{yield}$$

The expected yield on coconuts is:

$$Y_c = \frac{(P_v c) P_r Y_r (1-a_r)}{(P_v r) P_c (1-a_c)}$$

The expected yield index is:

$$\frac{Y_c}{Y_c^*} = \frac{P_v c}{P_v r^*} \cdot \left( \frac{P_r}{P_r^*} \cdot \frac{P_c^*}{P_c} \right) \cdot \frac{(1-a_r)}{(1-a_c)} \cdot \frac{(1-a_c^*)}{(1-a_r^*)}$$

where \* indexes the base year. If we assume that relative cost/revenue ratios are constant this reduces to:

$$\frac{Y_c}{Y_c^*} = \frac{P_v c}{P_v r} \cdot \frac{P_v r^*}{P_v c} \cdot \frac{P_r}{P_r^*} \cdot \frac{P_c^*}{P_c}$$

which is used to calculate line 6. The assumption of constant relative cost/revenue ratios is inaccurate since coconuts are labor intensive and the rural wage bill rose. Our results therefore exaggerate the drop in expected yield.

- 36) Though informal soybean trade with Cambodia is apparently high, the recorded foreign trade in soybeans is negligible.
- 37) ASY, 1971.
- 37) Computed from USAID Statistical Bulletin, 1968, Vietnam Statistical Bulletin 1971, and ASY, 1970.
- 38) Except nominal quantity in '66.
- 39) Except nominal quantity in '65.

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## SECTION VI. COMPENSATION PROGRAM AND REFUGEE MOVEMENT

### Introduction

As indicated in the preceding section, herbicide spraying seems to have had a minor impact on the national economy of Viet-Nam. It was also shown that economic loss to an individual Vietnamese peasant was a different matter. If a farmer could not harvest his basic crop one year, this might be significant but recoupable and on a par with loss by draught and other natural reverses. If it happened over two or three years, it became much more threatening. The loss of some tree crops which have a long cultivation period is still more devastating.

What does the farmer do if he has been the target of such loss? Three courses of action appear to have been open: 1) the individual might seek compensation, 2) he might move to another area in the hope of avoiding further losses or 3) he might simply accept the loss. The present section is addressed to these issues and to the events experienced by individuals if and when a course of action was taken.

#### A. Compensation for Individual Economic Losses

It was the stated intent of the Government of Vietnam to minimize the unfavorable psychological impact of herbicide damage to crops by providing monetary compensation to affected individuals. Intention does not appear to have been uniformly translated into action in the provinces, however, with Long Khanh and Ken Hoa presenting quite different pictures in this regard. The Kien Hoa compensation program, although not flawless in the eyes of respondents, appears to have functioned with reasonable efficiency and relative equity in disbursing payments. In Long Khanh, the indemnification process worked poorly and in a manner that offended people's sense of fairness.

In Kien Hoa the compensation program was administered by the Provincial Political Warfare (Polwar) Office. Two channels were available for seeking compensation:

1) Claims for under 100,000 piastres had to be submitted within 30 days to the District Polwar Office. An assessment committee consisted of the district chief, the U.S. advisor, the subsector intelligence officer and a representative of the administrative committee of the village where the damage took place. The committee made an on-site inspection, and verified claims were then transmitted to the Provincial Polwar Office. They were reviewed by the Provincial Investigation Committee consisting of the province chief, and representatives of the province committee, the U.S. advisor, the military security office, the technical services (such as agriculture and land), and the chief of the Polwar Office. This committee decided on the amount to be paid each claimant. The province chief would then send the claims to the concerned administrative and financial offices to settle.

2) Claims for over 100,000 piastres also had to be submitted within 30 days to the District Polwar Office which transmitted them directly to the Province Polwar Office. The assessment committee in this instance consisted of the province chief, the polwar officer, the military security officer, and representatives of the U.S. advisor, the technical services and the District submitting the claims. This committee also made field verification of damages. The claims were then transmitted to the General Directorate of Political Warfare in Saigon where they were reviewed and acted upon by a central investigation committee. The chief of the General Directorate of Political Warfare then authorized the payment of compensation.

This compensation apparatus was unwieldy, and it is not surprising that a provincial official in Kien Hoa reported that 8 months were required to complete processing a claim. Some villagers reported slightly faster results and others reported waiting up to two years for settlement. Claims for amounts under 100,000 piastres were generally processed much faster than were the larger claims.

Several obstacles lay in the path of a villager's obtaining restitution for herbicide damage:

a) Lack of knowledge of proper application procedures:  
Some villagers were frightened by the formidable amount of red tape involved. Others applied but violated various administrative regulations such as overwaiting the 30 day time limit for making their claims.

b) Residence in a contested or National Liberation Front controlled zone: Government policy was against giving reparation for damaged crops in areas under Front control. Some officials explained this by saying it was unsafe for the assessment committee to verify claims in these areas and therefore no payment could be approved.

c) Legal issues: The claimant's title deed showing ownership of the land had to be in order for him to receive compensation. Thus, tenant farmers and the many individuals whose plots were recorded in village land registers under the names of their ancestors were excluded.

d) American policy on maximum possible range for drift damage: In one case, a village chief reported that claims for compensation had been rejected because the American advisors said the village lay outside the coordinates chosen in advance for the herbicide operation.

Few respondents in Kien Hoa felt that the compensation program had been greatly marred by corruption or that indemnification had been handled unfairly. Most informants were dissatisfied, however, with the size of solatium payments which were markedly smaller than the losses claimed. This underpayment reflected official policy which indicated that funds were inadequate to repay everyone fully, that in time of war citizens must sacrifice for the nation, and that government payment provided individuals suffering war damages with a "subsidy" (boi thuong) to help support them until their land could be restored to productivity.

In line with this policy the Province Compensation Committee set the following fixed rates of compensation for representative crops:

Guava tree: 30 piastres for one tree.

Coconut tree: 100 piastres for one tree.

Orange tree: 100 piastres for one tree, 10 piastres for a small tree.



Mango tree: 80 to 150 piastres for one tree, 30 piastres for a small tree.  
Banana tree: 10 to 30 piastres for one tree  
Durian tree: 200 piastres for one tree, 30 piastres for a small tree.  
Jack tree: 40 to 70 piastres for one tree.  
Rambutan tree: 100 piastres for one tree, 25 piastres for a small tree.  
Mangosteen tree: 50 piastres for one tree.  
Papaw tree: 20 piastres for one tree.  
Grapefruit tree: 100 piastres for one tree.  
Lemon tree: 50 piastres for one tree, 10 piastres for a small tree.  
Pineapple plant: 200 piastres for one plant.  
Paddy: 100 piastres for one gia (i.e., 40 liters).

Under this valuation system a coconut farmer with a one hectare plot containing 250 trees totally destroyed by herbicides could claim a maximum compensation of 25,000 piastres. Yet, in an average year the undamaged plot would have yielded an income of approximately 280,000 piastres at 1970 price levels.\*

His loss is all the greater when it is considered that coconut trees do not begin to bear until they reach seven years of age, so that even if he replanted his plot immediately, he would still not regain his pre-herbicide income level for many years.

Other tree crops were equally undervalued. Oranges sold in 1970 for 200 to 500 piastres per dozen, while loss of a large tree was compensated at only 100 piastres. Destroyed banana trees were valued for compensation purposes at from 10 to 30 piastres, while a single hand of bananas had a market value of 25 to 30 piastres.

The discrepancy between Government solatium payments and the true value of an individual's loss due to herbicides was increased by the standard practice of only paying small claims in full. With any sum over 20,000 piastres, the first 20,000 was subsidized at 100% and the rest at a maximum of 50%. Many people did not, however,

\* In normal times one hectare of 250 coconut trees yields 6000 nuts per year. The 1968 price was 16.3 piastres per nut, and the hectare yield would have brought 97,800 piastres in the market. The 1969 price was 23 piastres. The 1970 price was 48 piastres, or an income of 288,000 piastres for the annual yield. See Section V, page 55 for further information on this point.

receive compensation even at this level. One claimant reported receiving 70,000 piastres, although claiming damages of 300,000 piastres, and others in his neighborhood also said they had received only about one third of their claims.

In Long Khanh we were unable to determine the exact nature of the provincial administrative machinery used to process claims for compensation. Interviews with province officials revealed that a general war compensation committee had apparently existed from about 1966 to 1970, but no one was able to identify the composition of this committee. Knowledgeable respondents usually identified three offices which were involved with the claims: Province Chief's Office, Political Warfare Section, and the Agriculture Office. The agriculture chief stated that he had been a member of the committee, but he and other individuals were unable to locate for us the documents and directives pertaining to herbicides. Apparently records of claims and payments had been kept, but all attempts to locate them proved futile.

District and especially village level officials were apparently involved in the processing of claims in Long Khanh. Some village officials, in particular, were quite concerned over their responsibilities in handling claims and were troubled by the excessive work created by the complexities of the procedure.

Despite the confusing nature of the compensation process in Long Khanh, some individuals received claims payment from the Government. Awareness of this fact created strong feelings of resentment among the large majority who did not receive restitution. Thus, a hamlet official stated that over 100 people in Phu-Cat 1 and 2 had filed claims in 1963 and 1964 but received nothing. On hearing about people from other areas receiving

payments, Phu-Cat people complained to him about this situation. Similar sentiments of jealousy and dissatisfaction with governmental handling of claims were reported by respondents from many other villages.

Even in those villages where individuals had received compensation, respondents were dissatisfied with the amount. In Tuong Tan Phat hamlet the highest payment made to anyone was 50,000 piasters although losses of up to 400,000 piasters had been declared. In other hamlets people received only half of what they had claimed.

The defects in the compensation system were often explained by farmers in terms of official corruption and the operating of competing cliques within villages. Village officials, on the other hand, cited the following factors: 1) the complexity of the claim filing process (one village chief stated that he had had to submit 30 pieces of paper on each individual claim); 2) the cost involved in processing the paperwork and the need to pay bribes to expedite the process; and 3) the necessity for the village chief to certify that the claim was valid. This certification was subject to review by technical specialists. One village chief said "...how can I tell for sure what is due to herbicides and what isn't?"; implying that he ran the risk of getting into trouble if he made a mistake. In view of this, he refused to certify claims for the villagers.

The major obstacle to successful operation of the compensation program in Long Khanh, however, appears to have been the short distance at which senior provincial officials and their American advisors believed that wind drift damage could occur. While in Viet-Nam, we were unable to obtain any official policy statements regarding the maximum distance at which wind drift could be accepted as damaging crops. Staff members

of the Committee on Effects of Herbicides in Viet-Nam (National Academy of Sciences) who have inquired at the Department of Defense have been told that no policy directives were issued on this matter. However, according to journalist Elizabeth Pond who reported on the circumstances in 1969 ". . .the province chief of Long Khanh informed his district chiefs that anything over three kilometers from targeted defoliation sites cannot be compensated for . . ." (Neilands, et al. 1972: 129).

As the province chief is unlikely to have selected the figure of three kilometers arbitrarily, it seems likely that it was based upon U.S. technical statements about the maximum distance at which drift could occur.\*

#### B. Herbicides as a Factor in Population Movement

One of the most pronounced human effects of the Viet-Nam war has been the widespread dislocation of the rural population. Accurate statistics are unavailable but up to 6 million Vietnamese (over 30% of the total population in the South) are estimated to have been in refugee status at one time or other in the course of the conflict. It is shown elsewhere in the report of this Committee (Economic Stress and Settlement Patterns, W. L. Thomas) that a significant amount of population re-arrangement

\*It should be pointed out that there is no other probable motive for the province chief to have selected such a low maximum range for permissible claims. If he were corrupt, it would have been to his advantage to use the longest possible distance limits at which damage could occur thus increasing the number of acceptable claims and hence the amount of funds passing through his hands. If he were not corrupt and was concerned about doing a good job, he would still want to honor as many claims as he appropriately could since a province chief's job is easier when the population he is administering is satisfied with the treatment given by the government. More than 3,000 petitions, each presented jointly by several peasants, were reportedly filed in 1967 in Kiem Tan district alone (Neilands, et al. 1972: 129). Since most of them were rejected on the distance criterion, the three kilometer rule did not contribute to achieving the objective of avoiding dissatisfaction among claimants.

is associated with herbicide spraying as evidenced in aerial photographic documentation. It has been suggested that herbicides contributed to the development of the refugee problem in three ways:

- 1) People became refugees to escape exposure to herbicides which were perceived as poisonous.
- 2) People became refugees because the destruction of crops and the loss of livestock by herbicide spraying left them without means of earning a livelihood.
- 3) People who became refugees for other reasons may have been or will be unable to return to their homes after security is reestablished because the residual effects of herbicide spraying on fields will threaten economic stability.

The aspect of this problem which is within the purview of behavioral science is the extent to which people say that herbicides are the reason for their relocation. Where in the hierarchy of beliefs about what caused a given family to move does the topic of herbicides appear?

In interviews conducted in mid-1972 in Long Khanh and Kien Hoa provinces, only a few respondents cited herbicides as an explanation for refugee movement although specific inquiries were made in this regard. Population movement in Long Khanh Province was generally seen as due either to insecurity or to deliberate regroupment by the government. A number of hamlet and village officials explicitly denied that herbicide spraying had caused refugee movement. They pointed

out that the people felt it was fruitless to move away from a sprayed area since they believed that no matter where they went they would still be exposed to herbicide spraying. Unlike more direct threats to security, herbicide spraying was not viewed as sufficient incentive to cause people to leave their homes for the uncertain future they would face as refugees. People were aware that it would be difficult for them to obtain land or employment in new locations. Thus, they chose to stay in their old villages in the hope that agricultural conditions would improve in the future.

In only one exceptional case was herbicide spraying defined as the cause of significant population movement in Long Khanh. In Bao Vinh-A Hamlet, Xuan Loc Village, a number of outsiders from Dinh Quan District and from Kien Hoa Province had cleared land and established new papaya plantations in the early 1960's. The plantations were destroyed by herbicides in 1966. After this, most of these pioneers gave up the land development venture and returned to their native villages.

In Kien Hoa Province, the Chief of the Social Welfare Office (the provincial office responsible for refugee relief) stated that most people moved because of the fighting. He said he had never heard of any people moving because of herbicide spraying. Officials in Phu Tuc and An Khanh villages explicitly denied that any of the people in their villages who had become refugees had done so because of herbicides.

The people of Phu Tuc fled because of bad security, National Liberation Front propaganda, and Government of Viet-Nam bombardments. Those of An Khanh had to leave because of heavy National Liberation Front pressure and general fear of war and mortaring.

Other Kien Hoa respondents corroborated the view that insecure conditions, especially the fear of bombing, artillery, and mortars, were the dominant motivations for refugee movement. A few, however, indicated that some people had left their villages because of herbicide spraying. Two officials from Luong Quoi Village reported that after crops in Chau Hoa Village were destroyed by spray in 1965, twenty families moved to Luong Quoi. In this case spraying appears to have been the last straw. Insecurity, bombing, and Government of Viet-Nam appeals for people to leave Front controlled areas were also cited as factors in their decision to move. About fifty percent of the people from Huu Dinh Village were also said, by a village cadre, to have resettled in other areas after their fruit gardens were sprayed, but later they returned.

This information from 1972 is congruent with data on the causes of refugee movement from earlier periods. Population movement is one of the most thoroughly studied aspects of the Viet-Nam war, and a large body of systematically collected survey data exists on the opinions of refugees. For example, in 1966 and 1967, two members of this behavioral science group participated in surveys during which 3836 refugees were interviewed. Of these, 1193 were in Phu Yen Province in Central Coastal Viet-Nam, 272 in Dinh Tuong Province in the Mekong Delta (Rambo et al. 1967). 2157 were in Quang Nam Province in Central Viet-Nam (Rambo 1969, A.R.P.A. 1971) and 214 were in Kien Giang Province in the Lower Mekong Delta (Murfin 1969). In none of these studies did herbicides form a large enough category to be listed separately among the causes given by the interviewed refugees as their personal reasons for leaving. In Phu Yen, for example, the most

commonly cited reason was forced labor, and in Dinh Tuong it was the death and destruction caused by artillery and bombardment (Rambo et al. 1967: 44). In Quang Nam, the prominent causes were fear of RVN and U.S. military activity and fear and/or dislike of the National Liberation Front (Rambo 1969: 41). In Kien Giang the lack of security, bombing, artillery fire, taxes, conscription, and imprisonment were most noteworthy. (Murfin 1969: 39). In each of these surveys, mention was also made of other causes such as ground military operations, lack of jobs, terror, etc. In some of the places where security was poor or where bombing occurred, there was also undoubtedly use of herbicides. That spraying may have been an associated factor in causing movement is not dealt with in these studies, but the point is that herbicides were not brought forward as the perceived cause for resettlement.

In an effort to see if herbicides might have been mentioned in these studies but then submerged in another category, the data were reviewed again as part of this current effort:

1) Although chemical plant killers had already been used in Phu-Yen by mid-1966, it appears that they were generally sprayed in areas of low population density. This may have minimized the impact on the villager's livelihoods. One refugee, from Song Long Village in Son Hoa District, said that in 1968 crops had been 80% damaged by defoliants. He did not, however, say that this was the factor that caused him to move. One other refugee reported use of herbicides in a populated area. Again he did not cite this as a reason why people had decided to become refugees. He stated that he "had heard that in Xa Hoai Xuan (probably



a reference to Hoa Xuan Village in Hieu-Xuong District) the crops had been killed by aircraft-delivered spray." (Rand AGR - 58).\*

2) Usage of herbicides had not been particularly heavy in Dinh Tuong at the time of the study. The districts bordering the Plain of Reeds (Dong Thap Muoi), from which many of the refugees came, had however, been exposed to spraying. The significant point is that none of the Dinh Tuong refugees offered herbicides as a reason for migration.

3) None of the Quang Nam refugees mentioned herbicides as a contributing factor.

4) In Kien Giang a few respondents mentioned herbicides. One such refugee gave the following reasons for moving:

"Because in my old place, airplanes often came to drop bombs about my hamlet. Besides they scattered chemical powder to clear wood, which made my fruit trees in the garden bare of leaves and rice plants dead. Staying there, I can't do anything to earn my living."

This review suggests that the original coding of the refugee statements accurately conveys the conclusion that herbicides were not perceived to be a major cause of refugee movement.

We have now presented the data gathered in 1972 on this topic and have reviewed the literature from 1966 and 1967. It would be desirable to turn to a comparable body of information covering the years from 1968 to 1971 when spraying reached its peak. We searched the other documentation on population movement such as the Kennedy Hearings (War Related Civilian Problems in Indochina, 1971) and have been unable to find any references

\* Rand Corporation, Studies of the National Liberation Front of Vietnam, File No. AGR - 58 (Santa Monica, California: Rand Corporation, 1965) pp. 27-28.

to herbicides that could be used for systematic analysis.

Thus, on the basis of available data, we conclude that refugees themselves do not see herbicides as having been a major force by virtue of their life-threatening quality as poison. Nor do they see herbicides as having been the main deterrent to their being able to make a living in the areas out of which they moved. And finally, none of the refugees voiced fears about the residual effects of herbicides as preventing them from returning to their homelands.

This is not to say that herbicides were without effect in regard to refugeeism. In certain limited areas or in certain circumstances, they may have been signally important. In the Binh Thuan refugee settlement in Gia Dinh Province in 1966, refugees from War Zone D revealed that some of the people had fled their home village of Thai Hung (Cong Khanh District, Phuoc Thanh Province) because they were frightened by the spraying of chemicals in the surrounding forest and some respondents said they were woodcutters and could no longer gather bamboo in the jungle because planes had sprayed a "powder" that killed the trees. It seems very possible that the main category of people who have moved because of herbicides and who may not be able to return are woodcutters and loggers, although in the case of the latter group, it should be pointed out that they tend to be migratory under normal conditions.

Early in 1972, for example, the Government imposed a ban on timber cutting in Military Region III. Some of the loggers left Xuan Loc in Long Khanh at that time. When the forests are re-opened, it may be that these workers will not be able to return simply because the supply

of cuttable timber will have been reduced due to defoliation.

Conclusion

This section has concerned compensation and relocation as they relate to herbicides. It has not been possible to estimate the percentage of people who sought recompense nor the percentage of refugees who moved because of defoliation. On the other hand, we can probably be confident that these actions were taken by a minority of the total Vietnamese population. Reliable statistics do not exist for defining the population at risk through exposure, much less categorizing the exposed population in terms of what proportion chose one course of action over another. Despite this inability to answer the question, "how many?", we have drawn together information which makes the following points:

1) The experiences of individual Vietnamese regarding financial reimbursement for losses due to herbicides were variable but on balance they appear to have been more dissatisfying than satisfying. Some people were undoubtedly recompensed, but few indeed were compensated to a degree that could be called recoupment.

2) Many Vietnamese have moved out of their homelands and have lived as refugees. It does not appear, however, that they perceived herbicides as a major cause of this dislocation.

## SECTION VII. HAZARDS TO HEALTH

The issue taken up in this chapter is: "What have been the effects of herbicide spraying on the physical health of Vietnamese people?" The data brought to bear came mainly from conversations with lay people, and to some extent with medical professionals, and to a small degree from hospital records.

It may be helpful to introduce this topic by posing two questions:

1) Could a group of lay people who had survived a typhoid epidemic tell us something useful about the symptoms and possible causes if typhoid fever were still largely unknown to the medical community?

2) Could a group of lay people whose total population was growing rapidly tell us something useful about the long-range implications of overpopulation if it had not yet been determined that population growth might threaten survival?

It seems to us that the answer to the first is "yes" and to the second "no". The difference is obviously related to time range and the complexity of chain reactions. If herbicides have destroyed an ecological balance, the effect of which will have repercussions on the livelihood and well being in generations to come, talking to people about their immediate experiences will not help us understand or measure that effect. As a parallel it is unlikely that a Vietnamese woman giving birth to a child will realize how this one birth might make life less possible or less healthy for her great-great-grandchildren than if she were not to give birth in this instance. Private individuals are apt to be unaware of long-range effects until they are told about them. This was true of most people to whom we spoke.

The situation is very different with regard to short-range effects. Thus, we formulated our research as if we were gathering data about a suspected typhoid epidemic that occurred three or four years ago and about which information was meager. We have asked if people got sick or died; what kind of symptoms they had, what other kinds of unusual events they observed, what they did about them, and what they think caused them.

This study was undertaken at a time when herbicides had already become the subject of propaganda. Many people had heard that herbicides cause leprosy, that they make women give birth to deformed fetuses which look like eggs, and so forth. Thus one of our jobs was to find out what people judged to be facts on the basis of their own experience and what they thought was rumor. Out of this endeavor has come a body of data, part of which has face value and part heuristic value. It does not suggest that a plague resulted from herbicides. On the other hand, it does point to recurrent patterns of symptoms which people associate with herbicides. For the most part these symptoms were not perceived as threatening to life. As one man said to us, "In my experience the herbicides did not cause perilous disease to people. It only makes them unwell."

#### Birth Anomalies

Of all the possible human effects of herbicides used in Vietnam, abnormal births have received the most discussion in both scientific and journalistic accounts. The possibility of such effects came into particular prominence when dioxin was discovered in fish from SVN (Meselson and Baughman, 1973). In light of this, interviewing on the topic was conducted in both provinces. Also, we attempted to procure documentary evidence of stillbirths and miscarriages from 1964 through 1972 so that it would be possible to present a time series analysis of birth statistics in a manner similar to what was

done with agricultural production statistics in Chapter VII. The guiding question was: "Have stillbirths and miscarriages increased in a time sequence that might suggest influence from herbicide spraying?" We were unable to locate pertinent documentation in Long Khanh. In Kien Hoa we discovered that systematic record keeping had been started in 1970 in an effort to draw together birth data from the various public hospitals in the province. We learned from this source that there had been 473 stillbirths and 546 miscarriages in 1970, and 728 stillbirths and 650 miscarriages in 1971. Figures such as these are unfortunately inadequate for answering the question at hand. They refer to a very limited time span and they do not show the total number of births that occurred during these years. Thus we have no way of estimating whether the proportion of stillbirths and miscarriages has remained the same over the years or has increased.

If there had been a marked increase in abnormal birth events, it might be that people would begin to notice it even without the benefit of a recording system. From interviews in the two provinces we learned that most people have heard that deformed babies and abortions may be caused by herbicides. Only one interviewee, however, claimed direct personal knowledge of such events due to herbicides. This took place in Phuong Tho Village, Dinh Quan District, Long Khanh Province. Eight women were reported to have suffered stillbirths, and one died as a direct result

of being sprayed. In the light of this incident the respondent felt that extreme care must be taken to avoid herbicide exposure in the case of pregnant women: "...women in the path of herbicide spray will definitely suffer a stillbirth or some other tragedy."

In order to establish the validity to this report, other residents throughout the seven hamlets of Phuong Tho were interviewed. These included farmers, merchants, and a civilian medic. No one else reported such a series of events. The medic who had been in the village for nearly ten years said that an epidemic of stillbirths could not have happened without his knowledge and that he knew of no such occurrence. Still not satisfied, we returned to Phuong Tho to conduct a second interview with the original respondent who, this time, said that all the people involved had moved away and he did not know where they were living now. Lacking any means for pursuing further evidence on these cases, we consider them uncorroborated in this study.

With doctors, midwives, and rural health workers, we also held in-depth discussions on the possible linkage between herbicide spraying and the frequency of reproductive anomalies. These professional people did not believe that herbicides cause such effects. For example, the Chief Midwife at the Kien Hoa Hospital said that she had seen many stillbirths and miscarriages during the period when herbicides were used. She had heard many rumors about herbicides but she felt that she herself could not give an opinion because information was lacking on whether stillbirths had increased or not. Further, she had never seen any unusual symptoms

associated with stillbirths or miscarriages and she had never heard a woman in question say that she thought it was caused by herbicides.

In talking about other effects of herbicides such as those on plants and animals, people said in effect, "I have observed this, this, and this, and these events fit together in such a way to make me believe that herbicides do this and this." As far as we were able to discover almost no one inferred from what they had seen that herbicides cause women to miscarry or give birth to deformed organisms. On the other hand, apprehensions have been raised through the publicity given this possible effect and few people are willing to say that the rumor is false.

We, like the Vietnamese people with whom we held conversations, consider the evidence as inconclusive. Neither the interview data nor the hospital records can be taken as confirmation or refutation of the possibility that herbicides have this effect. The birth anomalies issue is probably of the same order as long-range ecological changes, not because it takes a long span of time for people to become aware of what has happened but rather because it takes a very large number of observations of normal and abnormal births in conjunction with herbicide experiences for a trend to be discernible. The lay people and even the medical professionals lack such a basis in their own firsthand experiences for making generalizations of this type.

#### Physical Symptoms

Unlike the paucity of opinion and evidence regarding birth anomalies, there is a great deal of information about a variety of immediately painful



and disagreeable symptoms which some people experienced in association with herbicides. The most systematic data came from the Binh Hoa study where every person was asked, "Have you ever been made ill by herbicides? If so, how?" Through analyzing the content of the narrative statements of the respondents, it became evident that the symptoms could be roughly but logically classified into five categories:

- a.) Respiratory symptoms, such as colds, sniffles, cough, coughing blood, shortness of breath, difficulty in breathing, sore throat, hotness in nose, and nose-bleeds.
- b.) Central nervous system symptoms, such as headaches, dizziness, and, in one instance, loss of consciousness.
- c.) Gastrointestinal symptoms, such as diarrhea, nausea, and stomach ache.
- d.) Dermatic and ocular symptoms, such as itching skin, rash, scratchy skin, eye irritation, and conjunctivitis.
- e.) Generalized symptoms, such as pain, fever, soreness of body, fatigue, shaking, perspiration, palpitations, numbness, feeling sick, being nervous.

Forty-eight Binh Hoa subjects (i.e., 52% of the sample) indicated that they had experienced one or more of these symptoms in conjunction with spraying. Generalized symptoms, and those of the respiratory and central nervous systems were more commonly reported than symptomatology affiliated with the gastrointestinal, dermatic, and ocular systems, as seen in Table I. Because most subjects had more than one symptom the figures add up to more than 100% in this tabulation.

Table I

Symptoms Experienced by 48 Binh Hoa Subjects Reporting Illness in association  
With Herbicides

Generalized symptoms	71%
Respiratory symptoms	66%
Central nervous system symptoms	58%
Gastrointestinal symptoms	12%
Dermatic and ocular symptoms	12%

Qualitative interviews with selected people in Kien Hoa and Long Khanh were another source of data about symptoms. In this part of the study the questions we asked were not directed to the respondent's personal experience but to his or her understanding of the situation in general. The five symptom categories which had emerged from the Binh Hoa study included all the symptoms we heard from the general observers. Among these people it again appeared that the respiratory and central nervous systems as well as generalized aches and pains were more often involved than the eyes, the skin, or the gastrointestinal tract although all were mentioned. Thus in both the systematic and qualitative studies from three provinces a collection of symptoms was described as following upon herbicide exposure. The symptoms involve coughing, sneezing, having a headache, feeling dizzy, being tired, feeling full of aches and pains and somewhat less frequently nausea, diarrhea, skin sores and itchy, watery eyes.

The evidence from experimental studies with animals and from a few investigations with people known to have been exposed in production

factories suggests that the symptoms described to us are, indeed, possible concomitants of exposure. (Report of the Committee on Herbicide Effects, Section II - C). There are, however, a number of questions to be raised. One has to do with the fact that the recollection of symptoms and reported observation of symptoms by lay people is not as reliable a measure as the results of direct on-the-spot examination by a physician or other qualified professional.

Although our field team did not include a medical doctor, we kept our eyes open for opportunity to make direct observations ourselves. Although we saw and talked specifically about herbicides to approximately 300 people in the course of this study, there was no indication that any of them was, at the time, suffering from symptoms or experiencing a disease attributable to herbicides. We did not deliberately seek out people whose exposure was so intense that possible long term sequelae should be investigated. Such research would be highly useful. The fact we did not observe either acute or chronic symptomatology needs to be understood in terms of the work being done two years after the termination of herbicide spraying and of its applying to a general cross-section of the population.

In view of this limitation, our discussions with doctors and nurses was an attempt to reconstruct their experiences at the time herbicide spraying occurred. In Kien Hoa, for example, one physician recalled that in 1968 or 1969 he saw two patients who complained of excessive

perspiration, palpitations, and fatigue the day after having been exposed through spraying operations. Another doctor remembered four patients who came into the hospital about a week after spraying. According to report, their skin had been irritated as a result of herbicides and due to scratching had become swollen and weepy. Another reported that patients had been sent into the hospital with diarrhea which they claimed had resulted from herbicides. Another physician who had been in the city of Hue before his present assignment said that some patients complained of their eyes having been hurt by herbicides. Another while serving at Phu Quoc Island had heard the same complaint, especially from soldiers. None of these physicians thought they had enough information to determine that herbicides had been the cause. They said that they lacked scientific information on what to look for, and they lacked proof of herbicide exposure. Further, there was nothing unusual about the skin irritation or the diarrhea episode, and the patients responded well to ordinary treatment for skin and gastrointestinal disturbances.

An immediately evident feature of the symptoms reported by lay people and medical professionals is that they vary in the degree to which they can be observed and measured. A physician would have been able to take a thermometer reading for the presence of fever, examine eyes, nose, and throat, and inspect the appearance of the skin. He would, however, have needed to rely on what the person said about fatigue, headaches, and soreness, for example. Thus, when we report that a person said he had such and such a symptom following exposure to herbicides, we have

part but not all of what a physician would desire in order to be convinced that the symptoms were present. The ex post facto self-report of symptoms is a statement of belief that the symptoms existed. Such belief statements about feelings, pains, discomforts, under the best of clinical circumstances, cannot be proved or disproved and yet are regularly accepted in medical practice as extremely valuable pieces of evidence.

Our conclusion from interviewing doctors is that, like ourselves, they do not have proof and they had to rely on what people told them almost as much as we. The interesting point is that they were hearing virtually the same message we got--the eyes, the skin, the stomach, and the respiratory and central nervous systems are potentially implicated--but they were hearing it closer in time to alleged exposure than was possible in our study.

Another feature of the list of herbicide-related symptoms reported to us is that they are found in many patterns of illness, from the common cold to tuberculosis. No one told us about a symptom new to medical knowledge. In point of fact one hamlet chief in Long Khanh said specifically, "It seems the people were not affected with any new disease from the use of herbicides." There was no mention of a systematic sequence of symptoms which in any way approximated the origin and course of symptomatology in some diseases such as chicken pox or measles. Thus, it seems that if there are herbicide-specific symptoms or if there is a specific disease caused by herbicides, it lacks the clarity of patterning necessary to be observed or described as something new and different.

The information presented thus far indicates several patterns of symptomatic response said to appear when people are exposed to herbicides. The next questions of interest are such as these: "How many people were afflicted? Are there any differences in symptom response according to different kinds or places of exposure or according to different biological and social characteristics of the people? How long do the symptoms last? Do people die because of them? What did people do to relieve them?"

The issue of how many people were afflicted is of course of paramount importance. It would be misleading if we were to imply at this point that we have an answer. We do not. In the first place there is no definite information on how many people were exposed, at what distances, and through what means. Next it seems probable from what we know generally about diseases that there is not a one-to-one relationship between exposure and symptom response. In Binh Hoa where we can be confident that much of the population was exposed from aerial spraying, 48% of the sample members said they had never been made personally ill by herbicides. Some of them may have been in the fields while others were within doors, and these factors can be expected to make a difference. Some of them may simply have been more resistant than others.

Further, it may be that physical health is in no way changed or threatened by exposure and that what we have described thus far are the imaginings of people colored by propaganda. In both Kien Hoa and Long Khanh where we asked for generalizations about health, some people said explicitly that as far as they know human beings are not affected. A Long Khanh village chief said he knew "a stream that was actually sprayed

upon and that soldiers on operations drink from it but they do not become sick." Several people said they had seen soldiers demonstrate that herbicides are harmless by walking in front of a jet of herbicide spray or eating bread that had been sprayed. Nothing apparently happened to the soldiers under these circumstances. An officer in the Information Service said that he himself had eaten such bread: "My tongue became numb but even now I do not see that anything has happened to my health." In assessing such contradictory evidence it needs to be born in mind that propaganda could have influenced both the report of symptoms and the denial of symptoms. To the extent that the data gathered in this study can be used in resolving this conflict, we believe the weight of evidence falls on the side that herbicides were associated with symptoms rather than that they were not. This comes not only from the Binh Hoa group but also from the fact that denial of ill effect played a much smaller role in the interviews conducted than did reports of coughing, headaches, nausea, etc. Although we cannot say in quantitative terms how many people were thus afflicted, it appears that there were indeed some, perhaps many.

How long did the symptoms last and how severe were they? For the most part people reported that the symptoms lasted from a few days to a month. Children were not only thought to have more severe symptoms than adults but also to be sick for longer periods of time. This was true also of old people and weak people. As a priest in Long Khanh put it: "People got fever from herbicides but recovered within a few days,

but I know of one case that was longer. A man and his small son were working in the rice field when the wind blew the chemical to where they were working. The boy put a piece of cloth over his nose and face and suffered no consequences. The father did nothing and he became so dizzy he had to be led home. He had a nose bleed at that time, and it came back off and on for a month."

For the most part people did not think that death was caused by herbicides. The man mentioned earlier, who gave information on women having miscarriages due to herbicides, said that women and children suffered the most and indicated that in his hamlet several children had coughs and bloody noses, were taken to the hospital, "but still many died." This is the only report of actual death we received, and we were unable to corroborate it. One or two others said they believed people would die if sprayed directly but they did not report this having occurred. Thus on balance this study suggests that people got sick but did not die. This is different from the results of a similar study of Montagnards where people did report that actual numbers of children died as a result of herbicides (Report of the Committee on the Effects of Herbicides in Vietnam, Section VII - B 3).

It would be valuable if it were possible to analyze the symptom information in terms of the chemical agent applied. It is not feasible to go beyond the point that proportionately more of Agent Orange was sprayed in Kien Hoa than Long Khanh although considerably more gallons of herbicides were sprayed in Long Khanh, especially in the forested areas. Despite this there did not appear to be qualitatively different symptom response



patterns in the two provinces. In the two provinces both direct exposure and drift were seen as noxious. In both the respiratory and central nervous systems were more often affected than the gastrointestinal tract, the skin, and the eyes. In view of the provincial differences in spraying patterns, it is interesting to note that the Long Khanh informants singled out loggers who work in the forest as a particular group to talk about regarding special vulnerability to herbicide experiences. Further the symptoms reported for them were the rarer types; itchy skin, nausea and diarrhea. We interviewed one logger who said that he had been directly under a spray. The result was that "I was sick for three days with running nose and nausea."

In Kien Hoa spraying had been concentrated in mangroves and on waterways, but it also included spray runs over villages that were or had been under NLF control. An aspect of the interview material from the Delta is that it includes descriptions of the results of eating and touching contaminated fruits and leaves. The reports indicated that people mainly experienced stomach aches, diarrhea, and skin disturbances from ingestion. For example, the village chief of an NLF area said that during the spray period people stopped eating sweet potatoes and manioc because they could see the changes caused by herbicides, but people went on eating betel leaves thinking this would be safe because the leaves are only chewed and not swallowed. "After chewing their lips became swollen but a few days later they regained their original size." Unlike the more usual implication of skin and stomach, one man said that he himself had eaten a deformed banana and he felt dizzy and fainted. Another man, commenting on fish

rather than fruits and vegetables, said that he had picked up dead fish floating in the stream after the spraying. "I ate them and nothing happened to me at all."

Thus insofar as these data throw light on the question of variation in response, the most consistent comment was that children are more vulnerable than others, and next that forest workers and people who eat or touch sprayed fruits, vegetables and leaves are specially at risk.

What do people do about the kinds of symptoms reported in these interviews? Clearly, one route was to go to dispensaries and hospitals to seek aid from the medical profession. Another route was to use local treatments, presumably on a trial and error basis. Thus we learned that people who found their eyes and skin stinging and sore from herbicides got relief from washing with beer or lemon juice. Drinking beer or eating pumpkin were also said to be useful in controlling and terminating symptoms.

#### SUMMARY

This chapter has dealt with a topic - hazards to human health - about which it is difficult to gain satisfying knowledge. Direct experimental spraying of humans with a chemical of unknown effects is obviously not an ethical route to pursue. Thus much of what is known derives from animal studies where generalization to humans is useful, but clearly falls short of providing satisfactory answers. Also there are experiments of happenstance such as investigations in factories which produce herbicides or among people who are regularly involved in dispensing herbicides in agricultural settings. In the history of science

the type of information from these latter sources more often leads to the formulation of new questions than to definite answers.

In view of these difficulties, the circumstances which led to this report on human health appears to be unique and valuable as an opportunity for learning. We believe that the spraying of herbicides in the Vietnam war was initiated on the assumption that the chemicals are not harmful to humans and that, as a further precaution, attempt was made to avoid human settlements in planning the sites for deposition. Nevertheless a great quantity of herbicides was sprayed and a portion descended on or near human habitations.

This chapter gives information from people who were there. As individuals they had different vantage points from which to describe their experiences. Some had first hand experience; some had second hand. A main conclusion is that the reports they gave are not irresponsible talk. By every means we have been able to assess the value of what people said to us we have concluded that the information is exceedingly sensible and deserves to be heard with attention.

The large majority of Lowland Vietnamese people do not think that herbicides cause human fatality. The leaves die but the humans do not. Whether a greater number of babies were born dead or deformed is a question people do not believe they can answer. Herbicides are not, however, generally perceived as harmless. A great deal of information came to our attention indicating that people are made sick by contact with herbicides and that the symptomatology experienced is not random but rather has pattern. Nobody said he was paralyzed by herbicides or that he developed a urinary disorder as a consequence of being sprayed. Many people, however, spoke of headaches, dizziness, coughing, shortness of breath, and other symptoms indicating at least

temporary malfunction of the central nervous system and the respiratory system. We also heard reports of stomach aches and skin irritations. Further it appears that a gradient from minimal to severe response was observed so that it is appropriate to say that some people had a mild case and some had a bad case of whatever this illness is. The clarity with which this pattern of illness or illnesses was formulated by many people makes us believe that herbicides are noxious to humans in these specific short-term regards. The possible long-range effects from dioxin remain a question in our minds and in the minds of the Vietnamese people to whom we spoke.

## SECTION VIII. PSYCHOLOGICAL RESPONSES TO STRESS

### I. Introduction

The theme of this chapter is the individual Vietnamese person as a whole complex human being. The totality of a person is the interplay of the biological organism with the social and psychological phenomenon called personality. In the previous chapter attention was given to the effect of herbicides on the physical health of individual Vietnamese. In this we take up the question "What has been the effect upon his psychological well-being?"

Here and in the sections following we will often refer to emotions. This sets off the remainder as being somewhat different from what has come before where opinions and beliefs have been the focus. Up to this point, we have given a picture of people that is largely cognitive; that is, how they perceive the influence of herbicides in the events of the real world around them. Now we move closer to "what it feels like" to be a Vietnamese person in this situation.

A useful paradigm for understanding the relationship of external events to the psychological "inner workings" of an individual person is the stress-strain model used by engineers. To an engineer, stress is that external force which a structure must withstand. Strain is the deformation or change within itself which may be produced by the stress. Thus, if one visualizes a cable, a longitudinal pull upon it is considered a stress while the lengthening of the cable in the direction of the pull is strain.

Psychological strain is a type of effect which may result from stresses that threaten human survival and well-being. By psychological

strain, we mean patterns of emotional and cognitive functioning, which indicate suffering and often are maladaptive. Strain sometimes becomes a long-lasting pattern of anxiety, depression, apathy, anger, or other disturbance which severely impairs the functioning of an individual. We believe that the spraying of herbicides through destruction of crops and assault on the physical viability of animals and humans constituted a stress for some Vietnamese people. This chapter is a report of effort to measure the stress of herbicide exposure and to determine if psychological strain is associated with it. For purposes of clarity, we will consistently use the term stress for experienced events and strain for the psychological response.

Numbers of studies have shown a positive relationship between social stress and psychological strain (Langner and Michael, 1963; Scotch and Levine (eds.) 1970; Leighton, A., 1959; Hughes, et al., 1960; Leighton, D. C., et al., 1963; Levi (ed.) 1971; Bosowitz, et al., 1955; Grosser, et al., (eds.), 1964; Murphy and Leighton, (eds.), 1965; Dohrenwend and Dohrenwend, 1969). Typical events which have been investigated in this regard are economic deprivation, crowding, family break-up, urbanization, and relocation. Most of the systematic research on this topic has been conducted in the years following World War II. A considerable amount of this has now been done with representative samples of populations at large. A beginning has thus been made to go beyond mental hospital admission rates as evidence of psychological strain and beyond laboratory studies such as those which have investigated the stress of sleep deprivation, isolation, etc.

Several studies of stress have been carried out on military personnel, (Bourne, 1970; Grinker and Spiegel, 1945) but there have been few opportunities to study adequately the effect of war on psychological reactions of

civilians. In undertaking such a task in SVN for the purpose of assessing the effects of herbicide spraying, a prime consideration was that the use of herbicides did not occur in isolation from other war activities. The war created many extremely stressful situations and it has been necessary to consider a variety of other kinds of war events in order to understand the effect of herbicides.

It was our original intention to study psychological reactions, as well as other human effects, in four types of communities as outlined in this fourfold table:

	Exposed to Herbicide	Not Exposed to Herbicide
High War Exposure	A	B
Low War Exposure	C	D

This design could not be implemented due to war conditions and the deterioration of security at the time of our study. During field work, it did become possible, however, to conduct one intensive community study utilizing many of the plans and methods which had been prepared for the full study. This took place in the village of Binh Hoa in Binh Duong Province. The village was known to us through an earlier study (Advanced Research Projects Agency, 1969) and was selected at this time because it illustrates Cell A above.

Binh Hoa is inhabited mainly by refugees from the Iron Triangle area in "Zone D" who were resettled as part of a U.S. Military operation (Cedar

Falls) in 1967. The native hamlets of the Binh Hoa refugees had been a NLF stronghold and were subjected to heavy military activity including the use of herbicides prior to their being evacuated and destroyed (Schell, 1967). The lack of identical investigation in control communities (Cells B, C, and D) imposes obvious limitations on the generalizations to be drawn. However, it is possible to give context to the Binh Hoa study by reference to two other data banks.

One of these sources concerns community research carried out in An Xuyen Province (Hamb. and Jamieson, 1970) and involved two villages, one controlled by the NLF and the other by the RVN. Some of the methods used for assessing war stress in Binh Hoa had also been used in the An Xuyen villages. Neither of them had been subjected to herbicide spraying and their exposure to other war activities was low in comparison to many other parts of Vietnam. Thus, they illustrate Cell D and allow us to make some assessment of how Binh Hoa compares to other Vietnamese communities.

The other source of information are studies of psychological strain which employ the same techniques used in Binh Hoa but which were conducted in a variety of other countries (Harvard Program in Social Psychiatry, Leighton and associates). None of them involved populations undergoing war or herbicide spraying, but reference to them makes it possible to see how Binh Hoa relates to some other areas around the world.

The rest of this chapter is divided into three parts. The first describes the methods used and presents our scientific approach; the second compares Binh Hoa with the other communities mentioned above; and the last is concerned with differences in stress and strain among the Binh Hoa people themselves.



## II. Methods

The goal of our study was to determine what kinds of war and herbicide experiences people had sustained and to relate these to measures of psychological functioning. An ideal plan of data gathering would have included extensive observation, interviewing, and psychological testing by an interdisciplinary team of professionals. A significant part of the ideal would have included the use of questionnaire surveys. In view of field limitations under war conditions, structured questionnaires administered verbally by Vietnamese interviewers formed the chief means of collecting information. Four questionnaires were employed: a modified form of the Self-Anchoring Scale (SAS), the Health Opinion Survey (HOS), a Social, Demographic and Attitude Questionnaire (SDA), and a short version of a questionnaire utilized in the study of herbicides conducted by the American Association for the Advancement of Science in 1969 (Meselson, et al., 1972). These will be described individually below.

Questionnaire surveys of this type have the advantage that a sample of people representing a population of interest are asked directly to tell their experiences, feelings, and opinions about certain topics. They have the further advantage that each sample member is asked exactly the same questions phrased in exactly the same way so that comparison among respondents is possible.

Such a survey is undertaken with the knowledge that certain kinds of distortions occur and need to be understood and where possible accounted for or controlled. A well-known distortion is that respondents tend to give answers which they think the interviewer wants to hear. Another is that they give responses which they think may bring subsequent benefits.

It is possible to use numerous technical safeguards in questionnaire construction, research design, and interviewer training. These safeguards were observed as much as possible and will be discussed where apposite.

The Self-Anchoring Scale (SAS) was developed by F.P. Kilpatrick and Hadley Cantril (Kilpatrick and Cantril, 1960). It opens with a request for a description of the respondent's hopes and wishes for his own personal life; this is followed by a request for his fears and worries. The responses give the subject's attitudes and opinions about the best possible circumstances and the worst possible circumstances that could happen to him. These comments provide anchors for subsequent ratings.

A picture of a ten rung ladder is then presented and the respondent is told that the top of the ladder represents what has been defined as the best possible circumstances and the bottom of the ladder is the worst. He is then asked to rate his own personal situation on the "ladder of life," first as it was five years ago, as it is now, and then as he anticipates it will be five years in the future.\*

In human research conducted by Westerners in foreign countries, it is customary to raise the issue of cultural relativity. The question is whether a certain measure or questionnaire is or is not meaningful to each specific cultural group studied. Do the questions have the same meaning from group to group? If not, comparison is unjustified. Although it is not claimed that the ten rung ladder image is an absolute standard against which different groups can be compared, it is generally thought to be a useful

\* In the standard SAS format, the ladder is used not only for rating the subject's personal life situation but also for his view of the national scene. We used both. However, the national data proved to have little relevance for the measures of concern here and, thus, are not reported.

solution to the cultural relativity problem. It employs a visual stimulus (not requiring translation into different languages) which is then made relevant to a specific individual or situation by virtue of the fact that it is "anchored" to the respondent's own definition of what the top and the bottom of the ladder mean.

The SAS appears to be appropriate for use in Vietnam since ladders are familiar to Vietnamese people, as are also the numbers for counting from 1 to 10. The hierarchical organization of Vietnamese social structure would also incline people to understand the meaning of "top" and "bottom" (Hickey, 1964). In addition, the SAS had already been translated into Vietnamese and used in studies of refugees (Murfin, 1969; Rambo, 1969; Rambo, et al., 1967) and of villagers (Rambo and Jamieson, 1970; Popkin, 1972).

In selecting the SAS, we were aware that it did not relate to herbicides directly. We introduced an additional ladder-rating question which proved to be a useful avenue for exploring this area. The introduction to the new question is worded: "Think of your family's present living conditions and economic situation, which rung do you think your family is on now?" When asked for clarification, the interviewers emphasized that "economic condition" was the focus of this ladder rating. The rationale for this question was that it encourages the respondent to think about an area of life, economic condition, where herbicides might have had more relevant impact than on personal life generally. Most of the people at Binh Hoa had been farmers, or family members of farmers, before relocation. It seemed reasonable, therefore, to anticipate that the herbicide experiences of the 1967 era during the Cedar Falls operations might have affected their

economic circumstances. It also seemed reasonable to expect that if a respondent volunteered a herbicide explanation for his economic situation this would reflect both a more valid and a more salient picture of the effect than would questions which ask the respondent to think first about herbicides and then say whether or not they had affected his economic picture. The latter case, it can be suggested, would incline the subject to overstate the effects.

The Health Opinion Survey (HOS) was developed in the Stirling County Study, an investigation of psychiatric epidemiology in rural communities (Macmillan 1957; Leighton, D., et al., 1963). It bears resemblance to a number of other instruments designed to assess psychological strain in untreated populations. One of the first such questionnaires was the U.S. Army's Neuropsychiatric Screening Adjunct (Stouffer, et al., 1950). Other questionnaires which have been constructed for similar purposes include the Minnesota Multiphasic Personality Inventory (Dahlstrom and Welsh, 1960), the Cornell Medical Index (Brodman, et al., 1952; Arnhoff, et al., 1956), the Eysenk Personality Inventory (Eysenk and Eysenk, 1965 and 1967) and the 22 Item Scale (Langner, 1962).

The HOS consists of questions about psychological states (such as feeling that life is not worthwhile or being unsure of one's self) and questions about psychophysiological sensations which are often concomitants of psychological malfunction (such as having one's hands tremble or experiencing spells of dizziness). These feelings and sensations are queried in terms of whether the person is bothered by them; and the questions are formulated so that the respondent is asked to think about his whole life and not simply the situation of a given moment. An

illustrative question is "Have you ever been bothered by your heart beating very hard? Would you say often? Sometimes? or Never?"\*

All items are of this trichotomous forced-choice type which increases the sensitivity of the instrument over and above what would be the case if the respondent could answer only "yes" or "no". A scoring system is applied which rates a never response as 1, sometimes as 2, and often as 3. The range of possible scores is from 18 to 54 since the version used in this analysis consists of 18 questions.

The value of such scores depends on whether or not they differentiate a population into those who exhibit psychological strain and those who do not. The original questions for the HOS were chosen because they maximally discriminated between a criterion group of hospitalized and outpatient subjects who had been diagnosed as psychoneurotic and a criterion group of healthy, well-adjusted asymptomatic individuals living in Canadian communities. The validity of the HOS as measured through comparison of emotionally disturbed patients and community residents was explored more recently by two independent groups of researchers (Spiro, Siassi, and Crocetti, 1971 in Maryland, and Tousignant, Denis, and LaChapelle, 1973 in Quebec). In

\*Others are: Do your hands ever tremble enough to bother you? OFTEN/SOMETIMES/NEVER. Feet sweat so that they feel damp and clammy? Arms or legs go to sleep rather easily? Troubled by ordinary headaches? Feel in good spirits? Have spells of dizziness? Feel that your hair is on end? Feel weak all over? Feel that some people are trying to pick quarrels? Wonder if anything is worthwhile? Look forward to meeting new people? Feel somewhat apart even among friends? Feel healthy enough to carry out the things you want to do? Have periods of such great restlessness that you cannot sit long in a chair? Memory seem to be alright? Have trouble making up your mind? Usually sure of yourself?

both studies the scores of the patients were significantly higher than those of the community members, although the Baltimore group based this finding on a smaller number of questions being asked than the 18 utilized in this study. In the Quebec study and the Stirling County Study, the community residents had a mean score of approximately 25 on an 18 item version of the HOS and the psychiatric patients had a mean of about 35, and it appeared that an appropriate cutting point for distinguishing between people who are probably showing strain and those who are not is 29.5\*

It should be emphasized that the HOS is a screening instrument for surveying large numbers of untreated and undiagnosed people. The determination of a cutting point for the scores produced by such an instrument means that there is good probability that a person with a score higher than 29.5

\* The Stirling County Study, located in Maritime Canada, was begun in 1952 by Leighton and associates. The University of Sherbrook investigation of a Quebec population was conducted by Tousignant, Denis, and LaChapelle in 1970-71. Stirling patients (n=93) had a mean score of 35.9 and Stirling community residents (n=1003) had a mean of 25.8. The Sherbrook patients (n=88) had a mean HOS of 35.0 and the Sherbrook community sample (n=1158) had a score of 26.1. Although the scores are based on responses to 18 questions in each study, they are not an absolutely identical set, nor are they identical to the 18 used in Vietnam. There is a large area of overlap but the congruence is not perfect. The use of these figures as a point of reference is justified by virtue of the fact that there are very high correlations between the scores of slightly different selections of questions (Murphy, 1973; Inkeles and Smith, 1970; and Spiro, et al., 1971). The scores are not presented here to offer direct comparison with the Binh Hoa results which will be shown on later pages, but rather to give "bench marks" for the difference between patients and typical populations in North America.

With the exception of this one point, the HOS results to be presented in this chapter refer to identical sets of items. In the tables on pages 21 and 22, HOS results are given for a Canadian sample which is different from the two mentioned above. It comes from the Stirling County Study, but involves a new representative sample which was selected and investigated in 1969.

would be found on subsequent clinical examination to be suffering psychological strain. This does not mean that the HOS will perfectly identify such people. There are always a certain number of people who genuinely suffer strain but who respond to the questionnaire as if they did not. They are called false negatives. There are also a certain number of genuinely well people who respond to the questionnaire as if they were ill, and they are called false positives. A goal in designing and testing the validity of a measure such as the HOS is to improve the instrument until it produces very few false negatives and false positives.

In the Stirling and Quebec studies the percentage of false negatives runs from 8% to 19% (i.e., 8% to 19% of the patients scored below the cutting point). This could be taken to indicate that the use of the HOS in a population at large will tend to underestimate the actual number of emotionally disturbed people. Another possible explanation relates to the fact that the HOS does not detect schizophrenia, retardation, epilepsy, and senility, for example, and it is possible that the patient groups included some people who suffered from these disorders in addition to the psychoneurotic forms of illness for which they were mainly selected. Thus, on the whole, the HOS appears to identify most people who suffer psychological strain, although it may miss a few.

To explore the problem of false positives, a different approach is needed. In studying a population at large, those people who score above the cutting point are not necessarily false positives. They may be exhibiting psychological strain which has not yet been detected or diagnosed, and which may never cause them to enter the patient role. To locate such people is obviously the main purpose of a screening device such as the HOS. A

pertinent investigation on this point was carried out within the Stirling Study where a sub-sample of 64 community members surveyed by the HOS were subsequently interviewed at length by a clinical psychiatrist. This was a "blind" test, meaning that the psychiatrist did not know in advance who were high scorers and who were low scorers. There was a high correspondence between the psychiatrist's evaluation of the person and the HOS scores (Macmillan, 1957). Thirteen individuals of this sample scored above the cutting point. Ten were evaluated by the psychiatrist as definitely showing psychological strain, mainly of a psychoneurotic type; two were evaluated as essentially well but with slight features of strain, and one assessed as normal and well. The preponderance of high scores were thus found not to be false positives and an important feature of this exercise was that toward the ends of the score range there was especially impressive congruence between the HOS results and the psychiatrist. The higher the score the less likely that a false positive will appear. Thus, in regard to the question of false positives the HOS also appears to do what it is intended to do.

Although this evidence may offer satisfaction about the usefulness of the HOS in Western cultures, it does not touch the problem of cultural relativity. It may seem acceptable that frequent palpitations, low spirits, restlessness, etc., be considered indicative of psychological strain in the United States and other Western groups, but do they have the same meaning elsewhere? One attempt to deal with this question was carried out among a group of Alaskan Eskimos (Murphy and Hughes, 1965). It was discovered that the questions could easily be translated into Eskimo and that the sensations and feelings queried were all recognized by Eskimos as physical and psychological events which happen to Eskimos. This study further suggested that high scores are related to personality malfunctioning as identified by other Eskimos.



Subsequently, the HOS was used in a psychiatric epidemiologic study of Yoruba people in Nigeria (Leighton et al., 1963). This offered greater opportunity for investigating validity because the questionnaire was administered to a group of patients in a local mental hospital. These patients constitute a criterion group of people who had been identified from within their own culture as having mental and emotional problems. The patient sample (n=44) had a mean HOS of 27.3, while a representative group of Yorubas (n=245) from rural villages had a score of 22.8.\* Although the Yoruba rates are lower than the Canadian figures and the difference between the patients and the community population is not as great as in the Western examples, the HOS seems to work almost as well in differentiating the mentally ill from a typical sample of Yorubas in Nigeria as it did in the Western groups.

In Vietnam it was not possible, due to time limitations, to test the validity and cultural appropriateness of the HOS by an investigation of hospitalized patients. But, insofar as judgment can be based on the validation studies described here, we can say that there is a good probability that high scorers among the Vietnamese, as among other populations, are showing psychological strain.

The Social, Demographic and Attitude Questionnaire (SDA) was designed for the Binh Hoa study and is similar to a questionnaire employed in the An Xuyen villages. This instrument elicits information on the respondents' family members, the structure of the household where he lives, experiences

\* This difference is significant at the .01 level. If a score of 25 is taken as a cutting point, 77% of the community members score 25 or below and 70% of the patients score above. There are a somewhat larger percentage of false negatives than in the North American studies, and thus the population estimates in Nigeria may err on the side of missing people who have psychological strain.

in connection with war and relocation, and various other items on life experiences

The Herbicide Questionnaire elicited reports on the effects of herbicide application on a variety of crops and livestock. Many of the responses to this questionnaire have already been reported. They appear in the chapter on Plants and Animals. One question offers evidence about personal experiences with herbicides. It was "Have you ever been made ill by herbicides?" The responses to this were used in the chapter on Health Hazards and are incorporated in the analysis here.

The sample of people who were asked to respond to these four questionnaires was identified as an outgrowth of our earlier study of Binh Hoa. That investigation had been conducted shortly after the people were settled at Binh Hoa in 1967 and within a few weeks of their evacuation from the Iron Triangle. This group consisted of 120 households, and the head of each household had been interviewed. When we made contact again in 1972, we found that 102 of the houses were occupied by the same families as before. It was our goal to reinterview the head of the house in these 102 families for the herbicide study reported here. When the household head had died or could not be contacted within a reasonable amount of time, another adult in that family was interviewed instead.

Our plan was to conduct the 1972 survey in two independent units of time. During the first unit the Self-Anchoring Scale, the Health Opinion Survey, and the Social, Demographic and Attitude Questionnaires were administered to the 102 sample members. Four weeks later the interviewers returned to Binh Hoa and conducted the Herbicide Questionnaire survey. Staging the survey in this way is an important point in our research strategy. It meant that no one knew

at the time of responding to the first questionnaires that we were interested in the effects of herbicides. The interviewers never mentioned the word and no items in the questionnaires used it. It is very unlikely, therefore, that the responses to the first questionnaires were distorted by any pre-conceptions in the minds of the respondents about herbicides.

During the second stage, 92 of the 102 respondents were reinterviewed. Security broke down before the last ten interviews were accomplished, and the interviewing team had to be withdrawn from the field. Thus, the sample to be presented here consists of the 92 people for whom a complete record of the four questionnaires exists.

A prominent feature of the population which this sample represents is that women outnumber men in the ratio of nearly 2 to 1 and among the small number of men, most are over 40 years of age as indicated in the census data shown in Table I.

Table I

Age and Sex Characteristics of Adults at Binh Hoa

	<u>Males</u>		<u>Females</u>		<u>Total</u>	
60 and over	22	(25%)	26	(18%)	48	(21%)
40-59	10	(45%)	46	(32%)	86	(37%)
20-39	<u>27</u>	<u>(30%)</u>	<u>72</u>	<u>(50%)</u>	<u>99</u>	<u>(42%)</u>
	89	(38%)	144	(62%)	233	(100%)

The dearth of young men is characteristic of other Vietnamese communities such as those in An Xuyen (Rambo and Jamieson, 1970) and is accounted for by the fact that they have either died as a result of war or are away fighting. The absence of young men is exaggerated in Binh Hoa as compared to the An Xuyen villages, but this tends to be typical of refugee

settlements. It is also common in refugee encampments to find a marked preponderance of women.

Although the sample accentuates somewhat these two attributes of a refugee population, it is nevertheless a reasonable approximation of the parent population from which it was drawn as shown in Table II.

Table II

Age and Sex Characteristics of the Binh Hoa Sample

	<u>Males</u>		<u>Females</u>		<u>Total</u>	
60 and over	14	(45%)	6	(10%)	20	(22%)
40-59	13	(42%)	26	(43%)	39	(42%)
20-39	<u>4</u>	<u>(13%)</u>	<u>29</u>	<u>(47%)</u>	<u>33</u>	<u>(36%)</u>
	31	(33%)	61	(66%)	92	(100%)

From the beginning of this study it was our intention to observe the canons of scientific investigation as closely as possible. This was our goal in designing the research, developing hypotheses, deciding on instruments and methods of data collection, determining the sample, training interviewers, processing the data, selecting and conducting analytic procedures, and applying statistical tests regarding the significance of the results. Due to the war, these goals were only partially achieved as already evidenced in the fact that only one of the four community studies planned was actually conducted. It would be very misleading if we were to suggest here that what was accomplished will offer proof of either a negative or positive effect. Under the best of research circumstances, proof is rare. Our approach is to provide evidence regarding the confidence which is justified that a given result is probably significant or probably

not.

Many of the techniques available to social scientists nowadays for judging the degree of confidence to be recommended were of limited value in this study. This was mainly due to the small size of the sample and to the unequal distribution of potentially important factors. For example, it is advantageous in a population study to have approximately equal numbers of men and women and equal representation of different age groups. This desiderata was not achieved due to the empirical exigencies of studying a refugee settlement. It will be seen later that certain kinds of experiences regarding war and herbicide spraying were also unevenly distributed. Thus, a few people who may have had an experience critical to our interest are compared to a large number who have not. This creates statistical weakness.

Despite these limitations, it is possible to appraise the results by several criteria and to offer our best judgment as to what is important and what not. One criterion is whether or not a finding fits the hypotheses developed prior to the field investigation. If it does, we hold it to have a measure of credibility not to be given to those findings encountered in examining the data where ex post facto reasoning can occur.

Our general a priori hypothesis is that people who experience high levels of stress will exhibit a large amount of strain. For this study two kinds of stress were conceptualized. One concerns experiences specific to herbicide exposure, and the other concerns war events exclusive of

herbicides. The occurrences in mind as specific to herbicide exposure were damage to personal health and various welfare-threatening events associated with damage or loss of crops and animals. The kinds of experiences thought of as war stress exclusive of herbicide exposure are illustrated in the following: being injured as a result of battle, being captured, having family members killed in war or taken into military service or prison, having one's fields bombed or home destroyed, being hungry or poorly sheltered as a result of war, or having one's life threatened by bombing or gunfire, etc., etc. The amount of devastation thus implied by the term war stress is greater than that of herbicide spraying. Because of this, we developed three specific hypothesis. They flow from the general hypothesis but they constitute the actual guides to analytic procedures.

The three specific hypotheses are:

- A. People who experienced high levels of war stress will exhibit higher levels of psychological strain (e.g. higher HOS scores) than those who experienced less war stress.
- B. People who experienced high levels of herbicide stress will exhibit higher HOS scores than those who have experienced less herbicide stress, but the difference will not be as great as concerns war generally.
- C. People who experienced high levels of both kinds of stress in conjunction with each other will have higher HOS scores than those who experienced little stress or only one kind of stress.

Another criterion of the importance of a result is the level of significance which can be assigned to it by statistical tests.

If the tests indicate that a finding is sufficiently strong and consistent, that the chance of its having occurred at random is less than 5 times out of 100 ( $p < .05$ ) this fact too will lend credibility to the result. In the tables to follow p. values based on t tests are shown when they reach this level of significance.

Other criteria of the genuineness of a result have to do with whether it stems from a measurement that does in fact measure what it is supposed to measure and whether or not the measurement has been contaminated by extraneous influences. Comment on these points has and will be given where appropriate.

### III. Binh Hoa in Comparison to Other Communities

We have described the Binh Hoa refugees as people who have been heavily ravaged by war including exposure to herbicide spraying. Is this a true generalization and how badly off is Binh Hoa in comparison to other areas? A source for answering this question is the choice of rungs representing the ladder of life in the SAS.

In 1972, the Self-Anchoring Scale was administered to a sample of 1800 Americans (Watts and Free, 1973). In 1969, the same questions were asked of the sample of 200 An Xuyen villagers (Rambo and Jamieson, 1970). Table III shows the rung of the ladder referring to life situation which was chosen, on the average, in these separate studies. Americans view

Table III Life Situation Ratings by SAS  
in the United States and Three Vietnamese Communities

	<u>United States</u>	<u>An Xuyen NLF</u>	<u>An Xuyen GVN</u>	<u>Binh Hoa</u>
	1972 n=1800	1969 n=150	1969 n=150	1972 n=102
Average Ladder Rung	6.4	4.6	4.6	2.4

themselves as being more advantaged in regard to personal life situation than do the Vietnamese; and among the Vietnamese, the Binh Hoa residents view themselves as lower on the ladder than the An Xuyen villagers.

In fact the Binh Hoa people see themselves as fairly close to the bottom.

We lack measures by which to gauge the actual validity of the differences in life situation conveyed by the perceptions represented in the ladder rungs, but the face validity is impressive. Field workers familiar with all these areas agree that Americans do, on the whole, have a far better objective life situation than the Vietnamese and that the bombing, herbicide spraying, and evacuation experienced by the Binh Hoa people has been the major factor in reducing them to the least desirable situation.

It is appropriate to use the word "reduced" in describing the Binh Hoa situation because prior to relocation, these people had lived in a fertile and prosperous area. This change in circumstances is reflected in the ladder ratings shown in Table IV where the average rung chosen in the present is compared with the average selected for the period five years previous, which in this case would have been prior to relocation. Before the massive war effort and traumatic forced relocation associated with Cedar Falls, the Binh Hoa people saw themselves in a position very similar to that of the An Xuyen villages.

Table IV Life Situation Ratings by SAS in Binh Hoa

	<u>1972</u> n=102	<u>Five Years</u> <u>Before</u> n=98
Average Ladder Rung	2.4	4.9



Two questions can be raised about our interpretation that this information suggests that Binh Hoa was in an unusually disadvantaged position and that this situation resulted from war. One question concerns whether it is typical of people generally to paint the past in rosy colors as they carry it in their minds as a point of reference for judging the present. If so, the Binh Hoa ladder rungs would not be convincing as evidence that the people were better off before Cedar Falls than they were at the time of this study. The other question concerns whether the comparisons between the United States and Vietnam are not typical of people generally in developed and developing countries. If a large series of ladder ratings from developed countries range from 6 to 9 and a large series from underdeveloped countries ranged from 1 to 4, we would be inclined to say that Binh Hoa is similar to many communities in developing countries and the ladder ratings of Binh Hoa refugees are not necessarily related to war.

For material on this issue, the work carried out by Cantril and his associates in the late 50's and early 60's was consulted (Cantril, 1965). They administered the SAS to a sample numbering over 23,000 people from both developed and developing areas. Their findings suggest that, quite unlike Binh Hoa, the norm is for people to see life getting better rather than worse. They also indicate that people in the developed countries do tend to see their life situation as above the 5th rung and people in under-developed areas see their situation as below this level. It is to be noted, however, that Binh Hoa rates itself in the present as lower than any other of the 15 examples given in Table V except the Dominican Republic.

Table V

Mean Past and Present Ratings For Personal Life Situation  
From Cantril Studies Compared to Binh Hoa\*

<u>Country</u>	<u>Past</u>	<u>Present</u>
Kibbutzim	6.3	7.0
United States	5.9	6.6
Cuba	4.1	6.4
Egypt	4.6	5.5
Israel	4.7	5.3
West Germany	4.1	5.3
Japan	4.6	5.2
Yugoslavia	4.3	5.0
Philippines	4.9	4.9
Panama	4.5	4.8
Nigeria	2.8	4.8
Brazil	4.1	4.6
Poland	4.0	4.4
India	3.4	3.7
Dominican Republic	1.6	1.6
Binh Hoa	4.9	2.4
Average(excluding Binh Hoa)	4.3	5.0

From all these data on ladder ratings, we infer that Binh Hoa is severely disadvantaged in comparison to many other areas in Vietnam and most other developing areas, and further that its level of distress represents a genuine deterioration from the past and can be accounted for mainly by the occurrences of war.

What has happened to the mental health of the refugees while these events were taking place? The Health Opinion Survey (HOS) was not administered to the Binh Hoa people during the earlier study of 1967. And as far as we have been able to discover, this and similar questionnaires have also not been used in any other studies of the Vietnamese. This appears to be the case even though these types of instruments have been utilized in a sizeable number of cross-cultural studies elsewhere (Scotch, 1963;

\* See Cantril, 1965, page 185.

Inkeles and Smith, 1970; Chance, 1962; Langner, 1965). The Binh Hoa findings, however, can be compared to those on over 2500 individuals representing community groups in the United States, Canada, Nigeria and Senegal as shown in Table VI.

Table VI

Mean HOS Scores For Five Samples\*

<u>Country</u>	<u>HOS Score</u>
Nigeria	22.8
United States	24.9
Canada	24.8
Senegal	27.4
Vietnam (Binh Hoa)	32.7

All comparisons are significantly different ( $p < .001$ ) except for Canada and the United States.

The Binh Hoa sample has the highest mean HOS score in this series indicating the greatest amount of psychological strain of any representative group in this cross-national sampling. Recalling the discussion of the capacity of the HOS to differentiate between typical community populations and groups of emotionally disturbed patients, it can further be noted that 65% of the Binh Hoa people register above the point which by the clinical standards of North America would be considered an indicator of need for consultation and very probably for therapeutic aid. Thus, our interpretation of the HOS results is that the people at Binh Hoa are suffering and that the degree to which they are laden with symptoms marks them off as different from most people living in normal communities and as similar to groups whose need is sufficiently great that they seek

\* These data derive from the Harvard Program in Social Psychiatry (Beiser, et al., 1972; Beiser et al., 1973<sup>a</sup>; Beiser, et al., 1973<sup>b</sup>; Beiser, 1973; Benfari and Leighton, 1970; Benfari et al., 1973; Benfari et al., 1972; Leighton, et al., 1963; Leighton and Murphy, 1965; Murphy, 1972; Murphy, 1973)

out sources of relief.

What caused this burden of symptoms? In all probability there are multiple causes. It seems very likely, however, that the stress of war played a major contributing role. None of the groups in North America or West Africa was undergoing a war in their own territory at the time of these investigations. They were, however, experiencing other kinds of stressful situations. In the Canadian study, for example, some communities were rated as low stress and others as high stress in terms of poverty, inter-ethnic relations, secularization, and other factors thought to impoverish the quality of community life.

As seen in Table VII, the high stress communities in Canada have a higher rate of psychological strain than the low stress communities but still not as high as Binh Hoa. The high stress area in Canada exemplifies stress under peaceful conditions, and the factors of experience which make Binh Hoa unique in these comparisons are bombing, herbicide spraying, evacuation, and resettlement.

Table VII

Mean HOS Scores for Low and High Stress  
Communities in Canada and Vietnam

	<u>Low Stress</u>	<u>High Stress</u>
Canada	24.1	27.2
Vietnam (Binh Hoa)	--	32.7

All comparisons are significantly different ( $p < .001$ ).

A large amount of stress experienced by Binh Hoa refugees is conveyed in the SAS ladder ratings. A large amount of psychological strain is conveyed in the HOS scores. We infer that the two are related.

What kind of psychological strain do the Binh Hoa exhibit? In an

effort to gain insight into this question, we conducted a factor analysis of the HOS items utilizing all the groups described in the cross-national comparisons. Factor analysis is a technique for discovering which items hang together or cohere to form a qualitative dimension. Factors are different from the HOS scores which reflect a quantitative summation of the number of symptoms reported. Four factors emerged from this computation as given in Table VIII. Each item is shown with a "loading" which is a measure of its inter-correlation with the other items in that factor.

Table VIII

Factors and Loadings From Analysis of  
2526 Cross-Cultural Subjects

Factor I

Hands Tremble	.640
Arms-Legs Numb	.588
Heart Beat Hard	.552
Hands-Feet Sweat	.451

Factor II

Headaches	.625
Hair on End	.586
Trouble Decisions	.517
Dizziness	.429

Factor III

Life Not Worthwhile	.627
Not in Good Spirits	.599
People Quarrel With Me	.589
Feel Weak All Over	.396

Factor IV

Memory Not Okay	.693
Not Sure of Self	.684
Not Like Meet People	.496
Not Healthy Enough	.405

It is intriguing to note that the first two factors could be interpreted as the kinds of response which Hans Selye identified in his pioneering work on the concept of stress (Selye, 1956). The first factor resembles physiological arousal which is associated with preparing to fight or to flee when threatened. The second is somewhat similar to the pattern of fright which tends to paralyze a person in response to danger. Both factors invoke the image of anxiety. The third factor appears to be a type of psychological functioning which has often been identified as depression, and the fourth conveys a pattern of lacking self-confidence. These factors are drawn from data about men and women of all ages from several different cultures. They suggest that patterns of anxiety, depression, and lack of self-confidence are commonly found in people even of widely different social and biological circumstances.

In an effort to discover the patterns which most characterize the Vietnamese sample, we transformed the factor data into a series of T scores which show the profile of each sample member in terms of the four factors. A T score has a range from 1 to 100; 50 is the mean; and each standard deviation from the mean has the value of 10. A high mean T score indicates that the group of people represented by it responded to the questions in a given factor in such a way as to reflect that they have a lot of whatever that particular factor measures. For example, a high T score on the third factor means that the group of people so measured rarely feel that life is worthwhile and infrequently feel in good spirits while they often feel that other people are against them and they have the feeling of being weak. We can infer that such a group of people are probably more depressed than the other groups to whom they are compared. This factor is, in actuality,

the one on which the Binh Hoa refugees score the highest as shown in Table IX. The next highest is the second factor which involves headaches, dizziness, and trouble making decisions, a type of psychological response which suggests immobilizing anxiety.

Table IX

Factor T Scores of Vietnamese Subjects for Four  
Patterns of Psychological Strain

Factor I	56.3
Factor II	61.8
Factor III	65.7
Factor IV	56.7

Are the people at Binh Hoa similar to or different from most other groups in terms of the number of symptoms expressed by women versus men or among age groups? There are no universally consistent findings regarding this topic, but there is a tendency for women to show more strain than men and older people more than younger.\* These common age-sex tendencies

\* These generalizations are based on a review of epidemiological studies, some of which utilize the HOS or similar scales, while others utilize more intensive clinical investigation. In the North American studies utilized for comparison here women have higher HOS scores than men. This was true also, for example, in a study of Eskimos (Murphy, 1960), of Mexicans (Langer, 1965), of French Canadians (Denis, et al., 1973 and Prince et al., 1967), of Swedes (Essen-Moller, 1956 and Hagnell, 1966), of Blacks and Whites in Florida (Hodges, 1973), as well as in the Senegal example also employed here. An exception is the Nigerian sample where men showed slightly more psychological strain than women. Two interpretations have often been given for this trend. One is that women are constitutionally more emotional than men, and the other is that women experience more stress by virtue of filling a disadvantage and subservient role in most societies.

The situation with regard to age is less uniform, but in numbers of investigations the older people have been found to have more psychological strain than the younger (Srole, et al., 1962; Denis, et al., 1943; Prince, 1967; Hodges, 1973; Leighton, D., et al., 1963; Murphy, 1960; Essen-Moller, 1956; Hagnell, 1966; Taylor and Chave, 1964). In other studies, there appears to be little difference from youth to middle age to aged. In only one study known to us (Parker and Kleiner, 1966) were people under 40 found to exhibit a markedly larger number of symptoms than old people. Thus on balance,

were found generally to characterize the people at Binh Hoa, as shown in Table X. Binh Hoa women have a higher mean HOS than men, and the effect of age is generally to increase the number of symptoms reported except among the very few men under age 39.

Table X

<u>Mean HOS Scores by Age and Sex of</u> <u>Binh Hoa Respondents</u>			
	<u>Males</u>	<u>Females</u>	<u>Total</u>
Under 39	32.0 (4)	31.8 (29)	31.8 (33)
40-59	30.9 (13)	34.5 (26)	33.3 (39)
60 and Over	31.7 (14)	35.3 (6)	33.1 (20)
Total	31.4 (31)	33.4 (61)	32.7 (92)

No significant differences.

Despite the problems posed by unequal representation, these findings suggest that Binh Hoa people show the trends regarding age and sex which are found to exist in most other societies. Also this evidence demonstrates that the high HOS mean which represents Binh Hoa is not brought about by an excessive amount of strain evidenced in just one sex or in one age-sex group. Those factors which account for the high HOS appear to have had wide impact. If stress is a factor, these findings suggest that it has had influence on the young and the old, the men and the women.

To sum up the results of comparing the Binh Hoa refugees to other groups, five points can be made: 1) Binh Hoa is a severely disadvantaged population, 2) This position of disadvantage results from circumstances of

these cross-cultural comparisons suggest a tendency for older people to usually be worse off in terms of emotional strain and almost never better off than the younger people. This may reflect that biological aging is itself debilitating, that people have more opportunity to experience stress as they move along the life arc, or that in most societies older people fill a stressful role of lower social value than people in their prime or in their youth.



war, 3) Among the scars born by this group is a heavy burden of mental and emotional strain, 4) The psychological attributes which best represent their state of mind are the feeling of being depressed and doubting that life is worthwhile, and 5) Binh Hoa is very similar to many other populations in terms of the age and sex trends of psychological strain and no age-sex group has been completely protected against the life stresses of the war years.

#### IV. Stress and Strain in Binh Hoa

We know that the war experiences of the Binh Hoa people were homogeneous to a remarkable extent. All had lived through Operation Cedar Falls; all had had their homes destroyed; all had been evacuated; all had shared five years of marginal existence as refugees; most had been landed farming families and now were either unemployed or working as farm laborers. This similarity of stressful experiences has been offered as an explanation of the wide difference between the amount of psychological strain evident in Binh Hoa and that in other socio-cultural groups.

The questionnaire responses lend considerable support to this picture of commonly shared experiences. For example, the respondents were asked to rate house, employment, and community facilities in terms of whether they were worse, the same, or better in the present as compared to the past. The results are that 91% of the respondents believe their employment situation to be worse now than before, 85% think their houses are worse, and 92% believe the community facilities to be better.\*

\* This set of questions deserve comment in another vein. It touches on the relationship between objective reality and questionnaire data regarding perceptions and opinions. It seems to us that these responses correspond well to objective reality. Where they do not correspond, it is due to the interpretation of reality which exists in the emotionally

On the other hand, there is also evidence that everyone did not have exactly identical experiences. For example, in the last chapter where health hazards were discussed we pointed out that 52% of the Binh Hoa refugees indicated that they had sustained one or more symptoms at the time of herbicide spraying while the others did not. In this section we will look at differences in experience and relate them to differences in psychological responses among the Binh Hoa people themselves. If the stress-strain model is correct, those individuals in Binh Hoa who have borne the largest number of the hard knocks of war should be the ones who show the highest levels of strain. If exposure to herbicides can be isolated as a separate and specific hard knock, we can perhaps weigh the relative influences of herbicide stresses and other war stresses.

invested beliefs of the individual. It is the view of our field team that the employment situation had, indeed, deteriorated markedly since Cedar Falls. The housing and community facilities are a different matter. As part of the SVN's effort to improve refugee camps, Binh Hoa has a school, a health station, and an adequate water supply. Thus, the community facilities probably are better in an objective sense. To the outside observer, housing may also appear adequate, consisting of row houses made of cement blocks. These are not, however, in keeping with the life style of the Vietnamese villager and, in all probability, do genuinely seem worse to Binh Hoa people than their former homes.

Regarding survey methodology, the four questions are an example of the situation where a distortion might occur due to response set. We mean by this that the questions were asked one after the other, they had the same format and required the respondent to answer in terms of pre-determined categories. Under these circumstances, especially with a long list of similar items, it sometimes happens that the subject begins to respond in a "set" fashion and he does not change when change of response is actually what best conveys his opinion. It is clear that in this short series, response set did not interfere since community facilities were rated opposite to the rest. We can conclude that the responses are an adequate reflection of the real world as it is seen by these people and also that they underscore the point about homogeneity of experience.

In order to locate those factors which might differentiate the Binh Hoa group in terms of stress, we decided, as a rule of thumb, to ignore any experience which applied commonly to 50% or more of the sample. We also decided to adopt an additive model of stress. The additive model stems from the logic that experiencing two hard knocks is worse than one, and three is worse than two. This model has proved useful in another study of life stress (Langner and Michael, 1963). It also has the analytic advantage of spreading subjects out over a continuum of multifaceted stress rather than dichotomizing them by one variable only.

The first step in this section will be to describe the measures of herbicide stress, then war stress, and finally to discuss the relationships between both kinds of stress and the measures of psychological strain.

#### IV-A. Herbicide Stress

The purpose of our search for herbicide exposure variables was to identify the group of Binh Hoa refugees who were at risk and then to develop a scheme for rating the intensity of stress experienced in association with the risk factor. Two questionnaire items were utilized:

- 1) Herbicide mention (Herb mention hereafter)
- 2) Herbicide illness (Herb illness hereafter).

1) Herb mention refers to volunteered comments given in the SAS ladder rating questionnaire which was administered in the first round of interviewing. These comments were stimulated by the ladder of economic condition and were given prior to the identification of our interest in herbicides. Twenty-six percent of the sample (n=24) offered an herb mention, and we considered this sub-group as composed of people whose economic position was at risk due to herbicide spraying. Our next task was to discover

who among them had experienced a meaningful degree of stress. The question became, "For whom had herbicide spraying created a significant disadvantage or threat?"

The respondents had been asked to rate their economic position as it was five years previously and as it was at the time of the study. Just as the Binh Hoa people tended to see their personal life situation as getting worse after 1967 (page 20), most saw their economic position as also going down. It can be seen in Table XI that 49% evaluated themselves as dropping three or more rungs from their previous position on the economic ladder.

Table XI

Past and Present Rungs on the Ladder of Economic Position

<u>Position</u>	<u>Percent Reported</u>
Decline of 6 or more rungs	9%
Decline of 5 rungs	11%
Decline of 4 rungs	13%
Decline of 3 rungs	16%
Decline of 2 rungs	19%
Decline of 1 rung	8%
No change	15%
Increase of 1 or more rungs	9%
	<u>100%</u>

Taking a decline of three rungs as probably reflecting an important amount of disadvantage, we discovered that this divided the herb mentioners about equally between those who had experienced such a level of perceived stress and those who had not, as indicated in Table XII.

Table XII

Economic Disadvantage and Herb Mention

	<u>Herb Mention</u>	<u>No Herb Mention</u>	<u>Total</u>
Economic Disadvantage	15%	34%	49%
No Serious Economic Disadvantage	11%	40%	51%
Total	26%	74%	100%

The fourteen people (15% of the sample) who indicated economic disadvantage and volunteered herbicides as a contributing factor are the group who, in this analysis, will be rated as having experienced economic stress in association with spraying. In the herbicide stress measure, they are considered as having had one hard knock.

2) The other component of the herbicide stress measure is the health information. In keeping with the model outlined above, we conceptualized the group at risk as those who reported any symptoms at the time of spraying. Those people who said they had two or more symptoms we considered to have experienced stress. This definition of health stress in conjunction with herbicides identified 37% of the sample (n=34) as having had another kind of hard knock.

An asset of the herbicide stress score is that it deals with two facets of life, economic position and health status, which are the chief ways through which herbicides could have had a direct effect on humans. Further, the score has allowed us to identify a minority who were special in the sense that the impact of herbicide spraying was greater for them than that which may have applied across the board in this largely homogeneous population.

Are there any liabilities regarding the two herbicide stress variables? To avoid spurious results it is important to scrutinize the stress variables to see if they are, by any chance, measuring the same thing as the strain variables. If this were the case a correlation between stress and strain would be revealed by virtue of the fact that it had been built into the analysis.

The question can be stated in the following terms, "If a person is

anxious and depressed as would be conveyed by a high HOS score, does his psychological state influence his report of stressful experiences vis-a-vis herbicides?" Put more concretely, "Is it not the already depressed Binh Hoa refugees who report that they have been declining in economic position over the past years?" It is in keeping with the concept of depression as a psychological state that it inclines people to perceive the world in bleak and worsening terms. Perhaps the people who report a drop of three rungs in economic position are not actually the ones who experienced stress. Perhaps their perception of economic decline is simply the outcome of psychological depression, and the state of depression is then presumably the outcome of some other as yet unknown circumstance. If this were the case it would mean that we were measuring as stress what is actually strain. Any positive correlation we might later find between economic stress of this type and the HOS scores would be there because we had inadvertently put it there and not because we discovered it as the "true" relationship between two genuinely different types of phenomena, one being the stress of experience and the other being the strain within the person.

This is clearly an important issue. We will call it the problem of counterfeit measures. The significance we attach to it is disclosed in the emphasis placed on selecting study sites from a priori knowledge of different kinds and levels of stress so that such information would not have to come exclusively from asking the very people whose psychological state we hoped to measure.

Having built an argument against the economic decline variable, we will now outline why we believe it to be an useful indicator of stress connected with herbicide spraying. Our reasons are these:

a.) No matter how subjects and sites might have been selected, we would still have asked questions about each respondent's own personal experiences regarding war and herbicides. The results of these questions would have been given considerable weight in determining the impact of herbicides on that subject as a unique and private human being. The philosophy displayed in this reasoning is that in human research direct questioning is necessary and valuable even though under ideal conditions it is used in conjunction with other sources of information

b.) The problem of counterfeit measures has been put forth as though the strain measure concerned the psychological state of depression exclusively and the stress variable concerned the perception of economic decline exclusively. This is, in fact, a false picture. It was an oversimplification in order to state the problem.

c.) The HOS as a measure of psychological strain is highly generalized. It deals with both psychological and psychophysiological phenomena and regarding the latter refers to multiple systems of the body. It is not, therefore, just a measure of anxiety, nor is it just a measure of depression. One reason it appears to discriminate successfully between psychologically well and ill subjects is this non-specificity, probably because a mixture of psychological features is more common than a single dimension in pure form. In the light of this, the economic decline information which might be influenced by depression does not seem to be a counterfeit measure of general psychological strain, or at least if there were some contamination from this source it would be weak and dilute.

d.) The stress measure includes not only economic decline but also the volunteered herbicide mention. It will be recalled from Table XII

that the perception of a three rung decline in economic position was characteristic of half the Binh Hoa population and that only 15% mentioned herbicides in addition. We have been unable to think of any a priori state of psychological strain that would be a reason for a person to identify herbicides as related to economic decline rather than the other contributing factors given, such as difficulty in finding employment or the high cost of living. In other words, there do not appear to be any counterfeit links between the HOS responses and the herb mention.

e.) If there were a spurious correlation of the type being discussed here between a high HOS score and the likelihood of perceiving economic decline, the weight of it would be thrown against the herbicide stress hypothesis rather than toward it. This is because most people who reported a three rung decline will not be classified as having an economic hard knock in the herbicide stress score (34% of the economically disadvantaged did not mention herbicides as compared to 15% who did).

In the light of the points above, we consider the use of the herb mention indicator as contributing to as rigorous a test of the herbicide stress hypothesis as we will be able to accomplish.

This point about the questions we asked ourselves regarding the possibility of counterfeit measures has been spelled out at some length because the same exercise was carried out for each variable. This allowed us to sort the variables into those we assess as being stronger in these regards and those which are weaker.

Regarding the herbicide stress score, we consider the herb mention variable (economic stress) to be the stronger and the herb illness variable (health stress) to be the weaker. The reason for the latter is the recognition that it is more difficult to distinguish between psyche and



soma than between economic decline and psychological states.

For example, "Would a person suffering from an organic disease or from malnutrition answer the questions in such a way as to receive a high score simply on the basis of the physiological situation and not the psychological?" This question may come to mind because some of the items refer to physical sensations. This is especially important in a population from a developing country where the burden of physical illness may be heavy. In the study of the Serer referred to earlier, HOS-type scores were compared with the results of testing blood pressure levels and hemoglobin counts and were found not to be correlated (Beiser, 1973). This offers considerable support for the view that the HOS does in fact measure distinctively psychological phenomena and is not simply a reflection of organic disorders. On the other hand it is important to recognize that physical and psychological factors often combine to form a general state of well-being or a general state of ill-being and that it is rarely entirely clear-cut as whether the organic is antecedent and the psychological consequent or vice versa (Collis, 1966; Longaker and Godden, 1960).

A conservative position would be to exclude from the indicators of stress any measures of physical illness. We decided against this because health is one of only two avenues of direct herbicide effect on humans. To leave it out seemed more unwise than to include it in this qualified way as the weaker variable. Some researchers would be inclined to say that even this is unnecessarily cautious insofar as evidence exists that the HOS taps a distinguishable psychological dimension of functioning. To them illness would appear to fit particularly well the definition of stress as a threat to human survival and well being. They would argue that the

condition of being made ill when herbicides were applied is thus an excellent example of the kind of human stress which may have been caused by herbicides and should therefore be investigated.

In the last section of this chapter where the findings on the relationship between stress and strain are given, the herbicide stress measure is used in two ways: first by the single component of economic stress; and second by the two components in combination. For the latter we divided the sample into a low stress group and a high stress group. The low herbicide stress group consists of 49 respondents (53%) who gave no evidence of health or economic stress as defined above. The high stress group consists of 43 respondents (47%), of whom 38 experienced either a hard knock on economic position or a hard knock on health, and 5 of whom had both kinds of stress.

Among the Binh Hoa refugees it was somewhat more common for men (52%) to indicate herbicide stress than women (44%). This probably reflects the greater likelihood that men were in the fields when spraying occurred. It may also mean that men are more sensitive to changes in the economic position of the family than women. It is clear, however, that no segment of the population was totally excluded from the impact of herbicides since about 50% of each age-sex group reported herbicide stress except among younger women where only 35% indicated stressful experiences.\*

#### IV-B. War Stress

The model for designing a war stress score was essentially the same

\* In order to have as equal numbers as possible for assessing the impact of stress on the different age groups, the sample was divided into four units: 1) men 57 years and older; 2) younger men; 3) women 41 years and older; 4) younger women.

as that for herbicide stress except that we sought to identify war experiences in which herbicides did not play a role. The score thereby designed has four components:

- 1) War deaths
- 2) War separations
- 3) Life situation decline
- 4) Apprehension about the future.

The first two are considered stronger than the second two, and when applied in relation to psychological strain are utilized in the two-stage fashion described above for herbicide stress.

1) The war death indicator refers to the 21 respondents (23%) who reported that one or more relative within their households had been killed as a direct result of war. The relevance of this indicator seems self-evident. Since there is very little likelihood that the report of such experience could be distorted as an outcome of perception this variable is considered strong and constitutes one hard knock of war.

2) War separation refers to the 16 respondents (17%) who reported that a husband, son, or daughter was currently in military service, in prison, or missing in action. Our evaluation of this variable is the same as for war death.

3) The life situation decline indicator refers to the 38 respondents (41%) who reported that they had gone down three or more rungs on the ladder of life between 1967 and the present.

4) The indicator of apprehension about the future refers to the 42 subjects (46%) who identified two or more fears for the future in regard to the ladder of life. The most commonly identified fear concerned lack of food and clothing, and the next was difficulty in finding work.

The indicators regarding life situation decline and future apprehension are thought to be weaker variables than war death and separation because there is a possibility that anxiety and/or depression as psychological states would influence them. They are included because it seems clear that the effect of war on people was much greater than would be attested simply by the death and separation of family members. The information on decline from the past and fears for the future are general in orientation--life situation in general and the future in general--and therefore appeared useful in understanding the complex and overall impact of the war. Further, no one volunteered that they feared the future use of herbicides and no one saw herbicides as having played a role in placing them at a particular position on the general ladder of life situation.

Only a few of the Binh Hoa people (17%) had not been subjected to at least one of the four hard knocks of the war stress measure. Grouping those who reported none with those who reported one component of the war stress measure gives 47 subjects (51%). We believe these people can appropriately be classified as having experienced low war stress relative to their fellow refugees. The remainder (49%) are classified as having had high war stress, meaning that they reported two or more hard knocks.

There is very little difference in the proportions of men (52%) and women (48%) who sustained high war stress. As in the case of herbicide stress none of the age-sex groups was free from hazard although young women were again somewhat protected (42%) while young men were more vulnerable (57%).

IV-C. Relationships Between Psychological Strain and Stresses From War and Herbicide Spraying

In this section the findings are presented. They are represented in two Tables. The first (Table XIII) utilizes the following classification of stress types: 1) Economic stress from herbicides, 2) Death and separation stress from war, 3) Herbicide economic stress and war deaths/separations, and 4) None of the above stresses reported. The tabulation is thus limited to the variables we identify as strong.

The second (Table XIV) involves a broader classification of stress in which both the type and the degree of stress are taken into account. The second table employs all the stress indicators discussed in the previous pages in an additive model of hard knocks. The categories are: 1) Low herbicide stress and low war stress; 2) Low herbicide stress and high war stress; 3) High herbicide stress and low war stress; and 4) High herbicide stress and high war stress.

Table XIII

Herbicide and War as Types of Stress With Associated Mean HOS Scores

<u>Types of Stress</u>	<u>Sample Size</u>	<u>Mean HOS Score</u>
None of the specified stresses	47	31.6
War Death / Separations Only	31	33.4
Herb Economic Stress Only	8	33.5
Both War and Herb Stress	6	36.3
Total	92	32.7

No stress is significantly different from Both War and Herb Stress (p.<.036)

Table XIV

Types and Degree of Stress With Associated Mean  
HOS Scores

<u>Types and Degree of Stress</u>	<u>Sample Size</u>	<u>Mean HOS Score</u>
Low Herbicide - Low War	27	30.6
Low Herbicide - High War	22	33.0
High Herbicide - Low War	20	32.7
High Herbicide - High War	23	34.8
Total	92	32.7

Low-Low is significantly different from  
High-High (p. < .011)

The conclusion to be drawn from each of these analyses is that war and herbicide stress are correlated with high HOS scores. In the first, the people who indicate none of the specified types of stresses have a mean HOS score of 31.6. Those who reported both war and herbicide types of stress have a score of 36.3. The likelihood of this difference occurring by chance is 3 times out of a hundred. In the second, those people who report a high degree of both war and herbicide stress have a score of 34.8. Those who reported no ill effects from herbicides and who experienced a low level of war stress have a score of 30.1. The likelihood of this difference occurring by chance is one time out of a hundred.

It will be recalled that the hypothesis that guided our work was specified in three ways: 1) People who experienced war stress will have a higher mean HOS than those who did not; 2) People who experienced herbicide stress will have a higher HOS score than those who did not but it will not be as great a difference as pertains to war, and 3) People who experienced both kinds of stress in combination will have a higher HOS score than do those who experience only one of the two forms of stress. If the specifications of the hypothesis were to be supported by statistical

testing, it would require that each group be significantly different from all the others (i.e., within at least 5% confidence limits). This is not the case in either Table XIII or XIV. It is notable, however, that when war and herbicides are taken individually as sources of stress they have similar influence on the level of psychological strain. This was not expected and it suggests that herbicides in the Binh Hoa population have had equal rather than less influence when compared to other war activities.

It is now possible to evaluate the credibility of the finding that there is a positive relationship between psychological strain and a stress measure that combines herbicides and war. We believe the finding is genuine because:

- 1) In both analyses there is a generally good fit between the a priori hypotheses and the results. The deviation is in the direction of showing herbicides to have played a greater role as a stress factor than we originally expected.

- 2) In both analyses the results of statistical testing of a major comparison (i.e., between little stress and stress which combines herbicides and war) is within the limits generally used by social scientists as an indication that confidence in the findings is deserved. The fact that the level of significance for these intracommunity comparisons does not support as much confidence as that which pertained when Binh Hoa was compared to samples from other countries is mainly due to the smallness of the sample and uneven distributions.

- 3) The same conclusion derives from two analyses, one considered a rigorous but narrow test using only the stronger variables, and the

other considered a broader and more meaningful test which probably is a better approximation of reality.

A final step is to ask if these findings within the Binh Hoa population are clinically meaningful. As background we must recall that Binh Hoa as a whole is a heavily burdened population with 65% scoring above the point which clinicians in North America would use as an indicator that a person is probably disturbed emotionally and needs help. Among those who experienced high stress from war and herbicide spraying 76% report such a level of strain. Among those who experienced low stress relative to others at Binh Hoa, 52% score at this level.

Equally important to the question of clinical significance is the range of HOS scores for the two groups. For those who experienced relatively little stress the range is from 23 to 40; for those who experienced a high level of stress the range is from 24 to 47. As said earlier, the HOS seems to function in such a way that the higher the score the more sure the clinical examiner will be that he is dealing with an instance of unequivocal strain of a psychological type. We infer therefore that if the group of subjects at Binh Hoa is like other groups in which the HOS has been clinically validated, the relationship of the score to clear-cut clinical evidence of psychological strain is linear. Among the highly stressed refugees there are not only more people who show signs of strain but also more people about whom there is very little doubt that they are suffering.

To conclude this section of stress and strain among the Binh Hoa people themselves, the evidence suggests the following points: 1) Those refugees who have had the largest number of hard knocks during the war years show the greatest amount of psychological strain. 2) The stress related to the spraying of herbicides played a discernible role among



the correlates of psychological strain, and 3) Herbicide stress in conjunction with stress from other sources of war activity should be considered as possible causes of the psychological scars sustained by those who were at Operation Cedar Falls.

#### SUMMARY

This investigation of responses to stress indicates that the psychological well-being of people at Binh Hoa has been damaged. The correlation of high levels of psychological strain with the life-threatening and disadvantageous experiences examined in this study suggests that war was a major factor. Further, the evidence suggests that the spraying of herbicides contributed in both a general and a specific way to the burden of psychological malfunction.

In the last chapter where herbicide hazards to physical health were discussed, we pointed out that many people believe their health to have been affected for a short period of time after spraying occurred. In this chapter we have pointed to a much longer lasting effect. Five years after the traumatic upheaval of Cedar Falls, the Binh Hoa refugees still appear to be suffering a psychological aftermath which is not only important in the moment but which may continue into the future.

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## SECTION IX. VIETNAMESE VIEWS ON THE USE OF HERBICIDES

Our purpose in this section of the report is to discuss Vietnamese public opinion regarding the use of herbicides. This means attempting to assess the effect on attitudes. There are, of course, in Viet-Nam as elsewhere, not one but many publics, and even within each public, numerous subdivisions reflecting different trends in opinion.

For the purposes of this report, we are positing two publics:

1) the rural inhabitants of the provinces, and 2) the urban intelligentsia. Within the provinces, we shall distinguish between villagers and officials. Among villagers, we shall further distinguish among villagers under Government of Viet-Nam control, those under National Liberation Front control, and those living in contested areas at the time of spraying. We shall also distinguish between officials at the hamlet and village level and those in the district of provincial capitals. The urban intelligentsia will be divided into two categories, those who in general support the government, and those who are considered to be in opposition to it (but not members or necessarily supporters of the National Liberation Front).

The content of the interviews which have formed the basis of our data up to this point, i.e., what people said, shall here be called "opinions." We use opinion to indicate what someone has said they believe to be true, or said they think is probably true. From here on we shall limit "belief" to our inferences as to what people believe, based upon observations of their behavior, what they have said, what they are known to have done, and in some cases what they have written or told to others. Further, the word "belief" will also be largely restricted to descriptive, existential beliefs, with

focus upon the cognitive dimensions of belief systems.

"Attitude" will be used to refer to a relatively enduring affective, evaluative dimension and its behavioral implications. Also implicated is the concept of values. This refers to a much higher level of abstraction than belief or attitude. By "value" we mean preferred modes of action or states of being. Thus, in this framework, any given individual may have many tens of thousands of beliefs, several thousand attitudes, but no more than a few dozen values.

#### The View From the Provinces

The Vietnamese peasant, like many other peasants around the world, is a pragmatist\* concerned with physical and economic security for himself and his family. He is a careful observer of those factors which he perceives to be relevant to his security and survival. It is understandable, therefore, that the use of herbicides is not a matter of grave concern to people living in areas which are not close to those that have experienced exposure. Our data suggest that these people have relatively few attitudes about herbicides. Those they do have appear to be of low intensity.

On the other hand, the rural population living in or quite close to

\* This view of the peasants as essentially pragmatic and non-ideological in their views is supported by the responses of the Binh Hoa refugees to the SAS question on national well-being. Asked to describe what they considered to be the best possible future situation for Viet-Nam, 69% stated the hope for peace and happiness as their first choice, 14% wanted a peaceful, rich and strong country, 10% had economic and security concerns while only 7% expressed concern with the political issue of reunification. Second order choices were almost exclusively concerned with the economic situation of the country.



areas that have been sprayed have detailed, concrete beliefs about herbicide based upon their experience, and the experience of friends, relatives and opinion leaders in their communities. They believe that herbicides have damaged, or in some cases destroyed, a variety of crops ranging from the primary staple of rice to secondary crops of beans, manioc and fruit.

Respondents in the provinces we studied named over 25 different plants grown for food which they considered sensitive to herbicides (see Section IV). They distinguished certain crops and trees as much more susceptible than others to herbicides and between the effects of direct spraying and the effects of drift. Many of them also reported differential vulnerability of certain crops at various stages of plant development. In many cases they separated intentional crop destruction from accidental damage due to drift from defoliation missions, but they made no distinction between agents and think of herbicides as a single chemical agent.

People in the herbicide affected rural areas believed that the main consequence of herbicides was economic loss to farmers and fruit growers. Very few thought of damage as permanent in an ecological sense. They believed that fields and orchards destroyed by herbicides can be successfully replanted after a relatively short period of time. On the other hand, they viewed economic loss as something that would not be recovered. Most of these people also thought that herbicides caused loss of livestock, especially chickens and pigs, but did not consider this severe except in rare instances. Many thought that herbicides bring on coughing, headaches, and other painful symptoms but few believed herbicides are hazardous to health in a long term or fatal sense.

It was notable to us that villagers generally did not express values

regarding the use of herbicides. Their response to questions was to relate their experience with herbicides, describing in detail the various effects they or others witnessed. Spraying seemed to be accepted as a fact of life, one part of a larger situation which defied comprehension. We met few people in the provinces who spoke in terms of sweeping generalizations or with moralistic overtones. Yet it was quite obvious that no one was happy about having his crops destroyed. Destruction of crops was bad, bad no matter what the cause, but there did not seem to be a singling out of herbicides. As one respondent put it, "In this war my crops can be damaged anytime. If it isn't done by tanks or bombs, it's the chemicals dropped by planes."

Village and hamlet officials, in addition to citing their own opinions, gave what they claimed to be the beliefs and attitudes of the people in the village or hamlet. These showed the people as angry at the time their crops were damaged by spraying, and as expressing hostility towards those whom they felt were responsible, namely the United States.

Peasants and hamlet level officials in Long Khanh were explicit about assigning responsibility to the United States for the use of herbicides. Village officials, on the other hand, mentioned both the United States and the Government of Viet-Nam as being responsible. In Kien Hoa, a few people mentioned the Government of Viet-Nam; it was clearly the consensus of opinion among both villagers and village officials that it was Americans who performed the spraying, and it was they who must be held responsible.

Among the people from insecure or formerly National Liberation Front controlled areas, there was more of a tendency to view the use of herbicides as a harsh and inevitable fact of life--one more thing to be cursed, feared

and accepted along with drought, flood, pestilence, bombs and battles. Some officials from such areas described the attitude of the people as a passive one, with few complaints and acceptance of crop damage as inevitable.

Several village chiefs and farmers, however, said that there were some scattered protests and that debate over herbicides did arise during village meetings. Six of fifteen village chiefs interviewed in Kien Hoa, some military officials at district level, and some farmers expressed the opinion that many people had been angered by the use of herbicides beneath their outer passivity and hated the government for it.

Farmers from Thanh Phong Village in Kien Hoa, who had been living under National Liberation Front control from 1960 to 1970, reported being urged by National Liberation Front officials in 1966 to go to the Government of Viet-Nam district capital and request that spraying be stopped. Such requests were not, however, entirely limited to Front controlled villages. According to a hamlet official of On Cung, Hieu Kinh Village, after the farmers of the hamlet suffered crop damages in 1970, eight farmers, acting on the behalf of all the farmers in the hamlet, sent two protest letters to him. The letters did not ask for compensation, but asked for an end to herbicide spraying.

Reactions to the use of herbicides also tended to vary among the rural people according to sources of income. In general, rice farmers seemed to have little fear. Although in absolute terms there were many reports of damage to rice, there were also many rice growers so that proportionately, rice growers made few reports of damage. Coconut growers, on the other hand, were fearful of and antagonistic to the use of herbicides because of their well-founded belief that coconut trees were very susceptible to damage from

direct spraying and some damage from spray drift. Many village officials, farmers, and oil mill operators concurred that farmers were reluctant to plant new coconut trees because such trees would take a long time to reach the fruit-bearing stage and would be vulnerable to herbicides in the interim.

One case was encountered of requests by a rural population for more herbicide use. A village official from Tan Thuy Village in Ba Tri District, Kien Hoa, reported that people had requested more spraying because it opened up new land for their use in mangrove areas.

Since they believed that the primary effect of herbicide was temporary economic loss, many people held the attitude that herbicides were less detrimental than bombing and artillery fire. While some feared the effect of herbicides upon their health, others said that "bombs kill and herbicides don't." In areas where fields had sustained B-52 bombing runs, people tended to rank bomb craters as a more serious and permanent problem than herbicides.

Opinion was mixed as to whether herbicides or insects were a greater problem for crop production. Some felt that herbicides caused less damage to rice than insects and rats. Others observed that insects were always harmful, while herbicides were a temporary problem. Some people believed that herbicide spray actually reduced the number of insects, thus compensating somewhat for the damage caused by the herbicide itself. These represent a rather small number of people, however, and even they were not all convinced as to the importance of this presumed benefit.

#### Government of Viet-Nam and National Liberation Front

##### Propaganda About Herbicides

Peasant beliefs about herbicides were not formulated entirely from experience, but rather in the midst of a propaganda cross fire of National Liberation Front and Government of Viet-Nam claims as to the dangers and benefits of using herbicides. Such propaganda undoubtedly exerted some influence in the opinion formation process, although the marked discrepancies between peasant beliefs and propaganda themes in this regard suggests that neither Liberation Front nor Government of Viet-Nam statements had high credibility in the eyes of the villagers.

Long Khanh and Kien Hoa seem to have had rather different exposure to propaganda about herbicides. In fact, the pattern of diffusion for each province remarkably parallels its pattern of herbicide spraying described in Section III. In Long Khanh, rural informants reported only limited direct exposure to either GVN or NLF herbicide propaganda. It was known that the Liberation Front opposed the use of herbicides and called the spray "poison," but few of the specific Front claims about the alleged bad effects of defoliants were reported. National Liberation Front propaganda operations, like the herbicide spraying runs in this province, were carried out primarily deep in the forests, with only a limited quantity of "drift" penetrating into settlements. The Government of Viet-Nam propaganda appears to have been equally distant. Official policy at Province Headquarters maintained that herbicide use was a strictly military measure to deprive the Communist forces of hiding places; that herbicides were not injurious to people or livestock; that wind drift might destroy some crops, but that the people must remember that there was a war on and that they must be willing to make sacrifices for the betterment of the country and not think only of themselves. Arguments of this nature were reported as having been presented in several villages. Apparently, no sense of obligation on the part of the Government of Viet-Nam to compensate individuals for losses was expressed, and few farmers report having been told of the compensation program through local information service outlets. This may, in part, explain the very limited success of the indemnification effort there. People did, however, get some information through radio Saigon.

Kien Hoa presents a sharp contrast to Long Khanh with a far more vigorous

propaganda war about herbicides having been waged by both the National Liberation Front and the Government of Viet-Nam. Liberation Front statements emphasized the dangerous nature of herbicides, claiming that the chemicals caused the death of people, livestock and crops, resulted in increased numbers of miscarriages and stillbirths, and caused numerous diseases, especially leprosy and conjunctivitis, while eating spray-contaminated vegetables was said to bring on stomach aches. It was claimed that the United States had deliberately introduced "chemical bacteria" into the spray which could thus penetrate people's bodies and cause disease. Other charges were that herbicide spraying led to increases in the insect population (thus threatening the harvest), and that spraying was part of a deliberate United States and Government of Viet-Nam campaign to destroy the crops of the people. Unlike those we interviewed in Long Khanh, respondents in Kien Hoa, including persons with strong pro-government leanings, were usually familiar in detail with these National Liberation Front claims. On several occasions, villagers held "struggle meetings" and demonstrated at various government headquarters against the use of herbicides, basing their protests on the Front endorsed themes.\*

Government counter-propaganda was widely and vigorously disseminated in Kien Hoa, using a variety of media including motion pictures, posters, radio broadcasts, aircraft loudspeakers and leaflets, as well as talks and

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\* The Government of Viet-Nam officials uniformly stated that these protest demonstrations were organized by the Front and that once the Government information cadre told the people the "truth" about herbicide effects, they ceased to believe the National Liberation Front propaganda.

demonstrations by information cadre and local officials. According to province officials, an information cadre was sent to every hamlet\* to explain to the people about the government policy with regard to herbicide use and to demonstrate that herbicides were harmless. The Government of Viet-Nam's line was that the guerrillas "hid out" in thickly vegetated areas, using these as bases for their terrorist activities against the people. In order to defeat the guerrillas and thus ensure the people's security, the Government of Viet-Nam was forced to use herbicides. In some cases, people's crops would suffer limited damage and in these cases the government would provide compensation.

Specific themes stressed in the Government of Viet-Nam propaganda were that use of herbicides would improve security and that herbicides were essentially harmless\*\* and, in fact, were even often beneficial in that they promoted growth of trees and crops and improved the quality of the soil. Prior to spraying an area, the Government of Viet-Nam also frequently gave advance warning to the population, promised compensation for crop damage, and explained the procedures to follow in claiming compensation. Where compensation was not paid (Government of Viet-Nam policy was not to compensate for crop damage in National Liberation Front controlled zones), this was also explained by the information cadre

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\* Such visits were frequently reported by rural informants, but only those living in relatively secure areas. Thus, a large part of the population may not have been exposed to this source of Government of Viet-Nam propaganda.

\*\* Several public demonstrations were reportedly held in the Province to prove to people that herbicides were not poisonous. In 1964, information cadre allowed themselves to be sprayed with herbicide and then ate bread and bananas that had been sprayed in order to demonstrate to 3,000 people assembled at Ben Tre that the chemicals were safe. Such demonstrations were also reportedly conducted in some villages.



on the grounds that the damage assessment cadre could not go into guerrilla controlled areas and, thus, the Government of Viet-Nam could not verify these claims.

The main focus of complaints and criticisms voiced by the rural populace was upon the compensation program. Many were distressed, angry and resentful. Some felt cheated and some were indignant at the thought that their honesty or integrity had been impugned.

The effectiveness of the claims program seems to have varied considerably from province to province and from year to year. There were probably some cases of corruption and other cases of administrative inefficiency on the part of Government of Viet-Nam officers and officials responsible for the processing and payment of claims. And there were some cases where responsible officials were unable or unwilling to undergo the hardship and danger of investigating claims in remote and insecure areas. But it would be an error to take these instances as the main cause of the many breakdowns in the program. The complexity and sheer bulk of paperwork involved in the system taxed the capabilities and resources of many of the vital links in a long administrative chain. Local officials were forced to make decisions which they were neither qualified nor prepared to make. And in some cases, at the provincial level, claims were denied in good faith by officials who believed the alleged damage could not have been caused by herbicides based upon the information and guidelines which they had been given.\*

GVN hamlet and village officials along with district and province officials generally share the same basic beliefs, but there is more diversity and less certainty of opinion among the district and province officials than among village inhabitants. An important distinction

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\*According to a report of the U.S. Province Senior Advisor entitled "Defoliation Impact in Long Khanh Province" (Dec. 11, 1967), the province chief disallowed claims in cultivated areas because those were not "within the target or adjoining areas."

to be made here is the difference between beliefs based upon direct observation and what may be termed "derived beliefs," where the stated opinions of others who are viewed as authorities are accepted and incorporated into one's own belief system. Some of these people clung to official pronouncements and documents as the source of their convictions. Others were influenced, through informal personal contacts and through their reading, by the beliefs and attitudes of the urban intelligentsia. Most Government of Viet-Nam provincial officials, of course, have been drawn from the ranks of the urban middle sector and many of them maintain close ties in urban areas.

#### Revolutionary Cadre Views on the Use of Herbicides

The cadre of the National Liberation Front and the Democratic Republic of Viet-Nam, unlike the GVN officials, share a clearly defined and largely homogeneous world view. To assess their views on herbicides, however, was a difficult task. Our status as enemy nationals precluded direct interviewing of Liberation Front cadre, while the clandestine and illegal status of that organization in the Government of Viet-Nam controlled areas made it impossible to obtain suitable documents for use in content analysis. We have thus had to base our assessment of the beliefs of the revolutionary cadre on a limited analysis of newspapers published in Hanoi.

All issues of Nhan Dan, the official organ of the North Vietnamese Workers Party for 1970 and 1971, available in the Asia Library at the University of Hawaii, were searched for articles specifically dealing with herbicides. The sample is small and clearly inadequate for statistical purposes, but a number of points emerged from these articles:

- 1) In contrast to the situation in the Saigon press at this time, relatively few articles are devoted to herbicides.
- 2) Herbicides are seen as bad and their use is condemned, but they were not singled out for any special condemnation in comparison to bombing, pacification activities, or other war operations of American and GVN forces. Thus, an article issued by the Liberation News Service on February 1, 1971 entitled, "Committee Investigating American and Puppet War Crimes in the Southern Region of Viet-Nam During Nixon's First Two Years in Office," states that

" . . . in Phu-Yen, Khanh Hoa, Gia Lai, the Americans utilized extremely violent means in destroying the economy. During the months of March, April, May, and August, 1970, American jets machine-gunned and used incendiary, anti-personnel and delayed-action bombs to prevent the people from rescuing their crops. Following that, waves of planes released herbicides which completely ruined areas to tens of square kilometers."

- 3) No special surprise is indicated that the Americans would employ herbicides in South Viet-Nam; rather, it is seen as natural that "American aggressors" would use herbicides, however barbaric in effect, as just one additional weapon in their arsenal in carrying out their "criminal" intervention policy.

- 4) Concern with herbicide effects was primarily centered on short-term consequences, e.g., loss of crops and fruit trees, sickness and death of people and livestock. Concern over long-term ecological and genetic effects is rarely expressed and then appears to be based on quotations from Western scientists, as in the following excerpt which first details loss of food crops and animals, and human illnesses caused by herbicide spraying:

"More dangerous still is the possibility of birth defects (according to the conclusions of many famous American doctors at Yale University). Concerning the ecology, the use of a large quantity of toxic chemicals over a massive area has caused soil erosion and laterization, transformed rich, fertile land into a barren region resembling the face of the moon. The long-range results of this crime cannot yet be measured . . ."

#### The Views of the Urban Intelligentsia

The ideas and feelings of the urban intelligentsia regarding herbicides contrast sharply with the provincial view.\* A significant minority of urban middle sector has come to believe that as a direct result of

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\* Vietnamese social structure does not conform to the conventional western three class system as there is no true middle-class in the sense of a demarcated group of people with a shared and self-conscious ideology. Rather there is a rather vaguely defined middle-sector composed of civil servants, army officers, students and academics, white-collar personnel in Saigon businesses, Catholic and Buddhist clergy, etc. who while having a middle-economic status are not clearly distinguished ideologically from the upper class. Within the middle-sector is a smaller, but equally ill-defined group which we refer to as the "intelligentsia"--people who are concerned with the discussion of ideas on art, literature, and politics. These Vietnamese intelligentsia, in contrast to western intellectuals, are neither socially isolated or politically impotent, but instead are largely the political elite of the South. Thus, for an army officer or senator to read and even write poetry is not the remarkable phenomena in Saigon that it is in Washington.

herbicides, lasting ecological damage has been done, the health of the rural people has suffered (including instances of death, paralysis, birth defects, miscarriages, and a variety of strange diseases), many refugees have been created, and the national economy has suffered severe, long-term impairment.

Those who hold these beliefs, as may be expected, hold strong negative attitudes toward the use of herbicides and judge those responsible in harsh terms. Indeed, American motivations for using herbicides has been strongly questioned, and it has been asserted that extensive use of herbicides in Viet-Nam may have had an ulterior economic or strategic motivation.

Before elaborating these points, it is appropriate for us to specify the methodology and sources of data upon which this section of the report is based.

While the report up to this point has been based primarily upon extensive interviewing of knowledgeable people, personal observation, and the study of official records and documents, our inferences as to the views of the urban middle sector are based primarily upon newspapers, magazines, journals, and books published in Saigon. Our study of these sources was systematically done and yielded a great deal of data, but it must be noted that we have no systematic basis for estimating the extent to which the attitudes and beliefs uncovered are representative of the views of the urban middle sector as a whole. It is fair to say, however, that the four members of the team with previous experience in Viet-Nam have extensive contacts among urban middle sector Vietnamese through acquaintances, friends and relatives by marriage. This network has provided a certain sense of "ground truth" in the interpretation of the newspaper findings and in estimating the degree to which they represent the views of urban people. IX-15

At any given time one may find from twenty to thirty-five daily Vietnamese language newspapers being published in Saigon. A survey conducted in 1967 by one of the authors noted twenty-seven being published at that time. There have also been several newspapers in French and in English, and over half a dozen Chinese language newspapers. There are in addition ten or so weekly magazines and another ten to twenty bi-weekly or monthly magazines and journals of various types being published in Vietnamese. Newspapers, magazines and journals are constantly going out of business or being closed down either by their creditors or the government, but new ones keep springing up to take their place. This process has been going on for over four decades. While the addresses, names and formats of these various publications are continually changing, the groups of individuals who are the publishers, editors and writers remain fairly constant, as do the various special interest groups or particular viewpoints which they represent.

According to the only available estimates, there were nearly 700,000 copies of Vietnamese language newspapers printed daily in 1967. Of these, slightly more than one third (250,000-275,000) were reportedly sold in Saigon and its suburbs, and the rest were distributed throughout the country. While it is reasonable to assume that these figures are somewhat inflated, circulation is still sufficient to allow newspapers to exert some influence on public opinion, both in the cities and in the rural areas. Previous research by two of the authors has indicated that from ten to twenty percent of the rural adult population of the Mekong Delta reads a newspaper at least once a week, and about one half

of the rural adult population has some exposure to newspapers.\*

The word "newspaper" may be misleading to an American reader. These newspapers normally consist of either four or eight pages, although in recent years the minimum size has grown to sixteen pages. In a standard four-page paper, all news articles begin on the first page and longer articles are continued on the last page, which they share with a variety of advertisements and classified notices. The middle two pages usually consist of poems, short stories, installments of novels, a human interest item or two, and more advertisements.

Our approach to the assessment of the media was primarily through content analysis of selected newspapers that represented contrasting political viewpoints. In addition, a less systematic survey was made of books, journals, and magazines covering the period 1963 through the summer of 1972.

Content analysis was performed on two basic newspapers: Chinh Luan and Tin Sang. Chinh Luan was chosen as a major conservative and on the whole pro-establishment Saigon daily paper. Issues of this paper were coded for the period April, 1964, to July, 1972.

\*Unpublished survey data for three villages in Dinh Tuong Province (Jamieson, 1967) and two villages in An Xuyen Province (Rambo and Jamieson, 1969). It should be noted that these surveys show that both literacy rates and exposure to newspapers vary considerably by age and sex cohorts. Men have a higher rate of literacy and read newspapers with greater frequency than do women. Younger people have a higher rate of literacy and read newspapers with greater frequency than older people. Thus, young men read newspapers with a relatively high degree of frequency, and newspapers are seldom read by older women. This means that the percentage of households containing at least one member who reads a newspaper would be considerably higher than the above averages for the total adult population would seem to indicate.

In contrast to Chinh Luan, we selected Tin Sang (Morning News). This paper was known to be outspokenly critical of the government and of American policy in Viet-Nam and has been closed from time to time by the government. Because of this we had to substitute in our samples issues from several other papers in order to provide continuity for the opposition press. Constraint of time also limited our study of this press to the period from mid-1967 to mid-1972.

Chinh Luan has a reputation among Saigon intellectuals and the general reading public for its objectivity and overall seriousness. It also carries more news than any other paper, and is the largest of the Saigon dailies with a current total of sixteen pages. To the extent that Viet-Nam has a newspaper of record, Chinh Luan has filled this role. The editorial viewpoint has been firmly and consistently anti-Communist since its founding in April of 1964. As such, it is regarded in some quarters as pro-government and pro-American, despite the fact that it has on occasion been editorially critical of specific policies and actions and has, on a few occasions, had issues confiscated by the government. In our view Chinh Luan can be regarded more as a paper with pro-establishment leanings than one supporting a particular regime.\* During 1967 (the only year for which this information is available), it ranked third or fourth in total sales among the newspapers of South Viet-Nam having an estimated daily circulation of 35,000-40,000. The papers which surpassed it, however, were those featuring humor and light fiction as opposed to news coverage. The major opposition paper is Tin Sang which

\*We use the word "establishment" here in the sense attributed to it in the late '60's and early '70's in the United States. We mean, therefore, to point to "established society" irrespective of political persuasion - those people and institutions who are currently in control and who resist change, believing that they represent the important values and traditions of society.



began publication in December of 1963 and was suspended in 1964.

Publication was resumed in the summer of 1967, was shut down shortly thereafter, and resumed again late in the summer of 1968 and then continued with several brief but no extensive interruptions until it closed down in April of 1972.

As already noted, for those periods of time during which Tin Sang was not published, several other opposition newspapers were substituted. One of these was Chanh Dao (The Right Path), a semi-official publication of the Institute for Dharma Propagation of the United Buddhist Church of Viet-Nam. This newspaper was generally believed to be representative of the militant attitude of the An Quang faction within the Institute. Other opposition papers utilized were Hoa Binh (Peace), a Catholic-oriented daily often associated with the Diem regime and with bitterness over that regime's replacement by various successors; Dien Tin (The Telegraph), a paper which was published from 1943 until it was suspended in 1965 and then reappeared in 1969; and Song Than (Hollowed Waves), a recent addition to the journalistic scene which began publication in September, 1971, a satirical paper with a major theme of anti-corruption and an above average amount of news from the provinces, especially from central Viet-Nam.

The first procedure carried out, in order to analyze these newspapers, was to develop a coding system which comprises 39 categories grouped under four headings of: 1) military activity, 2) political issues, 3) social issues and, 4) economic issues. Herbicides are coded under military activity. With this format, it was possible to assign each line of print (excluding advertisements, stories, poetry, etc.) to one of the 39 categories. The total number of newsprint lines involved in this analysis is approximately 200,000.

The coding categories are shown in Table IX-9, along with the results of comparing the pro-establishment and anti-government papers in terms of these categories. The questions we had in mind in conducting this comparison were: "Are the two types of papers 'on the same wave length' in terms of picking up topics to report?" "Are events likely to be reported in both presses at about the same time?" If the answer is yes, this gives evidence that the two papers are sensitive to essentially the same stimuli, even if the slant of reporting or the amount of reporting is directly opposite in each paper.

In order to make this comparison, correlations were computed using the Pearson technique for comparing the citations in each category by month over the five-year period from mid-1967 through mid-1972. This gave 60 time units for each topical comparison. The results indicate that 15 of the topics were highly correlated in these terms. These topics are identified by an asterisk in the Table. The topics with the highest correlations, for example, are political activities (.914), ground combat (.794), and air bombing (.783). These are also the topics which consistently receive a large amount of space in the news media (as will be seen later in Table IX-2). Thus, in evaluating the results of the Pearson correlations, it must be borne in mind that topics of high frequency of appearance have a greater probability of being correlated in time than do those topics which infrequently occur. On the whole, the correlational analysis indicates that there was fairly good synchronization between the two presses in terms of what they were reporting.

Table IX-1

## CORRELATION OF NEWS REPORTING

Correlation (Pearson r) of news reporting by month over five years (mid 1967 through mid 1972) on 39 news topics by pro-establishment and anti-government position newspapers

<u>Category</u>	<u>Correlation Coefficient</u>
<b>I. <u>Military Actions</u></b>	
1. Military casualties (included: Army of the Republic of Viet-Nam, National Liberation Front, North Viet-Nam Army, United States and Allied troops)	.728*
2. Artillery shelling (in South Viet-Nam, North Viet-Nam and from combat ships on the sea)	.685*
3. Ground combat (in Laos, Cambodia when Army of the Republic of Viet-Nam and/or United States troops are involved)	.599*
4. Ground combat (in South Viet-Nam)	.794*
5. Air bombing (in South Viet-Nam, Laos and Cambodia by Army of the Republic of Viet-Nam and/or United States Air Force)	.357
6. Air bombing (in North Viet-Nam)	.783*
7. Terrorist actions (limited to South Viet-Nam)	.564*
8. Chemical warfare	.149
9. Herbicides	.148
10. United States build-up in South Viet-Nam	-.080
11. Allied troops build-up in South Viet-Nam	-.082
12. North Viet-Nam Army build-up in South Viet-Nam	-.094
13. Pacification (pre 1968)	-.039
14. Pacification (after 1968)	.173
15. Vietnamization	.507*
16. United States withdrawal	.612*

Table IX-1 (continued)

<u>Category</u>	<u>Correlation Coefficient</u>
17. Allied troops withdrawal	.000
18. Civilian casualties	.357
19. Damages caused by war (in South Viet-Nam and North Viet-Nam)	.754*
20. Loss of Army of the Republic of Viet-Nam and/or United States, allied weapons	.303
21. War spoils (confiscated by Army of the Republic of Viet-Nam and/or United States troops in South Viet-Nam, Laos and Cambodia)	.535*
<u>II. Political Factors</u>	
22. Paris talks	.724*
23. Political activities	.914*
24. People's anti-National Liberation Front actions	.247
25. Peace's moves	.352
<u>III. Social Factors</u>	
26. Population movement	.439
27. Social disruption	.435
28. Antisocial behavior	.190
29. Illegal use or holding of weapons	-.076
30. Anti-United States sentiment	.503*
31. Anti-foreigner sentiment	.119
32. Social relief	.335
33. Draft dodging	.175
<u>IV. Economic Factors</u>	
34. Monetary exchange	.597*
35. Cost of living	.038

Table IX-1 (continued)

<u>Category</u>	<u>Correlation Coefficient</u>
36. Labor	.398
37. Black market	.063
38. Foreign aid	.322
39. National budget	.498*

The next step was to determine the number of lines devoted to herbicides and to plot the frequency of herbicides appearing in the press over time in relation to the other topics. In Chinh Luan, news reporting of herbicide usage ranked twenty-ninth out of the 39 topics (average 4.4 lines per month), and in editorial coverage it ranked twenty-sixth (average 2.9 lines per month). Reporting on herbicides in Tin Sang ranked twenty-third out of the 39 topics (average 7.9 lines per month), while editorial coverage ranked twenty-ninth (average 1.3 lines per month). Thus, herbicide spraying held about the same position in the reporting and editorializing of both presses, but it ranked low vis-a-vis many other topics.

A composite overview of the quantitative saliency of the topic of herbicides compared with a selection of the other coded topics is shown in Table IX-2. It can be seen that military casualties and ground combat were reported and discussed continuously through the seven years analyzed, and that they form a larger portion of the news coverage than do any of the other selected themes. Numerous trends are discernible in these data, but to point them out or discuss them is beyond the scope of this report. It should be noted, however, that the peak of reporting about herbicides as measured in this way occurred in 1969, and that the rates for 1970 and 1971 were higher than those for any year between 1965 and 1968. When herbicides peaked in 1969, the reporting of anti-U.S. sentiment was at its nadir, but thereafter rose rapidly and was at its height for these years in 1971.

News Reporting: An Enumeration of Lines About Herbicides  
in Comparison to Selected Other Topics

Topic	Y E A R						
	1965	1966	1967	1968	1969	1970	1971
Herbicides	.03	.01	.19	.07	.78	.38	.43
Military Casualties	11.8	10.2	11.3	12.3	10.7	9.0	9.3
Ground Fighting (RVN)	16.8	13.7	15.1	19.6	15.2	9.4	9.8
Terrorist Action	8.6	10.1	7.8	6.4	6.3	3.1	2.1
Loss of Weapons	.17	.09	.23	.09	.06	.03	.02
U.S. Build-Up	1.1	.54	.90	.12	.37	.01	.06
Vietnamization	0	0	0	.08	.57	.36	.71
Population Movement	.62	.36	.77	1.5	.24	.61	.06
Anti-U.S. Sentiment	.23	.83	.16	.02	0	.97	2.58
Cost of Living	.23	.66	1.1	.49	1.1	.88	1.9
Blackmarket	.53	2.7	.29	.77	.59	.56	.36
Peace Moves	5.6	6.1	8.3	5.8	4.5	3.1	3.1
27 Other Topics	54.29	54.71	53.85	52.75	59.59	71.60	69.58
TOTAL LINES CODED	17389	19588	16407	41544	38819	28185	28674

The numerical value in each cell is the percentage for a given topic of the total lines coded for a given year. Thus, herbicides accounted for about 3/4ths of one percent (.78%) of the total output of coded news lines in 1969. The columns for 1965-1967 refer to the pro-establishment press only. The anti-government paper was coded for only a portion of 1967 and is not included for that year. The columns for 1968-71 combine data from both presses. Since only a portion of the 1972 papers from both pro-establishment and anti-government was analyzed, that year is also not included in this tabulation.

In addition to the line enumeration of the newspapers, we directed attention to articles about herbicides which appeared in these papers. In Chinh Luan 58 such articles were published between April, 1964, and July, 1972, totally approximately 1446 lines of print. Identified in Tin Sang were 132 articles (5182 printed lines) from the period June, 1967, through July, 1972. As seen in Table IX-3 the combined number of topically relevant articles increased markedly in 1969, fell back somewhat in 1970, and rose again in 1971. The greatest increase was in the opposition press, but it is noteworthy that in 1970 there were twice as many articles about herbicides in Chin Luan than there had been in 1968 or 1969. The figures for 1967 are similar to those for 1968 but the quantitative presentation given in Table IX-3 is limited to the four years for which we have year-long coverage in each paper.

Table IX-3 News Reporting:  
Enumeration of Articles About Herbicides

<u>Year</u>	<u>Pro-Establishment Press</u>	<u>Anti-Government Press</u>	<u>Total</u>
1968	6 ( 4%)	6 ( 4%)	12 ( 8%)
1969	6 ( 4%)	43 (28%)	49 (32%)
1970	12 ( 8%)	25 (17%)	37 (25%)
1971	<u>8 ( 5%)</u>	<u>45 (30%)</u>	<u>53 (35%)</u>
	32 (21%)	119 (79%)	151 (100%)

The point from both the line and article enumeration is that herbicides occupied more space in the press after the period when the greatest amount of herbicides were sprayed than during that period. Regarding the articles, moreover, it was possible to carry out a qualitative evaluation by means of content analysis regarding the attitudes conveyed. For this purpose, 14 coding categories were developed. Each



article was read in the original Vietnamese language version by a Vietnamese assistant. For each of the 14 categories, the assistant made a dichotomous judgment as to whether the attitude was present or absent in that particular article. The results are given in Table IX-4 where the number of articles reflecting each attitude in the pro-establishment press is shown in the upper left hand corner of the cells and the number of articles showing each attitude in the anti-government press is in the lower right hand corner of the cells.

Table IX - 4

Attitudes About Herbicides in the Pro-Establishment and Anti-Government Press

	1965	1966	1967	1968	1969	1970	1971
1. Objective Reporting of Effectiveness of Herbicides	1 -	0 -	1 0	0 0	5 3	2 0	1 1
2. Objective Reporting of Statements About Herbicides	2 -	2 -	1 2	3 1	3 8	4 1	2 8
3. Call for Study of Herbicide Effects	0 -	0 -	0 0	0 0	0 0	1 0	0 0
4. Herbicides Will Achieve Military Objective	0 -	1 -	1 0	0 0	0 0	1 0	0 0
5. Alarm at Large-scale Use of Herbicides	0 -	1 -	1 0	2 1	0 1	2 5	1 8
6. Concern re Herbicide Effect on Humans	0 -	0 -	1 0	0 0	2 6	1 3	3 6
7. Concerned but Resigned to Military Use	0 -	0 -	3 1	2 0	1 0	2 0	2 0
8. Doubt Advantages Compared to Economic & Health Disadvantages	0 -	0 -	1 0	0 0	0 0	1 0	0 0
9. Doubt Military Effectiveness	0 -	0 -	0 1	1 0	0 1	0 1	0 6
10. Doubt Advantages Compared to Other Disadvantages	0 -	0 -	0 0	0 1	0 3	5 4	3 6
11. Critical of RVN Handling of Herbicides, e.g., Compensation Program	0 -	0 -	0 1	0 4	0 24	0 5	0 11
12. Critical of U.S. Because Herbicides May Harm Crops, People, Environment	0 -	0 -	0 0	0 1	0 12	0 23	1 31
13. Doubt U.S. Motives re Using Herbicides	0 -	0 -	0 0	0 1	0 1	0 9	0 10
14. Critical of U.S. Conduct of War	0 -	0 -	0 0	0 2	0 15	0 10	0 32
Total Number of Articles	3 -	4 -	6 3	6 6	6 43	12 25	8 45

Pro-establishment:



Anti-government:



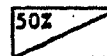
The 14 attitude categories were not conceived as being mutually exclusive. An article might begin with objective reporting and then shift to attitudinal comment of one or more kinds. In order to present these data more simply and with the benefit of proportions, Table IX-5 gives a selection of attitudes for the years 1968 through 1971 where we have comparable coverage for each press showing the percentage of articles from a given paper in which the selected attitude was displayed.

Table IX - 5

Selected Attitudes About Herbicides  
in the Pro-Establishment and Anti-Government Press

	1968	1969	1970	1971
Objective reporting of statements about herbicides without editorial comment	50% 17%	50% 17%	33% 4%	25% 18%
Doubting the advantages of herbicides as compared to disadvantages etc.	0% 17%	0% 7%	42% 16%	37% 13%
Critical of RVN because of herbicides, failures of compensation program, etc.	0% 67%	0% 56%	0% 20%	0% 24%
Critical of U.S. because of harmful effects of herbicides on crops, humans, environment, etc.	0% 17%	0% 28%	0% 92%	12% 69%
Total number of articles	6 6	6 43	12 25	8 45

The percentage of articles from the pro-establishment press which display a given attitude appears in the upper left hand corner of each cell:



The anti-government percentages are in the lower right:



The pro-establishment articles in 1965, 1966, and 1967 were similar to what is shown for 1968. The anti-government articles reviewed for half of the year 1967 were similar in number and attitudes to 1968.

Illustrative of the interpretation of this table is the pro-establishment press in 1971: eight articles on herbicides appear in this paper during the year. Two of them (25%) reported statements about good or bad effects of herbicides, but without editorial comment. Three of the eight (37%) raised doubts about the advantages of herbicides in the light of possible disadvantages of a general kind. None of the eight conveyed criticism of the RVN regarding the use of herbicides, but one (12%) expressed criticism of the U.S. for using herbicides which may be harmful to people, crops, or the environment.

This analysis suggests that objective reporting about herbicides, without editorial appraisal, was more characteristic of the pro-establishment press than the anti-government paper. In the instances where articles in the pro-establishment paper convey attitudes it is more likely to be a matter of raising doubts than expressing criticism. It is to be noted, however, that the emergence of pro-establishment doubt occurred in 1970 and 1971 after the cessation of the massive use of herbicides and was coincident in time with a decline in objective reporting. It appears, thus, that the conservative press was sensitive to questions being raised about herbicides, and that it participated, albeit not strongly, in the criticism of the United States which is associated with herbicides.

Doubt and especially criticism are consistently found in the anti-government paper, and it is not surprising that targets of criticism are the governments of South Vietnam and the United States. Insofar as herbicides provide a focus for negative evaluation of a government, it can be pointed out that RVN declined while criticism of the U.S. increased.

The above paragraph concludes the tabular presentation of the newspaper study. In what follows we will review and quote from the press on herbicides in order to describe the content of reporting and editorial commentary.

While there had been general agreement in the Saigon press during 1967 and 1968 that herbicide use was causing serious economic problems for many farmers and that the compensation program was not working in a satisfactory manner, official assurances that herbicides were not harmful to humans or animals had been accepted with little question. Such assurances were reported objectively and without editorial comment.

In the spring of 1969, however, a marked change occurred. Articles appeared in the opposition press that were subjective in nature, sensational, and often based more on rumor and conjecture than fact. This sharp shift in content and tone was marked by a series of articles in Tin Sang alleging that Vietnamese women were giving birth to "eggs" as a result of herbicide use. Other articles linking birth defects and miscarriages to herbicide exposure followed. Some examples are as follows:

From Tin Sang (October 5, 1969)

"Three Main Reasons Why Vietnamese Women Give Birth to Eggs

- 1) The widespread movement of sexual license.
- 2) The extensive use of aphrodisiacs by allied troops and call girls.
- 3) The change of weather and environment due to radiation and herbicides."

From Tin Sang (December 5, 1969)

"Dr. Ma Xai Confirmed Rumors of Vietnamese Women Giving Birth to Eggs

Defoliation sprays caused birth defects (egg) in Tan Hoi. We have witnessed a scene where hundreds of people, mostly children and women, surrounded people with authority requesting some concrete assistance: give them some money so they could get away from the sickness and misery caused by herbicides."

From Tin Sang (April 4, 1970)

"False Reports: Listen But Do Not Pay Attention  
To Them. There Are Rumors That:

There are a number of foreign reporters who have such good ears and such good noses that they have been running around looking for old issues of Tin Sang published over a year ago. One after another seeks old issues of Tin Sang for his collection, and such enthusiasm surprises our editorial staff. Finally, we learn that these reporters are looking for an article on "giving birth to an egg" due to the effect of defoliation sprays.

During that period Tin Sang was ordered to close down because of some articles written on the possible effect of defoliation sprays upon birth defects. The truth is that Tin Sang does not have a laboratory to prove such occurrences scientifically. Tin Sang only reports what it has heard through the people's complaints. And yet things did happen as Tin Sang has reported.

Recently, some U.S. scientists conducted an experiment with some rats by letting them live in a place saturated with defoliation chemicals. They found that these rats gave birth to many deformed rats (and eggs). They sent a petition to Prince Nixon requesting his leniency, an order to put a stop to the use of defoliation sprays until they could conduct more studies to determine the effects more fully.

May it please God that these scientists will prove it to the contrary, that is, they will prove that it is thanks to being sprayed with herbicides that the people of South Viet-Nam have been able to last so long, that they can fight for so long without feeling tired—that they can keep their mouths shut, can live without food and without housing.

I pray to God that the results will be as I have wished. Otherwise, if the results prove that what happened to the rats is true, I will feel very badly indeed, for the people, then, are worth less than rats."

From Tin Sang (June 6, 1970)

"False Reports: Listen But Don't Remember

Tin Sang was censured once before because it dared to criticize the use of defoliation sprays. Now people talk about it everywhere. Japanese newspapers write about it; U.S. newspapers criticize its use. So it has become a fact.

Birth defects, egg-bearing, and malfunction of genital glands are mentioned in connection with defoliation sprays. The President, in building up a government party, is also affected by defoliation sprays."

Soon articles were appearing which attributed many health problems to herbicides. Other articles relating herbicides and health problems appeared during 1970, 1971 and 1972 (Tin Sang, April 17, 19, 1970; January 19, July 15, 16, 23, 31, 1971; Dien Tin, February 19, 1972). An example of the way various health problems became associated with herbicides in a sensational way occurred in July of 1971 when an infectious eye disease that swept Viet-Nam was linked to herbicides.

From Tin Sang (July 23, 1971)

"The Eye Disease Is Still Spreading—The Chemical Causing the Disease Is Ten Times More Poisonous Than the Regular Herbicides. It Takes Crops at Least Five Years to Recover.

The eye disease is still spreading incredibly in near-by provinces and in the suburbs of the capital city. At least eighty percent of the population has caught the disease.

People who are knowledgeable about medicine have said that this disease has been caused by herbicides used by Americans to clear forests, brush, and especially marijuana in Viet-Nam. To them, this disease is not very dangerous if people know how to treat it, but the most threatening thing is the effect of herbicides upon crops in South Viet-Nam. The chemical the Americans used this time is ten times more poisonous than the ones they used before.



It will take the crops at least five years to recover because of the after-effect, and the situation will be very threatening when the Americans pull out of Viet-Nam."

From Tin Sang (July 31, 1971)

"Tall Story Column .

It is noticeable that a lot of people are wearing dark glasses these days. When the reason for this is asked, it is said that these people have caught an eye disease, a very fashionable disease.

The other side has taken advantage of this opportunity to make anti-American propaganda, saying the disease was caused by herbicides sprayed by the Americans. They changed the old slogan 'fight the Americans to save your country' into 'fight the Americans to save your . . . eyes,' to make it up-to-date. Who can believe in their way of treating illnesses?"

As for belief in the effects of herbicides upon animals, during a period of scarcely more than two years, Tin Sang moved from an objective reporting of United States Department of Defense assurances that herbicides were not harmful to animal life to the following statement: "In the defoliated areas of South Viet-Nam most farm animals are dead. Pigs, chickens, ducks, bees, frogs, fish, and snakes--all have disappeared. Those that are still alive are weak and unable to reproduce."

Herbicides have also been mentioned as a contributing factor to the generation of refugees. As early as April of 1967, Hoang Binh had presented an emotional example of a link between herbicides and refugee movement in a small vignette. "We felt moved by the desolate landscape before us: barren and defoliated orchards. We thought of the simple people with sad faces who had lived here and abandoned these orchards which had become barren and defoliated by herbicide sprays. They no longer live here."

An article appearing in Tin Sang on September 29, 1968, commented that "most people were unable to withstand the destructive power of bombs, shells and herbicides, so they left their homes, land, orchards and ancestral tombs to move to Saigon and lead lives of misery." Other articles associating herbicides and refugees also appeared, and by April of 1971 the tone had risen to the following level of criticism:

"Never in the history of mankind has one found such a frightening quantity of bombs and chemicals falling on such a tiny piece of land. Over fifty million kilograms of herbicides have been sprayed on South Viet-Nam. Over two hundred and fifty thousand hectares of rice fields have been destroyed and tens of thousands of families have had to move away as a result. Almost one third of the Vietnamese and Laotian populations are victims of forced evacuations caused by Allied troops, the intensity of bombing, and the destruction of herbicides."\*

By mid 1970 concern was being shown for more general ecological effects. At the conclusion of a long and objective article on herbicide use in Viet-Nam, Chinh Luan said:

"A large area of land has been sprayed with defoliants and the long-term effects have not been definitely assessed. Nevertheless, the excessive spreading of a number of strange chemical substances into the botanical environment will certainly affect the ecology, and chain reactions could cause a depletion of the nation's natural resources."\*\*

Not only was there a belief by some that the soil may have been permanently affected and trees and plants destroyed in some areas or irremediably altered, but even floods were blamed on herbicides.

"It is due to the effects of herbicides which defoliate the jungles that water pours from the mountains down to the plain and Central Viet-Nam is flooded."\*\*\*

Eventually, it was alleged by some that herbicides even affected the climate.

\* Tin Sang, April 6, 1971.

\*\* Chinh Luan, August 25, 1970.

\*\*\* Tin Sang, November 12, 1971 (See also Tin Sang, July 16, 1971).

" . . . due to this excessive defoliation, the weather changes suddenly from day to day, from cold to hot."

The following excerpts illustrate the feeling that damage to the nation was severe and lasting possibly to the point of ruin.

From Tin Sang (October 24, 1969)

"A Look at the Mekong Delta After U.S. Troops Withdraw

The U.S. came to this area with bombs, shells and modern weapons, with plans to clear and defoliate the land. Therefore, when they leave, they will leave behind them desolate fields, defoliated hamlets. The people will have to rebuild from scratch."

From Tin Sang (August 15, 1971)

"What is Left in Viet-Nam?

Recently a report from U.S. scientists indicated that at least one fifth of all the cultivated area in South Viet-Nam . . . is no longer good for cultivation. The defoliation operation started in 1961, but its effect might last for many years . . . In addition to the use of a great quantity of defoliation sprays to destroy gradually the regenerative power of trees, the U.S. has set fire to entire areas of jungle."

From Tin Sang (January 11, 1972)

"Now there is not enough bamboo to repair houses, where could we then find any for a paper industry?"

From Chinh Luan (January 31, 1972)

"Defoliation Sprays Used in South Viet-Nam Are More Destructive Than Bombs Dropped Over North Viet-Nam

-- When the War Is Over North Viet-Nam Will Recover Faster Than South Viet-Nam"

From Dien Tin (March 23, 1972)

"Some day, when the war is over, who will gather all the broken arms and legs from all over the country and join them together; who will plow the land, dig the ditches so that all the poisonous gas from bombs, shells, grenades . . . and herbicides will fade away.

-- Take a look and see what is left of our country!

The rice basket in the South of the Mekong Delta can no longer provide enough rice, fruit, fish and

shrimp, not to mention the possibility of export as in pre-war times!!"

Interspersed with statements of the above type, there came a growing disenchantment with American actions in Viet-Nam, often linked to a perception of American attitudes toward Viet-Nam and the Vietnamese people as cruel and heartless.

From Tin Sang (September 1, 1970)

"The U.S. has often proclaimed that U.S. troops are sent to Viet-Nam to help the Vietnamese people, to protect their liberty and fight communism. But the U.S. also interferes in Vietnamese affairs like a master, and acts cruelly as exemplified by the likes of the My Lai massacre, the assassination of Nguyen Khao Chuyen, the indiscriminate bombing of B-52's, and the spraying of herbicides. These devastate our country."

From Tin Sang (September 12, 1970)

" . . . But the destructive power of the French colonialists was limited. The French militarists were not able to discover herbicides with their dreadful killing capacity. Furthermore, French soldiers were still somewhat restrained by their humanness, which they had inherited as a national tradition. So they would not resort to just any mean policy in order to win."

From Tin Sang (January 2, 1971)

"The Venerable Thich Thien Hoa complained that while the U.S. government has used cunning tactics to calm the American people, its actions have been most cruel and atrocious, showing no respect for human lives or international law. For example, they dropped bombs and sprayed defoliants on Vietnamese villages, fields and orchards, causing great havoc to the economy of this country and strange diseases among the people."

From Dien Tin (March 8, 1972)

"The Americans have been many times more cruel than the French. Beside the destruction of the countryside, spraying herbicides over fields and orchards, they blatantly bombed the cities during the Tet Mau Than (1968) on the pretext of driving out the V.C."

Charges that the United States was intentionally destroying the Vietnamese economy and sapping the strength and diluting the cultural

vitality of the Vietnamese people were increasingly frequent in 1970. Only two such articles appeared during the three year period of 1967 to 1969. But there were nine in 1970 and ten in 1971. Examples follow:

From Chanh Dao (August 13, 1968)

"Before the war South Viet-Nam produced not only enough rice for local consumption but also exported millions of tons annually

Since the war broke out, they have to import from the United States six or seven hundred thousand tons of rice each year to feed their people. Naturally, this war has brought a sizable amount of income to farming states in the U.S. such as Arkansas, Louisiana, Mississippi, Missouri and Texas."

From Tin Sang (March 21, 1970)

"Vietnamization--Putting the Cart Before the Ox

Consequently, the rice our people eat has become Americanized; this means that we no longer have the rice that our own rice fields produce, but have to eat the rice produced by rice fields in California."

From Tin Sang (July 25, 1970)

"Interests of U.S. Businessmen--Are Above All

Now the aim is to assist farmers to raise their production to compensate for the deficit caused by the national policy of 'free defoliation.' Therefore, the government has given them special assistance by allowing them to be 'sole' importers of solely U.S. fertilizers."

From Tin Sang (November 19, 1971)

"Surplus Agricultural Products As Aid (for the United States it is called Food for Peace)

This program will bring about the devastation and ruin of the Vietnamese countryside. The U.S. destroys the rural areas of Viet-Nam with bombs and herbicides so that Viet-Nam is forced to import U.S. surplus agricultural products."

Thus we see that until 1968 the use of herbicides in South Viet-Nam was an issue of extremely low saliency in the press. Except for a few complaints about the effectiveness of the compensation program, reporting of the use of herbicides was objective and non-evaluative. Throughout 1968 the payment of claims for compensation continued to be the only aspect of the program to receive any significant degree of critical attention. And, this was despite the fact that 1967 and 1968 account for a very high proportion of the total amount of herbicides used in Viet-Nam. Beginning in the Spring of 1969, however, many more articles about the use of herbicides began to appear, and the greatest increase took place in the opposition press. Not only did the number of articles increase, but quite suddenly a number of attitudes appeared which were exceedingly critical, and there was a spurt of reporting of alleged adverse effects from herbicides. This process continued through 1970 and 1971, spreading from the anti-government newspapers to scholarly journals ( as will be seen in the next section) and finally the pro-establishment press. This shift in attitude and content, which manifested itself in the Spring of 1969, increased in 1970 and reached its peak in 1971, long after herbicides had ceased to be used to any significant extent. Thus there is no direct relationship between the intensity and extent of spraying actually occurring at any given time period and the amount of attention devoted to the issue by the press of either side, even allowing for a time lag of one to six months for feedback from the provinces to reach Saigon.

#### Conclusion

This chapter has concerned public opinion, and our analysis has led us to conclude that there is a major dichotomy between the views of the rural

population and those of the urban middle-sector regarding the use of herbicides in Vietnam. Contrary to what might be expected, the spraying of herbicides is a much less emotional issue among the peasants, who bore the brunt of spray effects, than it is among urban intellectuals.

The critical attitudes which came to characterize the middle-sector were largely after the fact. Most of the spraying had been terminated by the time the negative views were discernible. Our interpretation of why this occurred is that herbicides became a symbol in the eyes of the urban intellectuals. Symbols are often more powerful than facts in motivating human behavior and shaping human responses. Thus in the next section we take up the issue of how and why herbicides came to be a symbol and what meaning this may have for the future.

## Section X. Herbicides As A Symbol

It was said at the conclusion of the last chapter that herbicides seem to have become a symbol to the urban intellectuals in South Vietnam. In this section we will take up the questions, "What is a symbol?", "Herbicides are a symbol of what?", and "How and why did it happen that herbicides came to play such a role?"

A symbol, as we use it here, is a word or an emblem which stands for something other than itself and which evokes feelings and emotions that are only related to that thing itself by loose association and sometimes simply by imagination and hearsay. In the actions and beliefs of humans, a symbol is often far more influential than a fact. This is because a symbol represents the meaning given the fact. Another characteristic of a symbol is that it often binds a group together. The feelings and meanings are shared. Language, patriotic emblems and family portraits illustrate the point. Thus, a symbol often rallies the sentiments of a group, while at the same time arousing emotion in a private individual.

When we say that herbicides became a symbol among the middle sector people of urban South Vietnam, we mean that the word herbicides appears to arouse strong feelings in them, that the thoughts invoked by the word cover a wide range of circumstances, many of them not related directly to herbicides at all. Our interpretation is that herbicides came to symbolize certain undesirable aspects of American actions generally in South Vietnam, and that the emotions represented in the symbol are feelings of disenchantment with Americans, criticism of their actions, and suspicion about their motives. In other words, a subtle but pervasive negative evaluation of U.S. involvement.



Why had the voices of the middle sector of urban Vietnam suddenly become so critical of American actions in Vietnam? Why had even staunch friends of long-standing joined in this criticism? Why did they focus upon herbicides? The Vietnamese peasants were not as outraged as these city people, many of whom had never even seen a single fallen leaf which they could blame upon herbicides. And why did this happen in 1969, 1970, and 1971, when herbicide use was decreased and then discontinued? And while U. S. soldiers were dying by the tens of thousands, while billions of dollars worth of U. S. aid was pouring into the country, and U. S. negotiators were sitting at the Paris peace tables?

Were they correct in their assessments of the actual damage? Did they really know better than the peasants what the true effects had been? Or were they foolish, malicious or misled? Had they been victimized by Communist propaganda? We do not believe that any of those factors are adequate explanations to the questions of why this happened and why it happened when it did. We have no final or unequivocal answers to these questions, but we believe it is possible to identify some factors which were significant in producing this delayed but affect-laden response to herbicide use.

It is necessary to put aside for a moment this specific topic of herbicide use and pause to consider the broader social context in which the military use of herbicides by Americans in Vietnam occurred. Only in this way can the deeper meaning and significance of this program for the urban middle-sector, and especially the intellectuals be made clear.

## I. Historical Background

The political unrest and social malaise which characterizes much of South Vietnamese society today has its roots in more basic social and psychological changes that were well underway in the nineteenth century. By 1885 all of Vietnam was under French control and for all practical purposes Vietnamese sovereignty had simply ceased to exist. A proud and independent people suffered the humiliation of being ruled by a foreign nation. A number of mandarin scholars, elite products of traditional Vietnam, led armed revolts which quickly proved to be exercises in futility. No matter how noble their motives nor how great their courage, it was made painfully evident that traditional Vietnam was impotent in the face of Western power.

But in 1905 Japan's victory over Russia gave the frustrated and desperate Vietnamese revolutionary leaders a new perspective. Following the Meiji Reformation (a more apt term than "restoration") in 1876, the Japanese had in less than thirty years attained demonstrable military superiority over a major Western power, and the obvious keystone to their success had been modernization through mastery of Western technology. Meanwhile, small but growing numbers of Vietnamese intellectuals were for the first time gaining an awareness of the best of Western thought and culture, partly through those few Vietnamese who had mastered French and received some French education, and partly through Chinese translations of European books which were being published in Shanghai.

A revolutionary organization dedicated to the modernization of Vietnam as an instrument of nationalist revolutionary strength, the Viet Nam Duy Tan Hoi was organized in 1906. In 1907, Vietnamese nationalists organized and supported a national system of private schools, the Dong Kinh Nghia Thuc, to popularize Western thought and modern skills. The French saw this movement as a threat and quickly suppressed it. In the years which followed revolutionary hopes in Vietnam were kept alive by the inspiration of events in China, where Sun Yat Sen was enjoying considerable success with his enlightened revolutionary doctrine. His headquarters at Canton were not far from the Vietnamese border. In 1917 the University of Hanoi was established as the capstone of a standardized French educational system, and 1918 marked the end of the traditional mandarin examinations in Vietnam. There was no longer any practical incentive to pursue the arduous path of traditional studies.

By World War I the stage had been set for the final demise of tradition as a dominant and cohesive force in Vietnamese society. Almost 100,000 Vietnamese were sent to France during World War I to serve as soldiers and workers and were exposed to new ideas in the process. And after the war, in the general prosperity of the 1920's, French capital rushed into Vietnam at an unprecedented rate, dwarfing the total investment of the previous sixty years of colonial rule. The predominant thrust of this capital, however, was directed toward quick profits through exploitation of Vietnam's agricultural and mineral resources. This activity made little direct contribution to the land and the people of Vietnam.

Educational facilities, which had become equated in the Vietnamese mind with progress, strength and independence, remained grossly

inadequate and totally unsuited to the real needs of the nation. Meanwhile, the number of French bureaucrats in Vietnam more than doubled during the 1920's, with the lowest-ranking and least competent of them earning far more than the best-educated, most competent and hardest working of the Vietnamese.

The cumulative effect of such policies had a great impact upon Vietnamese society. A wage-earner class many times larger than ever before in Vietnamese history had been created. A few wealthy Vietnamese businessmen and landowners, comprising less than one-tenth of one percent of the population, had prospered along with the French, but even many of them felt frustrated because rigid French controls denied them the influence to which their wealth and position would normally have entitled them. A middle-class had begun to emerge, only to have its aspirations for further upward mobility blocked by an arrogant French colonial bureaucracy jealous of its prerequisites. And the bulk of the peasants, eighty-five per cent of the population, had an even more difficult life in many ways than they had known before the coming of the French.

Then came the world-wide Depression. Because of French economic dominance, Vietnam was struck rapidly and hard. Meanwhile, in the political realm, the years of 1930 and 1931 were bloody years of terror and counter-terror, revolts in the countryside, assassinations, executions, and mass arrests. And these were bleak times not only economically and politically, but intellectually and spiritually as well. Tran Trong Kim, one of the most renowned scholars of the time, who was later to lead a short-lived Vietnamese government under the Japanese, wrote in his three-volume work on Confucianism (1930-1933):

Upon careful consideration, it cannot be said that our current abandonment of the old to follow the new is not necessary. But because we are rash and do not let our thoughts mature, we are achieving nothing less than total destruction. As a result of such shortcomings, our faults have not necessarily been abandoned, while we have lost the essence of our society which has kept it stable for thousands of years. Whenever people wish to discard something old and damaged, they must have something better, something more attractive, to take its place. We now do not yet have the new and yet have hastily abandoned the old; as a result, we have lost everything and have nothing with which to replace it. That is the situation of our country today, no different than a ship which has gone into the middle of the ocean and lost its compass. It does not know which direction to take to keep on course and just keeps drifting on, in danger of being dashed upon the rocks by the wind and waves and shattered.

During the second and third decades of the twentieth century, journals and newspapers came into being and grew in readership and influence. A common goal shared by most of these early publications was the expansion of intellectual horizons to Western ideas. In the early 1930's the number and significance of newspapers and journals increased, accompanied by a dramatic change in the nature and scope of literary activity.

The most important facet of the new literature is that it was preponderantly and emphatically personal. The focus of literature shifted from the general to the specific, from the objective to the subjective, from reason and ethics to emotions, and -- and this is the most important shift of all -- from society to the individual. What men in general should think or do was suddenly much less important than what "I feel". All social institutions and ethical and moral conventions, not to mention literary ones, were subject to review, were open to question in light of the individual human being's right to the pursuit

of happiness. The quest for personal salvation was seriously challenging the Confucian priorities of loyalty to state and family -- i.e., the established social order. Other contrasts in both form and content between the traditional and the new poetry all derived from this one crucial point. What was new, was, in a word, individualism.

Individualism is at the heart of what we have come to think of as modernity, whether the setting be East or West. The very word "individualism" first appears in the English language as a translation of a word coined by Alexis de Tocqueville in his classic study of Democracy in America (1835) to describe what he perceived to be a novel state of affairs. But the concept of individualism is one of universal significance, and in little more than a century it had circled the globe to have a powerful impact upon the entire fabric of Vietnamese society, not strictly as a foreign import, but perhaps more as an inevitable response to an altered world. Novels flourished in Vietnam as a literary form for the first time, and traditional poetic forms were abandoned in search of greater freedom and diversity. Significantly, the Vietnamese themselves called this poetry literally the "new poetry".

With the coming of the Second World War, Vietnam, and especially the Southern half of the country, was embarking upon what was to be thirty years of war and conflict. Saigon grew from about half a million people at the outset of the resistance war against the French in 1945 to about two million by 1954. The population then fell back to little more than a million in the few years of relative peace which followed. But by 1965, the population of Saigon and its environs was again growing

by leaps and bounds, and was soon to approach the level of three million inhabitants.

## II. American Build-Up

Into this turbulent scene came half a million Americans. In 1963 there were 16,000 Americans in South Vietnam. By late 1965 the number neared 200,000. And by mid-1968 there were more than half a million U. S. soldiers in South Vietnam with close to 200,000 of them in the Saigon area alone, or one American soldier for every fifteen Vietnamese in the capital.

And the U. S. civilian presence also grew rapidly as USAID poured funds and technicians into the area to participate in "the struggle for the hearts and the minds of the people." Roads and bridges, air fields and bus depots were built. Parents who had never ridden in an automobile watched their children board modern airplanes. Transportation and communication in South Vietnam expanded at a rate probably unequaled in world history. The number of radio sets in Vietnam, which had just doubled, quickly doubled again, and urban voices reached into the remote rural areas. Television was introduced with communication sets distributed throughout the countryside. For the benefit of the many Americans, a U. S. channel was put on the air.

Most of the Americans in Vietnam worked hard and fought hard, and, when they had the time, they played hard as well. They even relaxed hard. The young GI who had just spent six weeks in the jungle or tied to a desk would arrive in Saigon with a month's pay and a three-day pass in his pocket, determined to make the most of them. Having been paid in

military script, he converted this "funny money" into huge amounts of local currency. And the month's pay which he was eager to spend on a three-day splurge exceeded a year's wages for most of the Vietnamese people who jostled him in the crowded streets.

Competing with Vietnamese housewives and students from the middle-sector for the scarce taxi cabs in Saigon, he might eagerly thrust out several dollars for what was a 20¢ or 30¢ ride to them. And he would be joined and replaced at the street corner by dozens of his comrades, while the women and young people waved to one driver after another, all of whom avoided looking at them while racing to pick up another group of Americans.

And these men came with unquenchable thirsts for beer and souvenirs and female companionship. So it became increasingly profitable for the many shops and restaurants along the nicer avenues of downtown Saigon to be converted to bars, designed and priced for American patronage. For many poor people this situation was a source of income too great to be spurned -- and those who served the Americans as companions or bartenders, hostesses, waiters, waitresses, those who cleaned their rooms, made their beds and shined their shoes, those who washed, pressed and mended their clothes, who gave them hair-cuts, manicures and massages, who sold them chewing gum and peanuts and candy bars and cigarettes and dirty post cards and gaudy paintings on velvet, custom-made suits and



shirts and shoes, wallets and briefcases, those who drove and washed their vehicles -- most of these people prospered, or at least survived in a situation where the alternative was severe deprivation. The rich men and women who already owned businesses, shops, bars, hotels and fleets of taxis also profited; many grew wealthy beyond their dreams.

But for many of the urban middle sector this massive American presence was a social and economic disaster. The doctors and nurses, school teachers, accountants, civil servants, journalists, scholars, army officers, writers, poets, lawyers, dentists, scientists, laboratory technicians, pharmacists -- in other words, those who served their own people but not the Americans -- these people tended to suffer a severe loss in relative economic well-being and hence in social status and influence. Their favorite shops and coffee houses closed down or changed drastically. They came to feel like strangers in the streets they had strolled for many years. Nor were things much better for them at home. Bar girls outbid their wives for the better materials in the dress shops, and the family next door whose daughter was a secretary for a U. S. agency out-bid them for the better cuts of meat in the market. Their nephew, perhaps, just nineteen years old, was making more money as an interpreter for an American engineer than his father or his uncles who had gone to college and held the same jobs for years.

The influx of money from American spending combined with the normal inflation of war. The general consumer price index for middle class families doubled between 1965 and 1967, and by the end of 1969 it was double again. A kilogram of shrimp which had cost fifty piastres in 1964 cost 224 piastres in 1969. C egg, which had cost three piastres in Saigon in 1964 cost fourteen piastres in 1969 and twenty-two piastres in 1970. For the urban middle sector, wages lagged far

behind unless one found a way to be useful to Americans. At one point almost all of the city garbage men and street department employees upon whom the city depended quit their jobs to go to work for American construction firms. Garbage rotted in the city streets while sturdy and freshly painted buildings sprang up at the U. S. bases in the suburbs.

Nor was the rapidly accelerating rate of social and economic dislocation the only stress of these years from 1965 until 1969. The direct effects of war continued to mount and press upon the Vietnamese people.

During six years of war from 1960 through 1965, the armed forces of the Republic of Vietnam had suffered about 11,000 dead and 23,000 seriously wounded. In the two-year period of 1966 and 1967, over 24,000 died and more than 50,000 were seriously wounded. Then, in 1968 alone, almost 30,000 were killed and another 70,000 were wounded. By the end of 1968 combat losses of the government forces exceeded 63,000 dead and 144,000 wounded. Thus, in a period of nine years, about one of every five soldiers, or one of every twenty adult males, was killed or seriously wounded while fighting for the government. And losses in the insurgent side, also Vietnamese, were even higher.

Virtually every soldier who was killed or wounded had a wife, parents, children, brothers and sisters and friends who were affected. And civilian casualties themselves, although difficult to estimate, increased in approximate terms from about 100,000 in 1965 to about 175,000 for the year 1967 and 300,000 for 1968. By the end of 1968 civilian war casualties were approaching the level of one million people, including perhaps 300,000 deaths. By late 1969, some 80,000

civilian amputees and paralyzees and another 25,000 blind or deaf civilian victims of the war were officially registered with the government. There were an estimated 50,000 widows and several hundreds of thousands of orphans (by late 1971 official U. S. estimates ran as high as 700,000). And by the end of 1968 the number of refugees had grown to well over three million, representing about 20% of the population.

Meanwhile, of course, massive U. S. programs continued to change South Vietnamese society though not always in the way intended. It is difficult to describe the nation or society which emerged in South Vietnam as a result of these historical and contemporary forces. It was neither developed nor undeveloped, neither traditional nor modern. None of these labels fits. Some parts of the system had grown strong while other parts had withered. Balance and equilibrium was lacking, and the normal pattern of development had been badly distorted. The traditional values which had bound the society together, albeit tenuously, were further weakened, while no new or more encompassing values and loyalties were emerging for the society as a whole. A society whose basic organization had assumed some degree of uniformity and consensus, consisted of people who now displayed widely divergent patterns of attitudes, values and behavior.

And it was into this situation, already exacerbated by the steady intensification of fighting, that half a million American troops and tens of thousands of American civilians came in 1965 through 1968.

Most of the urban middle-sector were, we believe, glad to see the Americans come and glad for their assistance. And the gradual impingements upon their life style seemed insignificant compared to the blood and sweat and dollars the Americans were giving. A large-scale unpublished public opinion survey conducted in 1966 showed that Saigonese felt little or no hostility at that time towards the American presence, despite the petty annoyance, the occasional ugly incident, or the already worrisome problem of inflation.

### III. Vietnamese Responses

What converted these minor irritants into moral issues was the perception on the part of many urban Vietnamese, and especially of the intelligentsia, that Americans did not view them as equal partners in a common struggle but rather as incompetent, inferior and untrustworthy subordinates. Whether this was in fact an accurate perception of American attitudes is irrelevant for the purpose of this analysis because the behavior of American forces in Vietnam was often such that it could easily be interpreted so as to fit the Vietnamese viewpoint.

How such resentments grew is exemplified by an occasion when a number of Vietnamese university students complained to one of the authors that the American flag at the entrance to a U. S. base was much larger than the Vietnamese flag flown next to it. They were

indignant, seeing this as a deliberate act of disrespect for Vietnamese sovereignty. On checking with the base commander it was learned that the Vietnamese and American flags had originally been the same size but that the U. S. flag had become worn and had been unthinkingly replaced with a larger flag sent to one of the GI's from home. No slight had been intended, but the Vietnamese did not know this.

Symbolic incidents of this sort multiplied providing the Vietnamese with further evidence that Americans held them in contempt. Then came the trauma of Tet Mau Than and the battle of Saigon of May 1968. Many urban Vietnamese saw the war close-up for the first time and became convinced that American fire power was being used to save American lives, but with no regard for Vietnamese lives or property.

Trinh Cong Son, a folksinger from Hue whose popularity has soared among young Vietnamese over the past seven or eight years, and who is seen by many and to some extent sees himself as the Bob Dylan or Joan Baez of Vietnam, was in Hue during the Tet 1968 offensive. He spent a month hiding in a library. Among the many vivid memories he has of Hue at that time, he recalls:

"I will never forget a mother running after a truck carrying corpses, which bore the body of her son. And as she ran she clapped her hands and laughed hysterically all the way down the muddy, red-dirt road.

Nor will I ever be able to forget the American troops stretched out by the side of the road who looked at her and laughed arrogantly." (in Ta Ty, 1970, p. )

Several major factors - the passing of time, the Tet 1968 fighting, and a general mobilization policy - combined to hurl many people from the middle sector into direct contact with the realities

of war. Many of these people, and perhaps especially the intellectuals, had felt themselves to be aloof from the war. During the late fifties and early 1960's introspective individualism had been the dominant intellectual theme. Then as the war escalated, the reaction was a mixture of shock, guilt, a sense of impotence, and a growing feeling of resentment of the American presence.

Some examples from the writings of contemporary poets illustrate the change in thinking of many of the intelligentsia in Saigon and Hue during the four years from 1964 to 1968.

Nguyen Sa, one of the most distinguished and popular poets of the late fifties and during the sixties among students and intellectuals in Vietnam, was noted for his lighthearted treatment of life and love. Carpe diem was his favorite theme. In August of 1967 he wrote a poem of a very different character entitled: "Forgive Me for Past Mistakes."

Now I carry a Garand rifle upon my back  
Now I carry a BAR on my shoulder  
Only now do I know how heavy these murderous sticks can be  
Only now do I know what a stupid fool I was during my life as a teacher

. . . . .  
I want to shout out what a stupid fool I've been

. . . . .  
Forgive me  
Forgive me  
My brothers who have died  
Brothers a thousand times more worthy of life than I, who  
Have died  
Are dying  
Will die  
Forgive me

The sense of guilt expressed here, of having awakened to a new dimension of national existence, is to be found elsewhere in the literature of these years. We believe this change in the literature to be representative and illustrative of a broader social phenomenon, especially among the urban middle sector. At the front of her best-seller novel Put on the Mourning Cloth for Hue which is about the

Tet 1968 offensive, Nha Ca placed "A Brief Preface: Written to Accept Guilt." Nha Ca is a widely respected, relatively young, novelist, short story writer and poet. She is also a Catholic, and her book is basically non-political and certainly non-communist. There are no anti-American sentiments in this book, indeed, there is little mention of Americans and her treatment of their role is sketchy, and neutral in affect. But the theme of guilt and impotence is revealed in a vignette contained in her preface.

. . . a small dog caught in a crossfire ran off, barking, fleeing wildly along the bank of the Ben Ngu River. And it became a humorous target for the ready guns on the opposite bank. They fired until the wretched creature leaped into the river from fear. And then they fired at any spot on the bank where the small dog attempted to scramble ashore. Those shots were fired in jest with no intention of killing the small dog, only of teasing it, keeping it precariously stranded in midstream, in order to have an amusing story to go along with the blood and flames. How different is the city of Hue, and perhaps even our entire miserable homeland, as well, from the plight of that small dog precariously stranded in midstream? Our generation, this generation so very fond of showing off by using the prettiest of phrases--not only must we tie cloth of mourning for Hue, for our ravished homeland, but we must accept our guilt for Hue and for our nation as well.

Another prominent poet, To Thuy Yen, who was born near Saigon in 1938, also expresses the sense of disillusionment, guilt, and impotence. Like Nguyen Sa, he too had entered the Army of the Republic of Viet-Nam. Here is an excerpt from the poem, "On the Battlefield."

#### On the Battlefield

dedicated to Thanh Tam Thuyen  
Dans l'attente de la mort, on retrouve  
la vie et sa vie.

My secret is that I have lived  
On earth covered with a scum of sombre shadows  
Where the rays of the sun were a sentence of arrows, knives and axes.

They said that the night was ebony light  
Only a black sun was a true sun  
We had to puncture the blindness of good vision.

They asked what good was intellect  
Each person must grow pale like any other  
And the soul of each must don the same garb.

Saying the dead corpses would fertilize for peace  
They slew the people in the house down the lane  
They slay people as if clearing a wilderness.

Reject with one word both capitalism and communism  
No one stands out here in this war of vengeance  
Which mashes my body on the edge of the scimitar formed by the two factions.

I fall to the ground with clean hands.

Another young poet, Nguyen Quoc Thai, has effectively captured the mood of the year 1969, the year in which we have noted such a grave shift in the tone and content of the newspapers and journals. In his poem "Ilyms Upon the Sea at Night" he calls to his friends, and to the youth of the nation, to rouse themselves, to speak out their resentments and hopes, to make their desires a reality.

Let's begin stand up  
hold hands and form a circle  
in the night shadows on the coast of the eastern sea  
from the smallest of you  
with heads raised like the sun  
tell each other about  
shameful indignities  
strange new marks of the whip  
pouring torrentially over life  
tell each other about  
loved ones who have died  
orchards where leaves have fallen  
fields which are black and dry  
rivers canals lakes ponds  
oil spreading to darken the surface of the water  
ragged kindergardens of grass and hemp  
scorched streets marked by hatred

Elsewhere in the poem, Nguyen Quoc Thai remarks that the climate has changed. There was, we believe, a marked shift in the "climate of values". A reassessment of the American use of herbicides in Vietnam





Though we have lain side by side in the battle front opposing communism  
And we have sweat together, and shed blood together  
And sacrificed together  
For the flesh and blood you have budgeted for my nation  
is not enough to prove that you are sincerely for freedom  
That you are sincerely helping a weak nation without profit  
Ah, it is extremely fortunate  
That my people do not bear grudges

.....

Oh, my U.S. soldier friends  
Have you ever asked yourselves  
With all the corpses of your comrades  
With all the wealth of your nation  
With all the modern weapons you use  
Why you have not yet achieved victory  
If we do not wish to say  
If we do not wish to accept  
That you are about to yield, about to retreat, about to be defeated

.....

So long as we have breath  
We shall have the strength to fight  
In search of freedom and in defense of peace  
Go ahead and leave Viet-Nam, my friends,  
If you are exhausted  
If you are ashamed  
For not being honest with yourselves before you came  
And take our thanks with you  
To serve as a bit of victory  
To inscribe upon the pages of your history  
We pray that those pages do not make you troubled and bitter.

Statements by American scientists, echoed by American politicians and reported in the American press were in part responsible for calling the attention to the real potential danger of herbicides, especially as being used by the U. S. in Vietnam. Given the new climate of values we have just illustrated, this gave power to herbicides as a symbol. It is a fact that the abrupt outbreak of criticism regarding herbicides and increased attention to it as a topic in the Vietnamese press followed close in time the decision by the New York Times to take an editorial stand against the U. S. use of herbicides in Vietnam (NYT, April 23, 1969, p. 15, col. 1). A cursory review of articles published in the New York Times and in Vietnamese papers and magazines suggests to us that increasing coverage of the herbicide issue from 1969 through 1971 may to a large extent be attributable to statements of concern made by Western (principally American) scientists and politicians about possible long-term health and ecological effects of herbicides. In these reports many Vietnamese of the urban middle sector found confirmation of their already heightened suspicions of U. S. motives and intentions.

An example of the way specific attitudes and opinions regarding herbicides were derived from and documented by American sources is an article by Phan Cao Duong entitled "Ten Years of Ecological Warfare in South Vietnam" which appeared in the October 22, 1971 issue of Trinh Bay, a popular Saigon journal of intellectual protest. This article also illustrates the way certain

derived attitudes regarding herbicides interacted with existing, independently formulated attitudes toward the American efforts generally to produce a powerful and symbolic issue. The major emphasis of this article can be seen in the following excerpts:

"Now ecological warfare, or warfare to destroy the means of subsistence, has taken place in Viet-Nam for exactly ten years. Beginning ten years ago with the experimental spraying of herbicides to the east of Saigon by American advisors, this war has continued strongly with all sorts of blue, white, red, and orange chemical agents.

The application of these poisonous chemicals upon people, animals, crops, forest products, soil and climate, as well as the effects of the program called 'defoliation,' has been described in great detail in the pages of this journal.

While another kind of warfare, according to some people, is gradually receding (?), the war of ecological destruction in South Viet-Nam, after ten long years, still is of a terrifying nature...The American authorities...still refuse actually to accept the barbaric and inhumane nature of ecological warfare. They stubbornly deny that the chemicals used in Viet-Nam are a form of chemical warfare...Is it that they are afraid of losing face?...Or is it that they subscribe to and are pursuing the principle that 'if you wish to break the fighting spirit of a people, you must destroy the subsistence base of those people?'

Ecological warfare continues, in one guise or another, with one type of weapon or another. For the past ten years, the American authorities have never had any intention of abandoning their war to exterminate the means of subsistence of the Vietnamese people.

On April 19, 1972, Trinh Bay published a special issue on "The American Destruction in Indochina." The issue contains translations of statements from the Congressional Record regarding a bill calling for an assessment of the effects of the war in Vietnam, translations of

articles by American scientists on herbicide damages as well as several by Vietnamese authors.

If Trinh Bay were an obscure and seldom read journal published by insignificant or unknown malcontents it would not be worth citing. But Trinh Bay is published by a distinguished editorial board<sup>1</sup> and is one of the most widely read and influential journals in South Vietnam.

Nor was Trinh Bay the only magazine that became concerned about the use of herbicides in this period after actual spraying had ceased. In January, 1972 the Saigon journal Doi Dien<sup>2</sup> (No. 31) featured an article by Hong Huu entitled "A Strategic Goal of the Americans in their Rural Pacification Policy: To Exterminate the Means of Subsistence, the Sentiments and the Traditional Love of Country of the Vietnamese Peasantry" (pp. 1-19). His major proposition is: "The basic principle in a people's war is to take the rural areas in order to encircle the cities, actually, to encircle the economy. The Americans, with economic goals, have destroyed crops and used the urban economy to encircle the countryside" (pp. 9-10). The Americans deny the Viet Cong their hiding places and source of strength--the rural population--by "forcing the rural people to leave their normal spheres of activity and placing them in refugee camps, regroupment camps, etc." (p. 11). The author feels that the

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<sup>1</sup>The editorial board of Trinh Bay includes non-communist intellectuals of some prominence: Thanh Lang, a distinguished literary critic and historical scholar; Pham Cao Duong, social historian; Nguyen Sa, one of the foremost modern poets of South Vietnam, more recently an ARVN officer; Du Tu Le, one of the most promising and popular poets to publish in Saigon in the past ten years; and many other names familiar to the reading public and in Saigon intellectual and scholarly circles.

<sup>2</sup>Doi Dien is published and edited by several Catholic priests, and has many contributors and a wide readership among the Catholic population.

true purpose of the use of herbicides, artillery, air strikes, Rome plows, and many military operations is to prevent the Vietnamese peasant in South Vietnam from working his fields in peace and producing enough to eat.

But they still have to live; they still have to eat. And there is only one path available to them: abandon their fields and orchards, change their occupation, take any job at all except farming (this is what the anti-communist strategists want so much). So the farmers 'voluntarily' come to the strategic hamlets, the regroupment camps, the refugee camps, the relocation centers in order to 'be assisted' and more secure. Through the compulsion of their will to stay alive, if they don't use aid commodities and canned goods and after their assistance has been prematurely terminated, the rural people must go to work doing other things, begging, stealing, pimping and whoring in the cities or around the allied bases.

Because of their agricultural life, the great mass of Vietnamese people have had a sentimental attachment to the land which is a first step toward love of homeland and love of nation. Now that the rice fields are devastated, the homeland of the rice has become a very distant thing. Furthermore the change in life style and the ease of earning a living on the part of those 'fortunate' peasants (having children who have American husbands, boyfriends, American jobs) had led them to no longer miss their rice fields and orchards. Farming has become something tiresome and unrewarding, and it provides no TV, refrigerators, or varieties of canned meat.

The kind of influence exerted by such journals on the thinking of the Vietnamese middle sector is exemplified by a young South Vietnamese army officer interviewed at Military Headquarters in a provincial Capital. After a lengthy discussion about the effects of herbicide, the officer noted that much of what he knew about such effects had been learned from several articles in some popular magazines and journals. He proceeded to name the articles and the issues of the magazines, and they included the articles in Trinh Bay and Doi Dien which were quoted in this section. This officer had been indirectly involved in the herbicide program and was greatly disturbed by what he had read.

Had this complex of feelings been restricted to persons with anti-government sentiments one could argue that this change was an illusion created by a few talented but perhaps misguided individuals, who were merely giving vent to their personal frustrations. Examination of the data available, however, leads us to conclude that while some student groups, a few newspapers and a minority of writers and poets were ahead of the bulk of the urban middle sector in the extent and intensity of their changed attitudes, they were not long alone.

Chinh Luan, as mentioned earlier, is recognized as representing conservative point of view in Saigon. The paper has been in the forefront of staunch anti-communist voices, and has often been criticized by Vietnamese liberals as having a pro-government and pro-American bias. But Chinh Luan, too, posed a question to the Thieu-Huong ticket in the 1971 elections, raising what they called "the people issue." In effect, Chinh Luan demanded that Thieu and Huong demonstrate their ability and willingness to stand up to the Americans and control more strictly American's actions. Their rationale was said to be based upon the following statement of their beliefs regarding the effects of the use of herbicides in Vietnam.

From Chinh Luan (September 29, 1971)

"The U. S. Armed Forces have a low regard for the lives and property of the people of this country. As a result much indiscriminate bombing has taken place, and careless herbicide spraying has been conducted, a spraying that is beyond the real and reasonable tactical needs...Indiscriminate defoliation activities of the U. S. Armed Forces have inflicted great damage upon trees and crops which are a source of life to the people."

#### IV. The Problem of Identity

Part of the urban middle-sector Vietnamese had long been apprehensive of American motives and fearful of the outcome of their intrusion into Vietnamese life. The most thoughtful and persistent anxieties seem to have lain more in the cultural sphere than in the military, economic, or political. Ton That Thien, a prominent Vietnamese social scientist, journalist and editor (Wesley Fischel has called him a "candidly acid nationalist") has been a long-time student of and commentator upon Vietnamese-American relations. (Ton That Thien, "Psychological Block", Far Eastern Economic Review, September 30, 1965, p. 600; quoted in Fischel, 1968, pp. 679-680.) As early as 1965 he warned that few Vietnamese of honesty and intelligence would welcome the massive American presence with open arms or support a close association between the two countries. They would "hold back", he felt, in part "because they are genuinely unsure about U. S. intentions". They felt that Americans in South Vietnam "shun the nationalists (not necessarily anti-American) who hate the idea of turning their country into a 'little America'". What was involved here, he perceptively noted, was the "dignity of the citizens of the Vietnamese state".

A year later Ton That Thien reported ("In Love and War", Far Eastern Economic Review, August 25, 1966, pp. 345, 348; quoted in Fischel, 1968, pp. 677-678) that two important events had recently occurred in Saigon. A group of intellectuals had held a meeting at the city hall "to discuss the problem of cultural and moral 'depravity' and measures to check it". At the same time a meeting of Vietnamese students in Saigon to discuss "current problems" had turned into "an indictment



of inter-marriage between Vietnamese women and American men, and of the Government's yielding to American pressure in the economic sphere".

The individuals who attended such meetings felt that war presented a threat not so much to life as to a way of life. Such meetings, the shifts we have noted in poetry and novels, the general growth of criticism of American actions, the disbelief in officially stated U. S. goals, the change in newspaper editorial policies, and the symbolic value of herbicides are all intimately related to this very real and perceived threat to Vietnamese identity.

The Vietnamese identity had, like Vietnamese art, been based primarily upon a way of life. This way of life involves harmony between men and nature, balance between complementary forces, and a closeness to and respect for nature. The Vietnamese were living ecology long before we had a word for it. Through the centuries they had often exploited the land and each other, but their ideal value system never rationalized nor glorified such actions. The Vietnamese, at all levels of society and throughout the centuries, have felt themselves to be an integral part of the tissue of life which covers the earth. Their word for the country of Vietnam can be translated as "waters of Vietnam." And, one of their words for nation is "rivers and mountains." They have long treasured the ecological and social balance of their land. And, this is what, at the most basic level, we threatened to destroy and what our use of herbicides came to symbolize: the possible degradation of a way of life.

As a young poet named Do Quy Toan, who would have been thirty years old in 1969, wrote a few years earlier:

We still have never seen the sea,  
Oh, that vast sea, sea which is still so distant.  
Though we have wandered across the desert for a thousand years,  
With such great thirsting after goals not yet obtained,  
Our eyes are still cast upon the horizon,  
Awaiting a beam of light.

The American use of herbicides in Vietnam seemed to many Vietnamese to symbolize the way technology served to obscure rather than light the path.

#### V. Conclusion

In this final section we have looked to Vietnamese history, literature, and culture for explanations as to why and how herbicides became a symbol. There are no hard facts to aid us in a task such as this. There is no way to see a symbol in a test tube, nor to describe it in weights and measures. The job is mainly one of assembling pieces of evidence from widespread and diverse sources and then offering an interpretation.

From this endeavor we have come to conclude that the symbol-making of herbicides came about because of fear. It was not simply fear of what herbicides themselves would destroy, but a much deeper fear of what the Americans and American technology in general might destroy. What was threatened was not only the physical environment but a sense of identity as Vietnamese people. This identity was threatened by what was perceived by many Vietnamese people as the American subscription to technologies that were neither effective nor humane.