STATE STRATEGIES TO COMBAT RESOURCE SCARCITY

BY

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A THESIS PRESENTED TO THE FACULTY OF
THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES
FOR THE COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIR AND SPACE STUDIES
AIR UNIVERSITY
MAXWELL AIR FORCE BASE, ALABAMA
JUNE 2011

APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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ACKNOWLEDGMENTS

I would like to acknowledge my thesis advisor, Colonel Suzanne Buono, for her tireless efforts motivating, redirecting, and focusing me throughout this project. Her instruction in International Relations theory and in research methodology has been priceless. Dr. Buono's academic rigor, her encouragement, and her never-ending niches of knowledge have been welcome additions. I would also like to thank my reader, Dr. Harold Winton, without whom this work would not have been as technically proficient or logically incisive as I hope it has become. My writing mentor, Dr. Thomas Hughes, also deserves my gratitude; his work in honing my drafting, composing, and argumentation skills over the past year has truly made me a more effective author. Finally, I would like to recognize my wife, whose patience I do not deserve, and without whose love, this project would not have come to fruition.

Thank you all.

ABSTRACT

States have historically faced resource scarcities that impeded accomplishment of their policy goals. They have applied disparate strategies in response and have achieved varying levels of success. This study examines historical instances of these scarcities, or ends-means disconnects, by analyzing Germany, Israel, and Iceland as case studies. The author assesses the importance of resource scarcity to state policy, and introduces a methodological framework by which to compare the three.

World War II Germany attempted to counter its perceived scarcities of land, petroleum, and metals by acquiring more land; this approach is consistent with a strategy based primarily on means. Israel decided to combat its perceived scarcity of water by using water more efficiently and by securing the headwaters of critical freshwater sources. According to the study's methodology, Israel's strategy was both ways-centric and means-centric. Iceland worked to counter its perceived fish scarcity by obtaining exclusive access to fishing areas and by pursuing conservation measures. These actions also reflect a strategy based on both means and ways.

The thesis concludes by assessing emergent themes common to the three cases and by answering the question, "How should states respond to resource scarcity?" The concepts of vital interests, self-sufficiency, unforeseen consequences, technology, environmental control, and public diplomacy were the primary shared ideas among the case studies. The author argues that states should adopt multifaceted strategies in terms of ends, ways, and means and should carefully evaluate whether or not a dearth of the resource in question poses an existential threat. Furthermore, states should respond to scarcities cautiously and incrementally, due to the inevitability of second-and-third-order effects. They should also pursue flexible strategies with which they can quickly adapt to changing circumstances. Finally, states should consider response options early, before scarcity is imminent or, worse yet, present.

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Introduction

Resource scarcity has plagued states in the past and continues to affect them today. In some cases, this scarcity has even precipitated conflict. Not all states, however, pursued violent methods to address such scarcities. To their credit, states have adopted a variety of approaches to rectify their resource shortfalls. Depending on their preferred definition, many scholars would characterize these approaches as strategies. Carl von Clausewitz defines strategy as the use of engagements for the purpose of war.[1] This definition would characterize state approaches to resource scarcity as strategies only if they involved war. The contemporary academic Colin Gray suggests strategy connects military force to political purpose and, more broadly, links any instrument of power to policy ends.[2] Gray's broader definition is more appropriate, but it unnecessarily restricts resource scarcity strategies to categorizations of power. For the purposes of this paper, strategy is defined as an approach to solving a policy problem. This definition still links action to political ends, but it avoids unnecessary restrictions or categorizations with instruments of power. A state's strategy with regard to resource scarcity simply becomes its plan to rectify the shortfall between policy ends and resource means. The remainder of this thesis will use the terms strategy and approach interchangeably. The following three examples may illustrate the historical relationship between resource scarcity and strategy.

In 800, the Mayan civilization, renowned for its early astronomical and architectural feats in Latin America, began a precipitous decline. As jungle cities grew to sizes in excess of 50,000 people, their population's quality of life began to plummet. Yet neither weather, nor foreign conquest, nor even natural disaster had intervened. What, then, was the likely cause? It was most likely resource scarcity. Many scholars now believe that an insufficient resource base drove previously peaceful citizens to strike out

1. Carl von Clausewitz, *On War,* ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 178. This definition is too parochial, as it focuses on military employment during war, rather than on the use of war for political aims. His definition might be better termed *military* strategy than *grand* strategy

2. Colin Gray, *Modern Strategy* (Oxford, UK: Oxford University Press, 1999), 17. Linking action to policy ends is the key distinction elevating this particular definition above Clausewitz's.

and attack neighboring settlements to acquire additional food.[3] They also suggest the Mayans deforested the jungle to an ecologically unsupportable level in a vain effort to expand their arable land. Mayan leaders designed both approaches—neighboring conquest and deforestation—to acquire sufficient food to maintain their quality of life and to obtain economic prosperity. Although their martial and agricultural efforts, coupled with eventual European conquest, led to the civilization's decline, the Mayan experience characterizes the timeless nature of resource scarcity.[4] Simply put, the Mayan policy aim was to sustain their quality of life. A scarcity of food stores frustrated this policy goal. Mayan leaders adopted a two-part strategy to overcome this deficit: acquiring food from other cities and increasing arable land.

From 1604-1861, Britain, in the wake of the Anglo-Spanish War, worked tirelessly to maintain its naval and maritime supremacy. As challengers arose, the British expanded and upgraded their fleet and solidified their sea control. Yet protecting its sea lines of communication and preserving its naval dominance carried a heavy cost. To satisfy these costs, the British leadership chose a mercantilist policy. Because Britain lacked sufficient timber, pitch, and tar to support its navy, it sought to rectify these scarcities by acquiring these resources abroad.[5] By exploiting its colonies' resource wealth, Britain could supply its expanding navy with the timber required for survival and supremacy. In sum, Britain adopted a mercantilist strategy to overcome its timber scarcity and thus protect its economic empire and naval dominance.

From 1931-1945, Japan slowly realized its inability to support a military campaign in Manchuria, part of its broader policy goal of East Asian dominance. Japan's initial military success caused an expansion of its industrial base, increasing its domestic demand for resources, and complicating its lack of indigenous petroleum, coal, and iron ore. These factors, coupled with a financial depression and a desire for economic self-

3. Clive Ponting, *A Green History of the World: The Environment and the Collapse of Great Civilizations*, 2nd ed. (New York, NY: Penguin, 1997), 80-83; Rafael Reuveny and John W. Maxwell, "Conflict and Renewable Resources," *Journal of Conflict Resolution* 45. no. 6 (December 2001): 736-737.

4. Ponting, *A Green History*, 80-83; Reuveny and Maxwell, "Conflict and Renewable Resources," 736-737.

5. Robert G. Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862* (Cambridge, MA: Harvard University Press, 1926), vii; Ian O. Lesser, *Resources and Strategy* (New York, NY: St. Martin's Press, 1989), 12.

sufficiency, slowly strained its resources.[6] Japan tried to counter its scarcity by harvesting resources from conquered Chinese territory and by converting its coal into petroleum through revolutionary methods such as low-temperature carbonization, coal liquefaction, and the Fischer-Tropsch synthesis process.[7] In the end, the Japanese policy goal of dominating the Asian mainland was stifled by insufficient petroleum access. Its dual strategies of resource seizure and energy conversion were inadequate to meet the expansionary state objectives.

These three historical examples demonstrate scarcity's impact on states over the last 1200 years. In today's post-Cold War era, many scholars believe resource scarcity will *continue* to produce conflict among states.[8] However, not all experts agree on the relationships among resources, conflict, and strategy. They debate two central questions: Does resource scarcity continue to exist? If it exists, does resource scarcity lead to conflict?[9] Sufficient scholarship exists to facilitate further examination of these ideas. Toward this end, an analysis of past scarcities may inform state responses to current and potential crises. In the course of its analysis, this paper will address several questions. Specifically, how should we define resource, scarcity, and the various approaches to overcoming shortfalls? Must scarcities actually exist, or are perceptions adequate to merit a reaction? How should states react when faced with looming scarcities? At what point does a state cross from the imminent threat of scarcity to potential future scarcity? What types of strategies do states employ to address such shortfalls? Which types of strategy are most effective in achieving policy aims? Do these approaches prevent the recurrence of resource scarcities? Ultimately, the research question this paper will try to answer is: How should states respond to resource scarcity?

This paper will examine three case studies as the historical backdrop upon which to answer the research question. Chapter One will narrow the topic of resource scarcity

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6. Anthony N. Stranges, "Synthetic Fuel Production in Prewar and World War II Japan: A Case Study in Technological Failure," *Annals of Science* 50 (1993): 229.

7. Stranges, "Synthetic Fuel Production," 230. The Fischer-Tropsch process converts hydrogen and carbon monoxide (both taken from biomass sources or other fossil fuels) into hydrocarbon fuels.

8. See Michael T. Klare, "Resource Competition and World Politics in the Twenty-First Century," *Current History* 99, no. 641 (December 2000): 403-407, and Thomas F. Homer-Dixon, *Environment, Scarcity, & Violence* (Princeton, NJ: Princeton University Press, 1999), 4.

9. The chapter on methodology and framework will examine the rationale of both sides of these questions in detail. Ultimately, the causality of scarcity to conflict is not central to this thesis; rather, the focus is the state response to perceived scarcity.

and will address its continuing relevance to present and future strategic contexts. It will define terms fundamental to the subsequent discussion and will describe the scope and methodology of the research, including a five-question analytical framework. Chapters Two, Three, and Four will consist of three case studies: Germany, Israel, and Iceland. Each case study will briefly explain the strategic context and will document the perceived resource scarcity in relation to a policy objective. Additionally, the cases will examine state responses and consequences and assess the success of applied strategies. Chapter Five will present a cross-case analysis that draws conclusions from the case-study evidence. It will pose an additional series of questions about strategies based primarily on ends, on ways, and on means. It will also address the root causes and symptoms of the scarcities, the applicability of lessons to other states' conflicts, and the timing of state action. Through past scarcity analyses, this thesis will identify successful strategies to counter perceived resource scarcities, with the hope of informing future state action.

Chapter 1

Strategic Context and Methodology

The strategic context and analytical framework of a research project matter. Ideas, circumstances, and boundaries aid problem framing, just as a unifying methodology applied to a research problem inevitably shapes the direction of analysis. Before exploring these concepts, it is necessary to define some critical terms and to examine the academic debate as to whether or not resource scarcity still exists and whether or not it causes conflict.[1] Modern strategists and policy makers must account for the significant impact resource scarcity can have on their decision-making cycle. This chapter explains this thesis's research methodology and discusses case study selection criteria, the rationale for rejecting alternate historical scenarios, and the logic behind the chosen methodology of process tracing. Finally, it presents a five-question systematic framework, defining analytical bins of strategies based on ends, on ways, and on means. It will ultimately form the basis for comparison among the three case studies, facilitating the discovery of certain resource-scarcity insights among the various state responses.

Resources

What is a resource? Most people would agree that water, minerals, and natural gas all constitute resources; but, what about arable land? What about human innovation and talent? Do livestock or flora, for example, count, while intellectual capital does not? Specifying the nature of resources is important to the subsequent discussion for several reasons, not the least of which is the need for a point of logical reference from which to begin the analysis. Not everyone, however, accepts the same definition.

Dr. Ian Lesser, senior fellow at the German Marshall Fund of the United States and former State Department planner, suggests resources simply mean raw materials, including agricultural products.[2] This definition would cover many obvious objects such as timber or crops but would exclude any refining or production processes applied to raw

1. As noted in the last chapter, the linkage between resource scarcity and conflict is not the focus of this study. It is worthwhile, however, to acknowledge scholarly arguments in this arena because state responses to resource scarcity do sometimes lead to conflict. As a result, this peripheral issue warrants a brief mention.
2. Ian O. Lesser, *Resources and Strategy* (New York, NY: St. Martin's Press, 1989), 4.

resources. Oil, for example, would not be considered a resource except in its natural state of crude petroleum. Michael Klare, director of World Security Studies at Amherst College, offers an alternate definition. He believes resources are tangible assets other states can hold at risk abroad; as such, resources deserve protection and security as items of potential national interest.[3] Although Klare draws a beneficial connection between the value of a resource and its role in the economic well-being of a state, he, too, overly restricts the definition. An acre of land is tangible—another important distinction—but physically, it cannot be held at risk abroad.[4] Yet it serves as a valuable and contributing factor to the economic well-being of a state, if for no other reason than because of its agricultural and commercial potential.

This last observation raises a key point: resources must have the potential to contribute to a state's economic success.[5] Toward this end, Raymond Aron, a French international relations theorist, offers a superior definition of resources. He believes resources are the sum of the material means states have at their disposal to assure their continued existence and economic prosperity.[6] This wording captures the critical ideas regarding resources. They must be tangible; states must perceive a right to use them; resource use must help states survive and sustain desired levels of economic well-being for their citizens.[7] Simply put, physicality, legal access, and use for existential or quality of life purposes are the defining characteristics of resources.[8]

Many scholars make a further distinction between renewable and nonrenewable resources; thus, the ease with which a state can renew a given resource might affect the degree of urgency the state's polity perceives with regard to the scarcity. Thomas

3. Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict* (New York, NY: Henry Holt & Company, 2002), 9.

4. Of course, states can threaten the physical territory of other states through military means, but they cannot physically withhold that land outside the confines of the owning state. By definition, land establishes sovereign boundaries. Removing a piece of land would remove a piece of sovereignty. By Klare's definition, removing people from their land would, in fact, qualify as resource extraction.

5. Whether or not states capitalize on this potential, or whether or not states "cash in" this potentiality for the pursuit of economic success, is a matter of strategic choice.

6. Raymond Aron, *Peace and War: A Theory of International Relations*, 2nd ed. (New Brunswick, NJ: Transaction Publishers, 2003), 244.

7. The perceived right to use a resource, or legal access, is an important distinction. Other states may contest this right. But to qualify as a resource for the purposes of this discussion and the subsequent research question, the object must be an item over which a state believes it has legitimate claim.

8. Granted, by this definition, monetary currency would qualify as a resource. Although it meets Aron's three criteria, this thesis will exclude second-order manmade objects such as currency, focusing instead on first-order natural resources.

Homer-Dixon is a Canadian international relations professor whose expertise lies at the intersection of interstate relations, environmental degradation, and resources in general as a *casus belli*. He emphasizes the difference between these two categories, arguing, on the one hand, that renewable resources are materials that replenish themselves over time, assuming proper human stewardship of the environment. Examples include water, timber, and topsoil. On the other hand, nonrenewable resources exist in a fixed amount on the planet, and cannot be efficiently generated using any technology humanity currently possesses. The only two examples he suggests are oil and minerals.[9] Although this distinction between renewable and nonrenewable resources is germane when evaluating causes of resource scarcity, it is of negligible consequence to the discussion herein.[10] This thesis will consider all resources, whether renewable or not…, as potential catalysts for policy change and even conflict.

Resource Scarcity

The next definition required for this discussion is resource scarcity. At the simplest level, resource scarcity exists when demand exceeds supply. Unfortunately, this basic definition misses the mark by omitting key elements worthy of consideration. Because individual citizens' demands vary and because they or their respective states could arbitrarily demand additional resources, the supply-demand imbalance definition is inadequate. It is overly elastic. A second definition comes from Homer-Dixon, who offers a new term called *environmental scarcity.* He says it refers to the scarcity of renewable resources, resulting from supply changes, demand shifts, improper distribution, or environmental degradation (a subcategory of supply).[11] But his construct fails to tie scarcity to policy objectives. As noted earlier, the state's strategy with regard to resource scarcity is its plan to rectify the shortfall between policy ends and resource means. As a result, we must define the scarcity in terms of this deficit:

9. Thomas F. Homer-Dixon, *Environment, Scarcity, & Violence* (Princeton, NJ: Princeton University Press, 1999), 47.

10. As we investigate the variety of state reactions to scarcities, whether or not the resource was a set stock (nonrenewable) or a stock with an annual flow (renewable) is peripheral. We are more concerned with state-perceived scarcities. Additional research could investigate whether the root cause of scarcity affects policy. For more information on the stock and flow analogies, see Homer-Dixon, *Environment, Scarcity, & Violence*, 47-51.

11. Homer-Dixon, *Environment, Scarcity, & Violence*, 7-9.

Resource scarcity is the perceived disconnect between policy ends and resource means.

To wit, a state specifies a desired end or policy objective. It assesses the resources it would require to pursue that aim. For the purposes of this study, a resource scarcity exists when the state believes it lacks the materials or means needed to achieve that end.[12] A state could address such a shortfall with one or more of three categories of strategies.[13] An *ends*-based strategy would involve a state curtailing its ends to a level consistent with its resources. Such a strategy would reduce a state's aims to a level achievable with its resources. In a *means*-based strategy, the state would focus on increasing existing means or acquiring substitute goods in order to achieve the desired ends. This strategy would affect the input, either increasing the amount of the scarce resource or substituting an alternate resource. Finally, a state employing a *ways*-based strategy would develop innovative ways to stretch existing resources sufficiently to reach the ends, without fundamentally creating new resources. Such a strategy would affect neither the ends nor the means (as defined here); rather, a ways-based strategy would target the efficiency of the process by which means are translated into ends. Examples will help clarify these three approaches.

Here, one can recall the example from the introduction concerning Japan and its Manchurian campaign. Its stated end was expansion of influence and eventual domination of the Asian mainland.[14] Its means to achieve that domination, or the resources to which it perceived a legal right, were insufficient. Specifically, Japan perceived a scarcity of petroleum, coal, and iron ore that would be integral to effecting

12. Perceived scarcity, not actual scarcity, is central to this research. Where the data exist for actual scarcities, I have included them. However, it is state or public perception, even in the face of conflicting objective data, that drives state responses to resource scarcity. If a state does not perceive a scarcity, it will not devise a strategy to address it. Furthermore, most resource scarcity scholars argue that it is nearly impossible to assess the actual status of most resources. For example, the stocks of petroleum, water, minerals, timber, and fish all elude precise enumeration. Therefore, for the purposes of this study, the actual state of resources in the case studies is supplementary data, rather than a critical piece of evidence.

13. I created this three-part categorization of potential state strategies as a logical tool to both group and distinguish between what I consider to be the predominant recourses available to states, to redress their resource shortfalls. It helps link state approaches with their success rates in the face of looming scarcities.

14. Lesser, *Resources and Strategy*, 84; Joseph W. Ballantine, "From Mukden to Pearl Harbor: The Foreign Policies of Japan," *Foreign Affairs* 27, no. 4 (July 1949): 653-654, 658-659; Anthony N. Stranges, "Synthetic Fuel Production in Prewar and World War II Japan: A Case Study in Technological Failure," *Annals of Science* 50 (1993): 229-265. Note that this case is complicated because an effect of successful Japanese domination of Manchuria would be the acquisition of additional resources. Thus, resources were inadequate as means, but possibly viewed as second-order ends.

this domination. One Japanese strategy could have been to limit the amount of expansion westward and southward, reducing its original policy objectives to a smaller territory, attainable with its existing means. Such an approach would have been ends based.

It is legitimate to consider a different type of solution to the same scarcity challenge. Suppose Japan decided to plunder resources from the land it conquered, fuelling its military forces and sending excess materials home to its islands. Such an act would have provided additional means to apply toward its desired end.[15] Similarly, purchasing additional coal and iron ore from disinterested third parties would have represented an augmentation of means. Japan could even have refit its ships and vehicles with oil-burning engines to avoid the indigenous coal shortage. The key characteristic of these approaches is the states' attempt to alter the value of the "resource" variable in its resource scarcity equation. Both approaches—augmenting resource supplies or substituting alternates—would have been means-based.

The final strategy type for this study centers on efficiency. Japan could have developed innovative ways of using its existing resource supplies more efficiently, thereby bridging its ends-means gap. By manipulating the resources it already possessed with increased efficiency, Japan would have garnered additional capability without changing the amount or type of resource upon which it relied. This would have exemplified a ways-based strategy.

Most states prefer a combination of strategy types to overcome their perceived shortfalls. In some instances, it is difficult to categorize a state's approaches as neatly as this study has suggested. For example, how would one classify the strategy if Japan had bought oil-burning ships from Russia that were more fuel efficient than its present ships? Would this have been means-centric, ways-centric, or both? Increasing efficiency is more aligned with ways-based strategies. Yet, augmenting its existing resources by buying additional means from a third party is a means-based strategy. Rarely will a country only attempt one type of solution. Why, then, make the distinction? Identifying the predominant or preferred types of strategies and evaluating their outcomes may suggest that certain approaches, or combinations thereof, favor success more than others.

15. Japan's legal right, as viewed by the international community, would have been questionable.

Such analyses may inform strategists and policy makers in their own efforts at addressing resource scarcities.

Based on the definition of resource scarcity as an ends-means disconnect, it is difficult to question its existence.[16] Historical examples abound. In 1950-1951, the United States recognized a shortfall in the mineral resources it required to support the Korean War. Because its means were both vulnerable, being dependent on foreign sources, and insufficient to achieve its mobilization aim, the United States founded the President's Materials Policy Commission. The Commission's recommendations included stockpiling, increasing mining and production, recycling, altering weapons design, and coordinating with allies for additional resources.[17] In another example, Brazil's deep-water drilling represents a response to a more recent scarcity. Brazil's oil exploration stems in part from its long history of scarcity. One journalist suggests the simultaneity of Brazil's debt accumulation and the rising cost of its oil imports at the end of the 20th century meant it could no longer maintain its quality of life and economic prosperity. As a result, Brazil sought alternative means—drilling outside its territorial waters and seeking deep ocean petroleum and natural gas fields. Success followed as Brazil's strategy led to oil self-sufficiency in less than a decade.[18] Some scholars even point to the decline of the former Soviet Union's empire in the 1980s as a result of resource scarcity. Purportedly, the Soviet Union was unable to continue its military and economic assistance to several countries within its sphere of influence because of resource shortfalls. It subsequently reduced its reach, particularly in Africa.[19]

Two concepts related to resource scarcity merit comparison, as they are easily confused. Resource vulnerability is a prolific topic in modern scarcity literature. It represents the likelihood of interruption to existing methods of resource supply, with resultant effects on national security.[20] Obviously, even a partial dependence on foreign sources increases resource vulnerability. On the one hand, some policy makers equate

16. The concept of an ends-means disconnect in terms of resources will be the definition of choice for the purposes of this thesis; however, as stated earlier, no definition meets universal approval.
17. Lesser, *Resources and Strategy*, 105-108.
18. Angel Gonzalez, "The End of Deep-Water Drilling? Not in Brazil," *Wall Street Journal*, 29 November 2010, R3.
19. Michael Radu and Arthur Jay Klinghoffer, *The Dynamics of Soviet Policy in Sub-Saharan Africa* (New York, NY: Holmes and Meier, 1991), viii.
20. Lesser, *Resources and Strategy*, 5, 17.

such vulnerability with a threat to national security; former US President Jimmy Carter's doctrine considered any state's effort to stem US access to Persian Gulf oil as an attack on the United States itself.[21] On the other hand, some scholars argue that the vulnerability of resources such as oil cannot comprise a threat to national security. They seek to divorce military and economic power, asserting that national security reflects military force structure rather than market access and raw materials acquired abroad.[22] Resource *vulnerability* refers to the potential for impeded resource access, a criteria we will explore in the methodology section. Resource *scarcity* refers to a specific objective-resource gap.

Resource war is the second related term. Used by former US Secretary of State Alexander Haig, resource wars occur when competing powers fight to control diminishing resources.[23] These conflicts need not involve existing or imminent scarcity; they roughly parallel Michael Walzer's concept of preventive war.[24] The implication here is that a state would attack another while it perceived it had adequate economic means, even though no resource shortage yet existed. The purported rationale would be to avoid a future impotence to claim the diminishing resources when the scarcity arrived. A modern example could be Iraq's preventive invasion of Kuwait in 1990. Although the causes of this aggression were many, Iraq perceived Kuwait was taking an unfair portion of the diminishing oil field disputed among the two states. Similarly, Kuwait's pricing policies were alleged by Iraq to have been designed to wreak cumulative havoc on Iraq's economic prosperity.[25] By attacking before an oil scarcity occurred and while Iraq still

21. Michael T. Klare and Daniel Volman, "Africa's Oil and American National Security," *Current History* 103, no. 673 (May 2004): 227.

22. Charles L. Schultze, "The Economic Content of National Security Policy," *Foreign Affairs* 51, no. 3 (April 1973): 536.

23. Roger Howard, "Peak Oil and Strategic Resource Wars," *The Futurist* 43, no. 5 (September-October 2009): 19-21; also see Michael Klare, *Resource Wars, 236;* and Lesser, *Resources and Strategy*, 147-153.

24. Michael Walzer, *Just and Unjust Wars*: *A Moral Argument with Historical Illustrations*, 4th ed. (New York, NY: Basic Books, 2006), xii-xiv, 83. Walzer's *preventive* wars lack imminence. They occur because of a nebulous future threat that is but one outcome among many, however likely it is. His *pre-emptive* war occurs when one state attacks another, because the other state presents an imminent threat to national security. He requires unambiguous intent from the *other* state, and no perceived benefit to delaying a strike until after the other state has attacked. Immediacy is the distinguishing factor.

25. Lawrence Freedman, *A Choice of Enemies* (New York, NY: Perseus Book Group, 2008), 214-218 and John Andreas Olsen, "Operation Desert Storm, 1991" in *A History of Air Warfare*, ed. John Andreas Olsen (Dulles, VA: Potomac Books, 2010), 178-181.

had the economic and military means to do so, Iraq executed an attack that exemplifies a preventive resource war.

Impact of Resource Scarcity

Despite recent scholarly trends suggesting resource scarcity continues to exist, many academics question the extent to which these shortfalls spur conflict. These scholars generally fall into three camps: the neo-Malthusians, the economic optimists, and the distributionists.[26] This academic debate has raged for centuries. The economist Thomas Malthus was the most famous proponent of the causal link between resources and conflict in the post-Westphalian age. He suggested population growth and environmental degradation would cause resource scarcity, pushing states toward conflict.[27] Several policy makers and academics promoted similar arguments. Former UN Secretary General Kofi Annan suggested resource scarcity and environmental damage would be the primary national security concerns of the future.[28] Former US Secretary of State Madeline Albright and several Johns Hopkins University professors went even further: they specified the scarcity of freshwater supplies would be the tinderbox for modern conflict.[29]

Michael Klare prefers a more generalized assertion. He believes the strategic environment in the post-Cold War era favors interstate conflict based on competition for limited resources.[30] Dixon, too, asserts the incidence of interstate violence resulting from environmental resource scarcity will increase, particularly among developing countries, though he also argues intrastate conflict and civil ethnic strife will outpace interstate resource wars.[31] Carol and Melvin Ember, cultural anthropologists and professors at multiple universities, go a step further. They suggest a group of people who lack sufficient resources will acquire the needed resources by force from other resource-

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26. Homer-Dixon, *Environment, Scarcity, & Violence*, 28.
27. Rafael Reuveny and John W. Maxwell, "Conflict and Renewable Resources," *Journal of Conflict Resolution* 45, no. 6 (6 December 2001): 719.
28. Hussein A. Amery, "Water Wars in the Middle East: A Looming Threat," *The Geographical Journal* 168, no. 4 (December 2002): 313.
29. Hussein, "Water Wars," 314.
30. Michael T. Klare, "Resource Competition and World Politics in the Twenty-First Century, *Current History* 99 (December 2000): 403-407.
31. Homer-Dixon, *Environment, Scarcity, & Violence*, 4-5. See also P. H. Gleick, *The World's Water* (Washington, DC: Island Press, 2000); and P. R. Ehlrich, *Population, Resources, and the Environment: Issues in Human Ecology* (San Francisco, CA: W.H. Freeman & Co., 1972).

abundant people. The Embers hesitate to generalize across all cultures and states in the post-nuclear era, but they refer to multiple studies linking war and resource scarcities.[32]

Economic optimists generally believe market forces, innovative strategies, and resource substitution will prevent any scarcity from evolving into conflict. Julian Simon, a professor at the University of Maryland, argues that population growth actually decreases resource scarcity because a larger population increases the number of innovators and thus the likelihood for an innovation to mitigate scarcity.[33] The logical fallacy is equating population size with success rate.[34] Another common economic optimist argument is a neo-Malthusian failure to consider innovation.[35] In this case, innovation may increase efficiency or resource access, but it might not address the root cause behind the scarcity, or the potential for overexploitation. In accordance with the Mayan example stated in the introduction, scholars believe the Mayans overused their innovation of irrigation, leading to infertile land and population decline.[36]

The critics of the neo-Malthusians offer a three-point rejoinder. First, they believe a non-linear relationship exists between scarcity and conflict. They contend neo-Malthusians fail to acknowledge that countries without a specific resource do not fight over the lack of that resource.[37] This is a tautological argument. States in these situations do not fight over what is not there because that resource is not central to their economic well-being. Only if the resource guaranteed a state's existence (water) or was critical to

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32. Carol R. Ember and Melvin Ember, "Resource Unpredictability, Mistrust, and War," *Journal of Conflict Resolution* 36, no. 2 (3 June 1991): 243, 259-260. The Embers concur with Dixon regarding the decreased likelihood of interstate conflict when compared with ethnic groups or tribal societies. For additional support linking resource scarcity and conflict, see A.P. Vayda, "Hypotheses about Functions of War," in *War: The Anthropology of Armed Conflict and Aggression,* eds. M. Fried, M. Harris, and R. Murphy (Garden City, NY: Natural History Press, 1967); R.A. Rappaport, *Pigs for the Ancestors* (New Haven, CT: Yale University Press, 1967); and M. Harris, "A Cultural Materialist Theory of Band and Village Warfare: The Yanomamo Test," in *Warfare, Culture, and Environment,* ed. R.B. Ferguson (Orlando, FL: Academic Press, 1984).

33. Julian L. Simon, "Lebensraum: Paradoxically, Population Growth May Eventually End Wars," *Journal of Conflict Resolution* 3, no. 1 (March 1989): 164.

34. Throwing more people at a problem does not always increase the chances of success. Sometimes, it sows confusion and thwarts productivity. Similarly, certain command economies or totalitarian regimes may institute harsher resource measures as population size increases simply to control their citizens. Robert Axelrod's group dynamics model suggests a larger population actually may be less inclined to innovate based on perceived marginal benefit and unwillingness to bear individual costs. See Robert Axelrod, *The Evolution of Cooperation,* 2nd ed. (New York, NY: Basic Books, 2006).

35. Reuveny and Maxwell, "Conflict and Renewable Resources," 738; Amery, "Water Wars," 313.

36. Reuveny and Maxwell, "Conflict and Renewable Resources," 736-737.

37. Mark F. Giordano, Meredith A. Giordano, and Aaron T. Wolf, "International Resource Conflict and Mitigation," *Journal of Peace Research* 42, no. 1 (2005): 50.

the economy (oil), would it drive conflict. Secondly, they argue states do not fight over resource scarcity because every economic item required countless resources to create it.[38] State survival, then, reflects strategy—how well did the state use the means it had to get what it needed? The implication, then, is that poor strategic choices yield poor consequences, and states should accept their self-driven fate. Regardless of external or internal fault attribution, if a state's needs were actual resources themselves, such as oil or water, conflict could erupt. Finally, they argue individual resources are part of a broader economic system, including culture, technology, and institutions.[39] This point, though valid, merely acknowledges strategic context. It neither refutes scarcity-induced violence nor offers more plausible outlets for state resource angst. Neo-Malthusian critics offer circular arguments, ignore obvious contradictions in logic, and elevate context above the causes for resource-based conflict. In short, their lack of cogency is unconvincing.

The distributionist argument is the classic North-South argument in different guise. Distributionists believe an inequitable allocation of resources among states is the root cause for conflict, rather than an actual scarcity.[40] Although this camp highlights social and cultural factors that help frame scarcity scenarios, it fails to address recent scholarship on the thresholds beyond which societies will consider violence. It also acknowledges, but neglects, the proximate cause neo-Malthusians offer: overpopulation. Distributionists argue initial misdistribution of resources caused overpopulation which, in turn, caused scarcity.[41] They assert areas of resource abundance encourage rampant population growth in these areas, and this population growth eventually exceeds the capacity of the land to sustain the people. This view, however, ignores the *human* decision and action of overpopulation. Even individuals who move to the areas of abundance likely still move from areas of insufficient resources. Logically, the migrant population exceeded the land's capacity at its previous location, obliging it to resettle. Regardless of proximate or root causality, overpopulation remains a pertinent factor for resource scarcity conflict. This thesis will address the root causes of case study scarcity

38. Giordano et al., "International Resource Conflict," 51.
39. Giordano et al., "International Resource Conflict," 52.
40. Homer-Dixon, *Environment, Scarcity, & Violence*, 28.
41. Homer-Dixon, *Environment, Scarcity, & Violence*, 35, 37, 42-44, 107-132.

as part of its analytical framework. Just as no single international relations lens will offer the perfect explanation behind a policy-making process, no single resource scarcity interpretation will yield the perfect causal chain.

Because the preponderance of evidence points to a relationship between resource scarcity and conflict, it is valuable to identify a possible mechanism by which the former could create the latter. A traditional and slightly reductionist view explains resource-based conflict in terms of supply and demand.[42] Such an explanation suggests scarcity results when demand for a resource outstrips supply. This scarcity translates into less economic prosperity for the state, as resource scarcity signifies insufficient inputs to the state's economic system. This scarcity also decreases the quality of life for its citizens, as the weakening economic system creates fewer products and services. Even if individuals purchase needed goods and services from elsewhere, the monetary and transaction costs would probably exceed the level of previous market balance. Citizens would then solicit their government to rectify the shortage or increased costs. In response, a government might pursue conflict to address the perceived needs of its population. Moreover, this mechanism can accelerate if overpopulation is part of the strategic context. By definition, overpopulation means the population requirements exceed an area's geographic capacity. In such an instance, the gap between population demand and resource scarcity is even greater. Quantitative resource deterioration coupled with increased demand from a burgeoning population will result in unrest and demands for state action. Conflict is a likely consequence of this scarcity.[43]

Nevertheless, supply and demand imbalances by themselves are insufficient to predict international conflict, primarily because of the presence of international institutions and regimes.[44] Robert Keohane, another prominent international relations theorist, notes these regimes consist of rules, norms, principles, and decision-making behaviors. To him, regimes foster cooperation as discordant positions result in mutual

42. This definition is reductionist as it fails to address policy ends; however, it remains useful for explicating the mechanism by which scarcity yields conflict.

43. Terry L. Anderson and Pamela Snyder, *Water Markets: Priming the Invisible Pump* (Washington, DC: Cato Institute, 1997), 1; Giordano et al., "International Resource Conflict," 47-49.

44. Giordano et al., "International Resource Conflict," 47, 61.

policy adjustment toward a new end.[45] In terms of resource scarcities, existing institutions and convenient processes for conflict resolution may forestall a resource war, trumping the simplistic supply-demand prediction of violence. One modern example may be South Africa and its use of existing institutions to negotiate several bilateral and multilateral agreements with its riparian neighbors concerning their shared problem of water scarcity.[46]

Although many theorists disagree on the specific relationship between resource scarcity and conflict, recent evidence concerning one contextual factor has reinvigorated scholastic interest: overpopulation. This renewed interest, however, has not translated into additional clarification. From 1900-2000, the world population increased from 1.6 billion people to 6.1 billion people; in other words, the population growth was over 2.8 times greater than the world population in its entirety in 1900.[47] This suggests an increased likelihood for scarcity-based conflict, particularly with regard to nonrenewable resources. As a counterpoint, since 1960, total food and food per capita have increased, while food prices have declined.[48] This implies humanity may find workarounds to burgeoning population resource problems, although localized shortages may still exist.

It is also unclear whether or not increased population density and the ensuing resource strain actually affect a country's economic viability, because states such as South Korea and Japan have higher levels of economic prosperity than many lesser-developed countries, despite being more physiologically dense. The relationship between a state's prosperity, population-induced scarcity, and perceived vital interests are crucial to state decisions regarding conflict. Two particular types of resource scarcities that consistently seem to affect economic prosperity and quality of life, however, are those of land and food. They can increase the likelihood of war.[49] A recent example of

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45. Robert O. Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton, NJ: Princeton University Press, 2005), xi, 46.

46. Meredith Giordano, Mark Giordano, and Aaron Wolf, "The Geography of Water Conflict and Cooperation: Internal Pressures and International Manifestations," *The Geographic Journal* 168, no. 4 (4 December 2002): 299-300.

47. Population Reference Bureau, *Population Bulletin: World Population Highlights: Key Findings from PRB's 2010 World Population Data Sheet* (Washington, DC: Population Reference Bureau, 2010), 2.

48. Giordano et al., "International Resource Conflict," 49; Food and Agriculture Organization of the United Nations, http://faostat.fao.org/site/609/default.aspx#ancor (accessed 28 May 2011) and http://faostat.fao.org/site/610/defaulr.aspx#ancor (accessed 28 May 2011).

49. Ember and Ember, "Resource Unpredictability," 244.

conflicting overpopulation data may exist in Israel, whose citizenry and irrigated areas have both increased sixfold since Israel's creation.[50] While land and food shortages are certainly not the only factors precipitating violence there—chronic water scarcity and religious tensions also exist—the rapidly increasing population may indeed have contributed to regional violence.

Research Question

Resource concerns are not new strategic issues. Resource access, vulnerability, and scarcity have been concerns of strategy for over a thousand years. If the relationship between resources and conflicts remains a planning factor for the foreseeable future, strategists would benefit from a more in-depth analysis of suggested linkages. Since states remain the primary actors in the international arena, this discussion will narrow its scope to exclude resource-centric intrastate conflict or ethnic strife. Also, as not every resource scarcity scenario results in armed conflict, a systematic analysis may provide an opportunity to examine peaceful resolutions to these historical scenarios. This seems especially useful since the threat of escalation is ever present, particularly if the involved states fail to address the scarcity's root cause. Employing an analytical framework to scarcity case studies may offer insights, inform policy decisions, and prevent potential escalation. If policy implications and strategy recommendations are potential outcomes from this analysis, it seems prudent to examine how states have addressed scarcities in the past, and with what effect. To that end, the question this thesis seeks to answer is: How should states respond to resource scarcities?

Methodology

My approach to this question involves three historical case studies, the context surrounding them, the tool of process tracing, and use of a systematic analytical framework. Case studies facilitate empirical analysis to discover hidden causalities and patterns.[51] In this discussion, the strengths of using case studies as an analytical tool outweigh the limitations. Alexander George and Andrew Bennett believe case studies reinforce conceptual validity across multiple scenarios, enable new hypothesis forming,

50. Giordano et al., "The Geography of Water Conflict," 295.

51. Christopher H. Achen and Duncan Snidal, "Rational Deterrence Theory and Comparative Case Studies," *World Politics* 41, no. 2 (January 1989): 167-168.

and help identify causal mechanisms in decision-making processes.[52] Conceptual validity incorporates strategic context and equalizes dissimilar scenarios for comparative purposes. During case-study analysis, previously unconsidered variables may appear, leading to hypothesis refinement or synthesis. Furthermore, identification of complex causal chains is more likely in an inductive case study examination than in a statistical regression analysis.

Identifying the key components of an event's historical context is significant for several reasons. Exploration of the context acknowledges multiple contributing factors to an event and avoids a monocausal analysis. The context also helps explain the complexity of a situation, which can be glossed over if certain facets are singled out. Additionally, a contextual examination can reveal potentially unique circumstances that may limit generalizations among cases. As a result, all three case study chapters will elicit the contextual factors that are most critical to the examination at hand.

George and Bennett also note several limitations to case studies, primarily related to statistical objections. Specifically, these drawbacks are case selection bias, scope conditions, indeterminacy, lack of representativeness, and lack of case independence.[53] Case selection bias refers to "cherry picking" scenarios whose dependent variable corresponds with a desired outcome or result. At the time of case selection for this thesis, I had culled insufficient data to assess the issue qualitatively or even suspect the dependent variable result. Scope conditions signify an ability to assess whether or not variable A influences variable B, not the extent to which one influences the other. Because this study does not seek to define how likely any one resource scarcity strategy is to achieve a desired end, this limitation is of minor applicability. Indeterminacy means an inability to distinguish among competing explanations for an event. Lacking a quantitative analysis, case studies must examine which explanatory variables are necessary. To mitigate indeterminacy, I will evaluate competing explanatory theories already present in the literature, rather than hypothesize and compare the nearly infinite number of alternatives. Lack of representativeness emerges when a conclusion is sufficiently case specific to lack utility when applied elsewhere. As a counter to this

52. Alexander L. George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences* (Cambridge, MA: MIT Press, 2005), 19-21.

53. George and Bennett, *Case Studies*, 22-34.

danger, I have selected cases from different regions, different time periods, different historical contexts, and even different resource shortfalls. Additionally, I will suggest limits for any conclusions drawn, and will sacrifice some specificity to increase applicability. Finally, lack of case independence implies unconscious diffusion of correlations from one scenario the next. Since process tracing is a known mitigating technique, I will employ it as often as possible with the available data.

Process tracing involves the identification of sequential processes within a particular case study, rather than the correlation of data across cases. It attempts to provide verifiable causalities among different cause-effect chains, where the efficacy of the causal link is independent of the actual cause.[54] In his seminal work, *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965,* Yuen Foong Khong, a professor of international relations at the University of Oxford, described process tracing as the intervening steps in policy making where an actor's beliefs influenced his behavior.[55] To draw a connection between scarcity and state response, this thesis must trace the process of two elements in each case. First, it must demonstrate the state and its policy makers perceived resource scarcity as defined earlier in this section. Second, it must also show the state responded to this perception of scarcity in an effort to bridge the ends-means gap. In order to meet these standards, criteria for case study selection are paramount.

First, any case study must have sufficient public statements and policy meeting notes to analyze key leaders' perceptions, ideas, and decision-making processes. Inferences might be acceptable for generalizations, but specific statements are necessary to trace the process adequately. Data availability is therefore important. As a result, recent case studies and the associated detailed record keeping seem more apt to provide this data. Second, as noted earlier in the chapter, each case study need not involve an actual resource scarcity, just the perception thereof. Because perception is the basis of most judgment, even a mistaken perception of the actual resource supply would be sufficient to constitute scarcity for our purposes. Further, very little accurate data exist

54. George and Bennett, *Case Studies,* 13; Charles Tilly, "Means and Ends of Comparison in Macrosociology," *Comparative Social Research* 16, (1997): 48, in George and Bennett, *Case Studies*, 205.

55. Yuen Foong Khong, *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965* (Princeton, NJ: Princeton University Press, 1992), 64.

concerning the exact amount of a resource present at any given time. It is nearly impossible to quantify the extent to which energy, minerals, or water existed during a certain timeframe. Third, the case studies need not result in armed conflict; artificially limiting the research scope to violent reactions would taint the results and reinforce the case selection bias and lack of representativeness limitations.

Fourth, the cases of resource scarcity must not be imposed. Scarcities caused in this manner impose artificial problems; states might not view them as critically or existentially as they would actual scarcities. Furthermore, imposed scarcities facilitate actors end-running the restriction through unrelated means; scarcity might not be the primary independent variable. A completely imposed scarcity does not represent an ends-means disconnect because the given state could choose to address the interference rather than the scarcity itself. The imposition becomes the focus because no internal policy shortfall exists. To warrant inclusion in this study, the state must wield a preponderance of ability and resolve in its selection of a strategy to implement. In the Berlin Airlift, for example, Berlin did not face a policy end-resource means gap; the Soviet Union intervened to create an artificial shortage. Imposed scarcities also bring the principal-agent relationship into question. Some states might lack sufficient power or ability to resolve the imposed scarcity. Continuing the Berlin Airlift example, Berlin was not an independent actor capable of resolving the crisis; the United States was the state responsible for addressing Berlin's shortage.[56] A fifth criterion relates to imminence and the earlier preventive/pre-emptive war discussion. Case studies must incorporate a perception of imminent scarcity. Iraq's invasion of Kuwait would not qualify as a case with this requirement because the expected scarcity was several years in the future. A wide timeframe for a potential threat merely introduces additional variables into consideration. The final selection criterion avoids cases in which resources are the actual state objectives. Therefore, problem framing is significant. If Japan's true policy end had been additional resources, rather than domination over Asia, Japan's means could have been a military conquest of Manchuria. Because scholars can view resources as

56. Also note: I do not treat a state's own policy as an imposition. In other words, if a state broadens its political aims or policy ends beyond its available means and thus causes a shortfall, the state has created its own scarcity. However, this is not an *imposed* scarcity; it is merely statecraft. In fact, the three case studies in this thesis all involve a state creating its own scarcity with a new policy objective.

either means or ends, the case studies in this thesis must have policy ends separate from simple resource acquisition.

In the end, I selected three cases with little advance knowledge of historical detail surrounding the relevant resource scarcities. Case study selection was the most difficult aspect of research, because I had to balance depth of data against selection criteria, while maintaining impartiality. The first case is the German pursuit of *Lebensraum* in World War II, the associated policy end of economic autarky, and the inadequacy of resources to meet this objective. The next case stems from the 60 years of water-related conflict in Israel. There, Israel adopted a policy objective of settlement expansion in land unable to support life. The final case involves Iceland, the primacy of its fishing industry, and its attempts to achieve and enforce its exclusive access to fish.

I considered several other equally illuminating case studies, but ultimately rejected them for a variety of reasons. The Israeli response to Syrian water siphoning in the 1960s is sufficiently obvious option for a case to require an alibi. Although this situation is rich in available data and potential instructive value, it ultimately represents an imposed scarcity. Syria attempted to siphon water and create a shortage. As such, the subsequent Israeli response fails the selection criteria for the reasons listed above. The three examples listed in the introduction also fail the selection criteria, but for different reasons. The Mayan case with arable land and the British case with naval timber lack sufficient data to go beyond logical speculation. Nor is there any hope of process tracing their leaders' specific awareness of scarcities or their policy decisions, in order to attempt reconstruction of strategies. In the Japanese example with China, iron ore, and petroleum, the policy objective is difficult to determine. Some scholars believe conquest of the mainland was the Japanese objective, and the resource shortage was an inherent consequence.[57] Others believe Japan's policy end was the resources themselves because it was frustrated at its resource dependencies, vulnerabilities, and scarcities. To these scholars, the Greater East-Asian Co-Prosperity Sphere and its associated conquest of neighboring states was the means to an end of self-sufficiency in resources.[58] Further,

57. Fritz Sternberg, *Germany and a Lightning War* (London, UK: Faber & Faber, 1938), 278.
58. Lesser, *Resources and Strategy*, 84-91.

even if Japan's political aim were conquest, Germany provided richer literature and an earlier genesis of this idea within the same historical context.

German resource scarcity in World War I is another rejected scenario. In this case, the issue over resources was more a point of blockade and counter-blockade.[59] Resource access and denial through the paradoxical logic of strategy and an intelligent opponent represented a subtler form of imposed scarcity. Finally, the variety of instances in which non-state actors perceived resource scarcities merited dismissal for the purposes of this discussion. The cases of the Palestinian Authority over water and land, the Kurds over land and food, and the Darfurian Sudanese over water and land also spring to mind. Because the research question involves state response to looming scarcities, non-state actors cannot be the principal subject of study.

Analytical Framework

The final portion of my methodology involves the systematic application of a five-question framework to each case study. This parallels a common approach in political science where questions form the comparative backbone through which analysis occurs and additional insights follow.[60] In this instance, such a framework may uncover additional causalities or explanatory factors in the strategies to accommodate resource scarcities. This series of questions may even suggest additional thematic elements to inform future policy decisions.

1) Did the strategy for responding to resource scarcity predominantly involve an approach based on ends, on ways, or on means? Why was that approach chosen?
2) Did the scarcity erupt in conflict? If so, why? If not, why not?
3) To what extent did the approach address the symptoms or the causes of scarcity?

59. Lesser, *Resources and Strategy*, 37, 49. Lesser even suggests resources became the actual strategic objective in World War I: oil in Romania, the Caucasus, and the Middle East.

60. Michael Krepon and Dan Caldwell, eds., *The Politics of Arms Control Treaty Ratification* (New York, NY: St. Martin's Press, 1991), 7-8, in George and Bennett, *Case Studies*, 314.

4) To what degree did the state's extant capabilities impact its strategy for addressing scarcity; did it apply a previously tested strategy or did it develop a new approach?
5) How well did the state's strategy facilitate its response to further resource scarcities?

Conclusions

This chapter has bounded the subsequent analysis in several meaningful ways. It solidified and justified the concepts of resources, resource scarcity, resource vulnerability, and resource wars, also accentuating the differences between approaches based on ends, on ways, and on means. By offering historical examples of resource scarcity and by demonstrating the policy and societal impact of these ends-means disconnects, this chapter solidified the timeless nature of scarcity and its inextricable link with strategy. Further, it framed and addressed the arguments of the three main resource scarcity camps: neo-Malthusians, economic optimists, and distributionists. How states should respond to resource scarcity is the question this thesis will attempt to answer. Toward this end, it will use three case studies, process tracing, and an analytical framework.

Chapter 2

Germany: A Resource Too Far

This chapter will examine the case of Germany in World War II as it combatted perceived resource scarcities in food, metals, and petroleum. After presenting the historical context within which German resource policy developed, the chapter will address Germany's objective of autarky, its assessment of resource scarcity, and its chosen strategy of land expansion. The analysis will continue with the unfavorable outcome of German decision making, and will conclude by applying the five-question comparative framework to the evidence.

Historical Context

Germany found itself in a challenging reconstruction environment after World War I. Socially, food shortages, anger over perceived harsh peace terms, and racist ideologies fueled the German population's discontent. Economically, high unemployment, burdensome reparations, and floundering industries complicated recovery efforts and set the conditions for an opportunistic totalitarian regime. Thus, Germany naturally returned to its militaristic tendencies, expediting rearmament in the pursuit of conquest-based solutions to its numerous challenges. A combination of these contextual factors facilitated conflict over German perceptions of resource scarcity.

Grievances from World War I and the Great Depression set a political tone for the National Socialist Party to rise to power on a wave of fascism. Many Germans recalled the lack of food during World War I; part of the German psyche wanted to avoid more lean years.[1] Similarly, Hitler's politics appealed to the masses of Germans who sought security in the economically chaotic decade of the 1930s.[2] Thus, the German National Socialist party pursued policies addressing both of these fears. Many Germans became willing to accept increased government intervention for the prospect of an improved

1. Bernhard R. Kroener, Rolf-Dieter Muller, and Hans Umbreit, *Germany and the Second World War, Volume V: Organization and Mobilization of the German Sphere of Power, Part 1: Wartime Administration, Economy, and Manpower Resources 1939-1941*, ed. Research Institute for Military History, trans. John Brownjohn, Patricia Crampton, Ewald Osers, and Louise Wilmot (Oxford, UK: Clarendon Press, 2000), 462.
2. William Carr, *Arms, Autarky, and Aggression: A Study in German Foreign Policy 1933-1939* (New York, NY: W. W. Norton & Company, Inc, 1972), 19.

quality of life. Hitler's party played to these fears by painting the Versailles Treaty's terms in a particularly unfavorable light.[3]

Further, Hitler and the National Socialists employed racism and anti-Semitic ideology to instill a sense of nationalist superiority in the German people. This idea suggested German entitlement to a high quality of life and to an improved German status within Europe.[4] The desired *Germanization* of other people and their land as a natural consequence of racial superiority became easier to justify through this propaganda. Hitler noted it was not God's intention to distribute resources unfairly, so political boundaries ought to be ignored in order to give the German people their due as the superior race.[5] The racism pervaded not only Hitler's speeches and propaganda, but also other senior leaders' proclamations. Joseph Goebbels's *Thirty Articles of War for the German People* in 1943 was a striking example of the supposed obligations and entitlements of a *superior* people; even children in primary education became indoctrinated to anti-Semitism, entitlement, and Aryan superiority.[6]

Both historical grievances and racist ideology helped buttress two other contextual themes—rearmament and militarism. From the beginning of his rise to power, Hitler echoed Thucydides' articulation of the concept that *might makes right*.[7] In *Mein Kampf*, Hitler introduced an obligation for the German people to take what they needed by force.[8] He further convinced the German masses that a lack of resources constituted a security need that should be addressed through military force.[9] These factors, coupled with a cultural preference for conquest-based solutions dating back to Frederic the Great,

3. William L. Shirer, *The Rise and Fall of the Third Reich: A History of Nazi Germany* (New York, NY: Touchstone, 1981), 142, 209-211, 291, 471.

4. Carr, *Arms, Autarky, & Aggression*, 12-14. See also Adolf Hitler, *Mein Kampf*, Sentry ed., trans. Ralph Manheim (Cambridge, MA: The Riverside Press, 1962), 54-60, 284-319, 383, 388-390 and Shirer, *The Rise and Fall of the Third Reich*, 23-26, 372.

5. Hitler, *Mein Kampf*, 138-139.

6. David Welch, *The Third Reich: Politics and Propaganda*, 2nd ed. (New York, NY: Routledge, 2002), 83, 208-210.

7. Robert B. Strassler, ed., *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War* (New York, NY: Touchstone, 1998), 352 (para 5.89).

8. Hitler, *Mein Kampf*, 139, 653.

9. John L. Stipp, ed., *Devil's Diary: The Record of Nazi Conspiracy and Aggression* (Yellow Springs, OH: The Antioch Press, 1955), 6-7. See also Tiago Saraiva and M. Norton Wise, "Autarky/Autarchy: Genetics, Food Production, and the Building of Fascism," *Historical Studies in the Natural Sciences* 40, no. 4 (2010): 426.

simplified the argument for rapid rearmament.[10] By pairing a cultural proclivity for militarism with a polarizing ideology and a promise to address historical grievances, the Nazi Party capitalized on a struggling national economy—the final contextual factor.

Germany faced a challenging economic situation in the 1930s. It was still in the midst of the Great Depression, it continued to rebuild its economy after World War I, and it still owed reparations stemming from the Versailles Treaty.[11] Thus, when the Hitler Republic came to power in 1933 and his regime rapidly curbed unemployment, German society was impressed. German unemployment in January 1933 was over 6 million people; by 1939, it had fallen to a mere 430,000.[12] Similarly, German industrial production rose over 107 percent from 1932-1937, and German gross domestic product doubled during the same period.[13] Nazi success in these areas, particularly due to nationalization of certain industries and government rearmament programs, likely lent credence by association to Nazi political and ideological ideas. In order to tie these levels of socio-economic improvement to ideology, grievances, and politics, Hitler and the National Socialists advocated one unifying objective. This objective was a recurring theme in German leaders' propaganda, internal party meetings, and external communications. Simply put, a policy of autarky unified Nazi efforts and was central to German perceptions of resource scarcity.

Perception of Scarcity

Autarky can be a difficult concept to grasp. Autarky means economic self-sufficiency and in the English language, is frequently conflated with autarchy, or absolute rule.[14] The former term refers to a condition in which a country does not depend on resource imports either for its survival or to maintain its quality of life. The latter refers

10. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 496; Gerhard Ritter, *The Sword and the Scepter: The Problem of Militarism in Germany, Volume I: The Prussian Tradition 1740-1890*, 3rd ed., trans. by Heinz Norden (Miami, FL: University of Miami Press, 1969), 18-33, 324-326. Ritter traces the tradition of German militarism back to the time of Frederic the Great. However, he argues it is the post-Bismarck era in which the German armed forces supersede the civilian statesmen; only then did the sword supplant the scepter.

11. Olivia Lang, "Why Has Germany Taken So Long to Pay Off its WWI Debt?" *BBC News*, 2 October 2010, http://www.bbc.co.uk/news/world-europe-11442892 (accessed 3 March 2011).

12. Wilhelm Deist, Manfred Messerschmidt, Hans-Erich Volkmann, and Wolfram Wette, *Germany and the Second World War Volume I: The Build-Up of German Aggression*, ed. Research Institute for Military History, trans. P. S. Falla, Dean S. McMurray, and Ewald Osers (Oxford, UK: Clarendon Press, 1990), 160, 233.

13. Shirer, *The Rise and Fall of the Third Reich*, 258-259.

14. Saraiva and Wise, *Autarky/Autarchy*, 424.

to a country's government that is top-down, dictatorial, interventionist—in a word, it is totalitarian. This is particularly confusing in Germany, where policies were both autarkic and autarchic. Autarky was a common policy as a response to the Great Depression; fascist governments maintained this policy after economic crises had passed to legitimize their power through institutions, legal maneuvering, and state economic control.[15] For the purposes of addressing resource scarcity, this discussion will center on the economic policy of autarky, not its related cousin, the top-down control of autarchy.

World War II Germany's unifying objective was autarky; it was a recurring theme in Hitler's statements, both oral and written. In 1925, autarky made one of its earliest appearances in German philosophy in *Mein Kampf*. There, Hitler noted his primary concern was setting the conditions to facilitate German self sustenance, especially in terms of soil and agriculture.[16] Eleven years later, then in a leadership position, he released an unsigned memorandum, sometimes referred to as "Hitler's Confidential Memo on Autarky."[17] In it, he argued Germany had "only one interest and that is the interest of the nation, and only one single view, which is that Germany must be brought politically and economically into a state of self-sufficiency… In short: I consider it necessary that now, with iron determination, a 100 per cent self-sufficiency should be attained in all those spheres where it is feasible, and that not only should the national requirements in these most important raw materials be made independent of other countries but that we should also thus save the foreign exchange which in peacetime we require for our imports of foodstuffs."[18] Clearly, Hitler had embraced autarky as a central tenet of German national policy. Moreover, autarky was not simply Hitler's objective; it was a prevalent aim within the German population and the rank and file of the National Socialist Party. It complemented the aggrieved mood of the population, it bolstered domestic industry, and it remained an objective throughout the war.[19]

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15. Saraiva and Wise, *Autarky/Autarchy*, 425.
16. Hitler, *Mein Kampf*, 643.
17. Adolf Hitler, "Unsigned Memorandum (August 1936)," *Documents on German Foreign Policy: From the Archives of the German Foreign Ministry*, trans. US Department of State Division of Language Services (Washington, DC: US Government Printing Office, 1957-1964, series C (1933-1937)), 1 in The Third Reich: First Phase, Volume 5: March 5 – October 31, 1936, Document Number 490, 853-862, http://Germanhistorydocs.ghi-dc.org/sub_document.cfm?document_id=1551 (accessed 5 March 2011).
18. Hitler, "Unsigned Memorandum (August 1936)," 6, 8.
19. Carr, *Arms, Autarky, & Aggression*, 49-50.

However, German leaders perceived that their state lacked sufficient natural resources required to attain autarky. Such inadequacies were present in several areas of raw materials. *Mein Kamp* was Hitler's first public articulation that insufficient foodstuffs existed for a burgeoning population. He extrapolated the increase of Germany's population into the future, and predicted significant difficulty in feeding an extra 900,000 citizens with the state's existing resources.[20] Again in 1936, he claimed Germany was overpopulated and was unable to feed itself using only its own resources.[21] Second, Hitler had been analyzing the German potential for autarky in a variety of raw materials with the resources inherent to the Reich's pre-war borders. On 10 November 1937, he held a meeting presenting his analysis of resource scarcity and the likelihood of economic self-sufficiency with Germany's raw materials at the time. His evaluation was captured in the now-infamous Hossbach Memorandum:

> **Autarchy:** [sic]
>
> Achievement only possible under strict National Socialist leadership of the State, which is assumed; accepting its achievement as possible, the following could be stated as results:-
>
> A. In the field of raw materials only limited, not total, autarchy.
>
> 1) In regard to coal, so far as it could be considered as a source of raw materials, autarchy was possible;
> 2) But even as regards ores, the position was much more difficult. Iron requirements can be met from home resources and similarly with light metals, but with other raw materials -copper, tin- this was not the case.
> 3) Synthetic textile requirements can be met from home resources to the limit of timber supplies. A permanent solution impossible.
> 4) Edible fats-possible.
>
> B. In the field of food the question of autarchy was to be answered by a flat "No." [22]

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20. Hitler, *Mein Kampf*, 131, 642-643, 646, 652. See also, Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 462-463.
21. Hitler, "Unsigned Memorandum," 4. See also Carr, *Arms, Autarky, & Aggression*, 53-54.
22. Hitler, "Hossbach Memorandum: Minutes of a Conference in the Reich Chancellery, Berlin, 5 November 1937," http://avalon.law.yale.edu/imt/hossbach.asp (accessed 16 February 2011). The memorandum is infamous because it was a primary source in the Nuremberg Trials to show Nazi party malicious intent. Also note the autarky/autarchy conflation occurs again here; the intended meaning is clearly economic self-sufficiency, though the translators chose the fascist spelling.

The fact that Hitler; the German War Minister; the Commanders in Chief of the German Army, Navy, and Luftwaffe; and the Foreign Minister were all present at this meeting demonstrated German policy and intent. Further, Hitler declared this meeting should represent his last will and testament in the event of his premature death, emphasizing the primacy of this analysis and position.[23] Germany added petroleum to this list in the autumn of 1940.[24] Essentially, German leadership perceived that resource scarcity existed in several realms—food, copper, tin, timber, and petroleum. These scarcities precluded their achievement of autarkic ends.

Response to Scarcity

Germany pursued multiple strategies to address resource scarcity; the primary approach, however, was forcible acquisition of new resources through territorial expansion. Hitler had considered this approach as early as 1925, as it was one of the four options he suggested to combat German starvation and insufficient foodstuffs in *Mein Kampf*. He considered limiting births, increasing agricultural productivity, increasing globalization and trade, and acquiring new soil; ultimately, though, he advocated aggression and violent force as constituting the appropriate response.[25] Consistent with his belief that might makes right, he considered food shortages an existential threat and advocated violent conquest to obtain "sod for the German plow and daily bread for the nation."[26] Hitler's infamous *Lebensraum* policy stemmed from this idea. Essentially, he argued Germany must advance from restricted living space to new soil as a source of food and power.[27]

German leaders publicly and privately argued for raw-material acquisition through forced territorial expansion, a theme that remained consistent throughout World War II. In his unsigned memo, Hitler provided the final solution to German resource scarcity "in extending living space of our people and/or the sources of its raw materials and foodstuffs. It is the task of the political leadership one day to solve this problem."[28] Later, the Hossbach memo noted that the only solution to the food and raw material

23. Hitler, "Hossbach Memorandum," n.p. Colonel Hossbach recorded no dissent to this autarkic analysis, nor to the prescribed response, which will become apparent in the next section of this essay.
24. Stipp, *Devil's Diary*, 189-190.
25. Hitler, *Mein Kampf*, 131, 133, 138-139, 142, 653.
26. Hitler, *Mein Kampf*, 138-140.
27. Hitler, *Mein Kampf*, 646.
28. Hitler, "Unsigned Memorandum," 4.

situation was to acquire greater space within Europe, for both agriculture and other resources.[29] Hitler also told the League of Nations and his military commanders that the food supply was the most urgent German problem, the solution for which was territorial expansion and, more specifically, Ukraine's bread basket.[30] Lower-level German military planners in 1940 identified a key task for Operation Barbarossa as being to identify raw material and petroleum sources in the Soviet Union for exploitation.[31] In fact, throughout the war, Germany prioritized the importance of raw material exploitation from conquered territories—oil in 1942, iron ore and coal in 1943, and nickel in 1944.[32] Clearly, expanding the borders of Germany offered new raw material sources that would be considered *German* when the political boundaries were redrawn.

Nevertheless, German leaders concurrently pursued other solutions. They attempted to increase German production of agriculture and raw materials but eventually came to believe Germany could not sufficiently increase its agricultural and resource output.[33] Resource substitutes for rubber, fuel, and textiles were another option Hitler and his administration pursued; they attempted petroleum production through coal hydrogenation plants and artificial rubber synthesis through *Buna* substitutes.[34] Both initiatives improved domestic production, and the use of substitute goods remained a response to resource scarcity throughout the war. But these measures were complementary and subsidiary to territorial acquisition.

Hitler also considered improved efficiencies in domestic production, in the hopes of further expanding existing production capacity. His bureaucrats attempted to adjust

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29. Hitler, "Hossbach Memorandum," n.p. Here, German leadership identified the primary strategy it would pursue: forcible acquisition.

30. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 462-463.

31. Stipp, *Devil's Diary,* 190.

32. Bernhard R. Kroener, Rolf-Dieter Muller, and Hans Umbreit, *Germany and the Second World War, Volume V: Organization and Mobilization of the German Sphere of Power, Part 2: Wartime Administration, Economy, and Manpower Resources 1942-1944/5*, ed. Research Institute for Military History, trans. Derry Cook-Radmore, Ewald Osers, Barry Smerin, and Barbara Wilson (Oxford, UK: Clarendon Press, 2003), 468.

33. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 468, 470-471, 497, 506-507. See also Carr, *Arms, Autarky, & Aggression*, 55; Hitler, "Unsigned Memorandum," 8; Hitler, "Hossbach Memorandum," n.p.; Hitler, *Mein Kampf*, 133.

34. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 496, 504; Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 456, 473, 477; Hitler, "Unsigned Memorandum," 8. Buna rubber is a synthetic alternative to natural rubber from trees. The Germans chemically created Buna from butadiene by polymerizing it with sodium metal, later replacing butadiene with styrene. Both compounds were consistent with Germany's autarkic policies.

governmental planning, rationing, and distribution to maximize efficiencies.[35] In other words, he sought to achieve better output for the same input of materials and worked to achieve an improved allocation of extant resources to minimize waste. Another of World War II Germany's responses to resource scarcity was a series of closures and decreased production goals. The closure effort was designed to curtail non-essential businesses, diverting limited resources to critical industries. Here, too, the intent was to reopen the nonessential industries when Germany acquired sufficient resources from its new lands and returned to a peacetime posture.[36] Germany employed one additional strategy in the latter part of the war; it limited its Axis partners' resource use. This approach regulated the other Axis powers' demand for raw materials, in order to free up additional resources for Germany.[37] This seems counterintuitive at first, but conquered lands were also made to provide resources for German allies. Thus, the German pursuit of autarky had an unforeseen cost: increased resource exports to support German allies.

German leaders employed various complementary strategies to combat resource scarcity, yet they continuously asserted the primacy of aggressive territorial expansion. It would be easy, however, to misinterpret some of Hitler's documents by reading them too literally. Indeed, several authors have made this mistake. Stipp, for one, misinterprets the Hossbach Memorandum and Hitler's position; he undoubtedly refers to the comment, "Thus autarchy was untenable in regard both to food and to the economy as a whole."[38] At first glance, this appears to refute Hitler's autarkic objective. Yet, Hitler's very solution articulated in this document and in later communications—forcible expansion and raw material acquisition—is the strategy he pursued toward economic self-sufficiency. As noted earlier, Hitler, senior German leaders, and the National Socialist Party all made autarky a unifying objective throughout the war. The most likely interpretation, then, is Hitler rejected the possibility of autarky within Germany's pre-war borders, yet actively pursued the objective through his *Lebensraum* strategy. The new materials he hoped to acquire through violent aggression would support this self-

35. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 501-503.
36. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 512-513.
37. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 449.
38. Stipp, *Devil's Diary,* 5; Hitler, "Hossbach Memorandum," n.p.

sufficient end. They would also help facilitate the redress of many of Germany's socio-economic problems.

Consequences of Response

Germany achieved mixed results with its policy of territorial aggression and subsidiary strategies; it achieved some short-term self-sufficiency but ultimately failed in the long term. German coal production decreased during the war because of declining productivity, but it increased after the acquisition of Polish mines.[39] Similarly, copper and aluminum faced rising demands and decreasing stocks as the war progressed.[40] Economic gains from the annexation of Czechoslovakia and Austria were a boon to German iron ore and steel supplies, at least in the short term.[41] The use of substitute materials was also somewhat successful in the near term but was insufficient for the broad economic demand in the long run, particularly in non- wartime industries.[42] Overall however, German industrial production increased by a third, primarily as a result of territorial conquests of raw materials; by the end of 1944, however, production had already begun to decrease, corresponding perhaps to territorial losses.[43] Moreover, German strategy failed to account for the increased support it would have to provide inhabitants of those regions in terms of resources for production capacity.[44] Such a significant oversight points to flawed logic and strategic overreach.

Germany also failed in terms of agriculture. An efficient agricultural sector would have ensured freedom of strategic decision, contributing to autarky, but during World War II German agriculture faced unceasingly falling production. While other states increased their arable land, Germany's decreased, both in terms of total cultivated area and in many cases, in yield per area.[45] Similarly, German leaders failed to account for the means of agricultural production—particularly neglecting to realize that additional raw materials such as iron and fuel would be required for machinery. The extant resource

39. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 503.
40. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 530.
41. Carr, *Arms, Autarky, and Aggression*, 104-105.
42. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 456, 477.
43. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 450.
44. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 457, 461-462.
45. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 511. For example, bread and meat production decreased throughout the war, whereas a warm 1943 summer, temporarily increased crop yields despite the German cultivation of less land.

scarcity prevented relying on machine-based harvest. Conscription prevented human-based harvest.[46] As a result, Germany overworked its soil by attempting to obtain maximum production without adequate fertilizer. The long-term effect of this agricultural policy was the food crisis of 1946-7.[47] Thus, Hitler's primary strategy and the essence of his last will and testament—that Germany should acquire new soil to provide for its population—failed to materialize and represented a strategic misstep, despite the multiple strategies pursued.

It should be noted that Germany was not simply looking at the short term. Hydrogenation and other synthesizing plants were arguably designed to be long-term remedies for petroleum dependence.[48] This approach's potential success is unassessable, however, because it was cut short by the fall of the German empire. Furthermore, Hitler had demanded a long-term increase in use of domestic iron and steel. When combined with increased production, increased demand, civil-military relationship problems, market economy challenges, and interstate competition, his long-term approaches led to increased resource scarcity rather than abundance.[49] The German Research Institute for Military History offered a concise summary in 2000, "Seen overall, the supply of raw materials involved constant bottlenecks for the German war economy, and gave rise to burdensome restrictions, costly workarounds, or pillaging of the conquered."[50] In fact, the Germans were forced to adjust their production to match supply and resource unavailability. This adjustment of production targets did not signify an adjustment of political objectives. It did, however, highlight the probable misalignment of autarky as a policy aim with territorial aggression as a strategy.

Five Question Framework

1) Did the strategy for responding to resource scarcity predominantly involve an approach based on ends, on ways, or on means? Why was that approach chosen? German strategy was primarily means based. Territorial aggression to acquire new resources, increased German production, and the use of substitute goods all constituted

46. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 511-513.
47. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 514.
48. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 504; Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 473.
49. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 506-507.
50. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 478.

additional inputs into the economic system, and were therefore approaches centered on means. A few approaches, however, seemed to be ways oriented. Hitler's attempts to increase efficiency, command planning, and decrease distributional waste all centered around stretching existing resources to meet specified objectives. This would include coal hydrogenation to extend the energy capacity of existing resources. Germany did not, however, adjust its ends. Decreasing its production to match available resources, closing its non-essential industries, and legislating that its allies use fewer materials, did not change Germany's objective of self-sufficiency. In the first two instances, decreased production from smaller goals or from closure campaigns represented Germany's acknowledgment to accept a lesser output based on available resources. It continued to seek autarky. In the third example, regulating its allies represented a clever approach to inject more resources into the German economy at the expense of other states.

German leaders chose means-based strategies primarily because they did not believe other approaches would achieve their autarkic goal. They perceived increased efficiency could not supply all Germany's needs, and they would not entertain sacrificing their unifying political end: autarky. As noted above, Germany eventually came to realize that one means-based approach, increased domestic production, was unlikely to satisfy all Germany's economic needs. Arguably, the ideological context and carryover grievances from World War I made sacrificing quality of life, self-sufficiency, and *Lebensraum* unpalatable choices. Limiting the German society's advances likely seemed inconsistent with its cultural mindset.

2) Did the scarcity erupt in conflict? If so, why? If not, why not? World War II definitely qualifies as a conflict, one that emerged as a result of the chosen German strategy. The primary means-based approach relied on territorial aggression. By definition, this was warlike. Furthermore, rearmament policies, militarism, and upward economic trends in the run-up to war lent credence to the National Socialist interpretation of resource scarcity and their preferred solution. The previously discussed German historical inclination to conquest-based solutions likely shaped their approach to World War II. If Hitler and his administration openly acknowledged Thucydides' might makes right mentality, downplaying political borders, and elevating power over morality, it is clear that Germany sought armed conflict in the pursuit of resources.

3) *To what extent did the approach address the symptoms or the causes of scarcity?* This question gets to the heart of whether Germany's strategy addressed the root cause of its problems or whether it focused on peripheral factors. The root cause of German resource scarcity was its unachievable objective; few states have found it easy to achieve full economic self-sufficiency.[51] Such a policy aim is incompatible with the free market economy and with the distribution of resources around the world. In other words, the strategic flaw was in the ends. That being said, the German strategy appeared to address some symptoms of the scarcity. The foreign lands targeted for exploitation contained those specific resources most lacking in German territory. Ukraine was targeted for food, the Caucasus and Romania were targeted for petroleum, and Belgium and France were targeted for iron ore.[52] The symptom, then, was the inequitable distribution of resources. Additionally, German strategies only began to address another contributing factor, one that is inextricable from the nature of resources: renewability. Hitler did not fully address Germany's dependence on fossil fuels and nonrenewable resources, in terms of petroleum, coal, and strategic ores. Certainly, he acknowledged the nature of some resources, seeking substitutes or modified processes that did not require strategic minerals. Nevertheless, even long-term solutions such as hydrogenation simply substituted one fossil fuel for another. To sum up, Germany pursued an unachievable end, for which no strategy could succeed.

4) To what degree did the state's extant capabilities impact its strategy for addressing scarcity; did it apply a previously tested strategy or did it develop a new approach? Germany used the armed forces it had expressly built for the strategy of forcible acquisition and territorial expansion. Although this was the same strategy it applied in World War I, the earlier conflict involved different political objectives in a different context, thus preventing an identical comparison. Nevertheless, it is again worth noting the rapid inclination to adopt a conquest-based approach. Furthermore, Germany did develop new technologies during the course of the war, in terms of agriculture, industry, and the armed forces. However, it delayed expanding its national territory until its military services were sufficiently robust. This fact reinforces the

51. Saraiva and Wise, *Autarky/Autarchy*, 425.

52. Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part I*, 463, 504, 511; Kroener, Muller, and Umbreit, *Germany and the Second World War, Volume V, Part II*, 451, 465.

primacy of territorial expansion as a strategy as well as a belief that its World War I military forces had been inadequately prepared to execute a long-term territorial expansion. Oddly, Germany's previously tested strategy had failed in World War I, but his new leaders apparently believed they had properly addressed the fatal flaws. One author suggests the remedies Germany pursued were tactical and operational, rather than strategic.[53] In the end, German reliance on an improved military capability remained insufficient to overcome a strategically flawed end—autarky.

5) How well did the state's strategy facilitate its response to further resource scarcities? Most significantly, German strategy failed again. The German economy was destroyed for the better part of a decade. The country was divided in two. Its armed forces did not succeed and were temporarily relegated to a self-defense force. As a result, it is unlikely Germany will again rely on a conquest-based approach to solving future perceived resource scarcities. Moreover, Germany made no further attempts at territorial expansion, nor has it experienced any massive rearmament. To its credit, it has maintained a relatively small armed force and has abrogated the development of nuclear weapons.[54] Germany is still dependent for its energy needs on other nations, but it has strongest economy in Europe. It exports more than it imports and has successfully addressed a potential energy shortage with imports and global economic interdependence. Furthermore, it has embraced a long-term strategy of alternate energy sources, leading the global environmental movement. Germany's failed World War II strategy may have, in the long run, facilitated its pursuit of alternate strategies to ensure economic survival. At a minimum, this failure caused an abandonment of an unattainable autarkic policy objective.

Conclusions

Germany's autarkic policy aim and primarily means-based approach of territorial expansion were ultimately unsuccessful. In addition to seeking an unrealistic political objective, Germany adopted a strategy that overlooked important strategic assumptions.

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53. Williamson Murray, "Germany's Fatal Blunders: Teutonic Military History of the 20th Century," *Military History*, January 2010, 33-35.

54. Kate Connolly, "Germany to Abolish Compulsory Military Service," *Guardian*, 22 November 2010, http://www.guardian.co.uk/world/2010/nov/22/germany-abolish-compulsory-military-service (accessed 5 March 2010). German armed forces comprise between 0.1%-0.3% of its population. Ralf Beste and Stefan Simons, "Sarko's Nuke Offer Bombs with Berlin," *Der Spiegel*, 1 September 2007, http://www.spiegel.de/international/Europe/0,1518,506124,00.html (accessed 9 March 2011).

Ignoring the additional resource requirements to sustain the population and industries of newly acquired territories was one such effect. Mistaking peacetime economic requirements with wartime logistics and sustenance was another. Despite Germany's disastrous post-conflict economic state, it has since blossomed into a leading European power, well attuned to the free market, global interdependence, and alternate resource solutions. Whether or not the failure of an aggressive means-based strategy is unique to Germany's historical context will be illuminated by comparing its experience to both Israel and Iceland.

Chapter 3

Israel: Water Everywhere and Not a Drop to Drink

This chapter examines Israel's struggle with its perceived water scarcity from its nascent Zionist roots to the modern era. Because the contextual issues within which Israeli resource policy developed are crucial to this analysis, the chapter will address the Israeli objectives of increased immigration and an agriculturally based economy. Additionally, it will trace the gradual change in Israeli perception regarding its water scarcity and the practical steps Israel took to combat the shortage as part of its national strategy. The analysis will highlight the largely favorable outcome of Israeli decision making and will conclude by applying the five-question comparative framework to the evidence.

Historical Context

One of the most significant contextual factors influencing this case is the Arab-Israeli conflict. When the British withdrew from Palestine on 14 May 1948 and the United Nations mandate ended without any peacekeeping forces to fill the vacuum, Israel declared independence the following day.[1] As most Arab countries in the region felt threatened by Israel's sudden reclamation of land to the exclusion of the Palestinians, five Arab armies attacked Israel. This war of independence ended in February 1949 with multiple bilateral armistices, a larger Israeli state, and over 700,000 Palestinian refugees.[2] These refugees and the very existence of an Israeli state became closely intertwined with regional water problems. The surrounding Arab countries did not believe resolution on water allocation questions was possible without first addressing the Palestinian territory and refugee issues.[3] Where the Arab states saw a temporary, unsatisfactory situation, Israel saw a permanent condition, one that provided an opportunity to further pursue its Zionist ideology.

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1. Jeffrey K. Sosland, *Cooperating Rivals: The Riparian Politics of the Jordan River Basin* (Albany, NY: State University of New York Press, 2007), 25.
2. Sosland, *Cooperating Rivals*, 25.
3. Kathryn B. Doherty, "Jordan Waters Conflict," *International Conciliation* no. 553 (May 1965): 49. See also Marwa Daoudy, "A Missed Chance for Peace: Israel and Syria's Negotiations over the Golan Heights," *Journal of International Affairs* 61, no. 2 (Spring/Summer 2008): 222.

Zionism, upon which the Israeli state was founded, has several central tenets. The first concept is that the Jewish diaspora should return to the land of Israel; the survival of the world Jewry having been linked to the foundation of a Jewish state.[4] Even before Israel became a state, Zionists saw water as being absolutely necessary for the long-term survival of a Jewish state, for reasons of national security, biological requirements, and economic output.[5] Tied to this concept was the belief that maximizing Jewish immigration to the newly formed state would ensure Israel's survival. By increasing the Jewish population in the disputed territory claimed by Israel in the war's aftermath, Zionist planners hoped the Jews would outnumber the Palestinians and thus create a state in which Jews would be in the majority.[6] Former Israeli Prime Minister David Ben-Gurion argued that "Israel can have no security without immigration… Security means the settlement and peopling of the empty areas."[7]

Another Zionist maxim was the imperative to work the land and to foster agriculture through the kibbutz, or collective farm community.[8] On one hand, this satisfied the Zionist images of green fields, soldier farmers, the ideal man, and a classless Jewish society.[9] On the other hand, it was crucial to the economic viability of the state and its potential self-sufficiency. Israel acknowledged that water was the essential ingredient of agriculture. Former Israeli Prime Minister Moshe Sharett believed "water is life itself. It is bread for the nation – and not only bread. Without large irrigation works we will not reach high production levels…to achieve economic independence."[10] An agricultural focus provided additional rationale for Israeli immigration. Israel's plans to

4. Miriam R. Lowi, "West Bank Water Resources and the Resolution of Conflict in the Middle East," *Occasional Paper Series on Environmental Change and Acute Conflict* no. 1 (September 1992): 38. See also Nadav Morag, "Water, Geopolitics and State Building: The Case of Israel," *Middle Eastern Studies* 37, no. 3 (July 2001): 183.

5. Meredith Giordano, Mark Giordano, and Aaron Wolf, "The Geography of Water Conflict and Cooperation: Internal Pressures and International Manifestations," *The Geographical Journal* 168, no. 4 (December 2002): 295.

6. Morag, "Water, Geopolitics, and State Building," 179; Miriam R. Lowi, *Water and Power: The Politics of a Scarce Resource in the Jordan River Basin* (Cambridge, UK: Cambridge University Press, 1993), 38.

7. Lowi, *Water and Power*, 107.

8. Marjorie Federbush, "Israeli Waters and a Thirsty World: Israel Today," *American Foreign Policy Interests* 31 (2009): 402.

9. Morag, "Water, Geopolitics, and State Building," 183; Howard M. Sachar, *A History of Israel: From the Rise of Zionism to Our Time,* 3rd ed. (New York, NY: Alfred A. Knopf, 2007), 76; Lowi, "West Bank Water Resources," 39.

10. Lowi, "West Bank Water Resources," 39.

settle remote areas with immigrant farmers helped build a geographically broad defense. It also helped disperse the population, complicating future Palestinian desires to redraw Israel's borders. One of Israel's major policy goals was settling the Negev desert; ironically, Ben-Gurion believed the Negev to be Israel's version of living space or *Lebensraum*, but without the territorial aggression.[11] He believed these major policy aims of desert settlement and increased immigration would establish a demographic proof of right to land for Israel. Despite retiring to the Negev himself, he did not foresee that this policy would ultimately lead to Israel's perception and realization of water scarcity.

The Israeli elevation of water to the status of a vital or existential interest also warrants consideration. Another former Israeli Prime Minister, Levi Eshkol, articulated that "without control over the water sources we cannot realize the Zionist dream… Water is the basis for Jewish existence in the Land of Israel."[12] Even before Israel became a state, Zionists saw water as Israel's future lifeblood and as requisite for its long-term viability.[13] Israel also made the logical connection between its reliance on agriculture and the centrality of water to an agrarian-centric economy. It recognized 70%-95% of the Jordan River usage was consumed by agriculture, so in 1953, its published seven-year plan highlighted soil and water as the two most important basic raw materials in the state.[14] In the end, Israel's conceptual stake in the ground over water resources, its aggressive immigration and settlement policies, and its siege mentality as a fledgling state surrounded by Arab aggressors, set the stage for a high-stakes struggle over vital resources.

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11. Sachar, *A History of Israel*, 519; A.L. Gruenbaum, *Four Year Development Plan of Israel 1950-1953: Summary and Conclusions* (Jerusalem, Israel: Office of the Prime Minister, 1951), 8; Israeli Government, *Israel Government Year-Book 5719 (1958)* (Israel: Government Printer, 1958), 61; Lowi, *Water and Power*, 33; Morag, "Water, Geopolitics, and State Building," 179, 187; Georgiana G. Stevens, *Jordan River Partition* (Stanford, CA: The Hoover Institution of War, Revolution and Peace, 1965), 11.

12. Michael B. Oren, *Six Days of War: June 1967 and the Making of the Modern Middle East* (New York, NY: Presidio Press, 2003), 23.

13. Giordano, Giordano, and Wolf, "The Geography of Water Conflict," 295; George De Carvalho, "An Ancient Hatred Builds Toward War," *Life* 58, no. 24 (18 June 1965): 44.

14. Israeli Ministry of Foreign Affairs, "1: Israel Seven-Year Plan-from Data and Plans-Submitted to the Jerusalem Conference-October 1953, Section VII," http://www.mfa.gov.il/MFA/Foreign+Relations/Israels+Foreign+Relations+since+1947/1947-1974/1+Israel+Seven-Year+Plan-+from+Data+and+Plans-+sub.htm (accessed 7 April 2011); Sosland, *Cooperating Rivals*, 26.

Perception of Scarcity

Unlike in the German case, Israel's perception of resource scarcity was more nuanced. Thus, it is necessary to look at the evolution of this perception over time to understand how Israel viewed water scarcity. Scholars speaking about water crises typically address three kinds: pollution, access, and scarcity.[15] Israel has faced all three, though its perception of water shortages has stemmed primarily from the second and third types. For example, although Jordan River water is unusable because of its salinity when it reaches the Dead Sea, pollution there did not substantively contribute to Israel's perceived water scarcity.[16] Rather, Israel's access to the distribution of water – a perceived surplus in the north – was insufficient for its Negev settlement plans in the south.[17] Moreover, despite an initial ideological belief in water abundance, Israel eventually realized that it had a chronic water scarcity.[18] In these terms, Israeli problems with both water access and scarcity hampered its objectives of settlement and agricultural development in the south. Both types of crises are ends-means disconnects. This section will demonstrate that the evolution of these two concepts formed the backbone of the Israeli water scarcity perception.

In terms of access, new settlements and agricultural development in the Negev desert required additional water because water did not naturally exist there.[19] As early as 1919, the World Zionist Organization proclaimed the importance of water access as a nonnegotiable prerequisite to state survival.[20] This perception was not limited to Zionists. Israeli policy makers were cognizant of the arid nature of the Negev and were aware that additional water had to be transferred.[21] Former Israeli Prime Minister Ben-

15. Upmanu Lall, Tanya Heikkila, Casey Brown, and Tobias Siegfried, "Water in the 21st Century: Defining the Elements of Global Crises and Potential Solutions," *Journal of International Affairs* 61, no. 2 (Spring/Summer 2008), 2. Pollution refers to fouled water sources. Access refers either to an inability to physically access available water or to a distribution problem where water demand and water supply are geographically misaligned. Scarcity simply means insufficient water exists for the population's needs; this is our accepted ends-means disconnect definition.

16. Peter H. Gleick, "Water, War & Peace in the Middle East," *Environment* 36, no. 3 (April 1994): 9.

17. Morag, "Water, Geopolitics and State Building," 181. Climatological data averages 1000 mm/yr rainfall in the north compared to 31 mm/yr in the Negev.

18. Samer Alatout, "States of Scarcity: Water, Space and Identity Politics in Israel, 1948-1959," *Environment and Planning D: Society and Space* 26 (2009): 959.

19. Morag, "Water, Geopolitics and State Building," 179, 188-189.

20. Lowi, "West Bank Water Resources," 39.

21. Israeli Government, *Streams in the Desert: Israel's Quest for* Water (Jerusalem: Israel Ministry for Foreign Affairs, 1963), 8, in Doherty, "Jordan Waters Conflict," 6-7.

Gurion once argued that water for Negev immigrants would have to originate elsewhere and that nuclear power could help Israel overcome the water shortage in the Negev to "make the desert bloom."[22] Similarly, the subsequent Israeli Prime Minister, Moshe Sharett, continued this theme, arguing that Israel's most fundamental problem was "how best to utilize the extremely limited soil resources of the country in order to produce as much as possible of the food we need… Every drop of its water is precious."[23] In 1958, the Israeli government acknowledged that water had been the central concern for the state over its first decade of existence and that Israel had to enlarge its irrigable areas. Further, it cited three central planning factors for its nascent National Water Carrier project: settler dispersal, agricultural development in the south and in the Negev, and limited water availability for irrigation.[24] Five years later, the same annual publication specifically documented a failure to connect resource means to policy ends, noting the "lack of water for irrigation, accentuated by successive droughts, made it impossible to establish new settlements in the last few years."[25] Clearly, by 1963, Israeli leaders had become increasingly aware of the dearth of water in their desired settlement areas, and had begun to redistribute the water resources they thought they had. It was the misperception of available water supplies that comprised the second and most critical part of Israel's water crisis.

Samer Alatout, a rural sociology professor and middle eastern hydrology expert at the University of Wisconsin, argues that two distinct perceptions existed relating to Israel's water supply. He asserts that the Jewish nation perceived an abundance of water in Palestine prior to Israeli independence in 1948, then slowly shifted to a perception of water scarcity from 1948-1959.[26] Initially, water was a Zionist tool to convince the world of Palestine's absorptive capacity; if water were portrayed as being abundant, it would

22. Tom Zoellner, *Uranium: War, Energy and the Rock that Shaped The World* (New York, NY: Viking Penguin, 2009), 106; Sachar, *A History of Israel*, 519.

23. Lowi, *Water and Power*, 110.

24. Israeli Government, *Israel Government Year-Book* 5719 (1958), 60-61.

25. Israeli Government, *Israel Government Year-Book* 5723 (1962-3) (Israel: Government Printer, 1963), 344. This acknowledgment of an ends-means disconnect epitomizes resource scarcity.

26. Alatout, "States of Scarcity, 959; Samer Alatout, "Bringing Abundance into Environmental Politics: Constructing a Zionist Network of Water Abundance, Immigration, and Colonization," *Social Studies of Science* 39 (2009): 363; Leila M. Harris and Samer Alatout, "Negotiating Hydro-scales, Forging States: Comparison of the Upper Tigris/Euphrates and Jordan River Basins," *Political Geography* 29 (2010): 153.

increase the perceived ease of Jewish immigrant absorption.[27] To this end, multiple water allocation plans supported the concepts of abundance and absorption.[28] After Israel's statehood, however, many citizens stopped touting the purported abundance, shifting their view of water from a variable-sum resource pool to a zero-sum, scarce resource pool.[29] In 1952, Israel established a committee to investigate the actual water potential of the state; unfortunately, neither the committee nor the government could reach a consensus.[30] It was, perhaps, the 1953 conflict between Simcha Blass, the Israeli Director of Water within the Ministry of Agriculture, and Aaron Wiener, the Chief Engineer of *Mekorot* (Resources) Water Company, that exemplified the differences and shift in Israeli perception. Blass represented the portion of Israeli society who perceived water abundance and undiscovered water sources; Wiener represented those who perceived water scarcity, arguing that the only water Israel could count on was that which came from the known sources, to which its citizens already had access. Ultimately, Blass was forced to resign from his water planning position in the Israeli government as water was empirically proven to be scarce.[31]

This shift in the Israeli national psyche during the 1950s toward a perception of water scarcity was accompanied by a series of progressive laws centralizing government control of Israeli water resources.[32] This shift was reflected in official government statements, in which Israel went from investigating the status of water sources to

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27. Samer Alatout, "From Abundance to Scarcity (1936-1959): A 'Fluid' History of Jewish Subjectivity in Historic Palestine and Israel," in Mark LeVine and Sandy Sufian, eds., *Reapproaching the Border: New Perspectives on the Study of Palestine/Israel* (New York, NY: Rowman & Littlefield Publishers, 2007), 199-204.

28. Morag, "Water, Geopolitics and State Building," 193; Doherty, "Jordan Waters Conflict," 14; Lowi, *Water and Power*, 49-50; Sachar, *A History of Israel*, 519. The most well-known allocation designs included the Lowdermilk Plan, the Hays Plan, the Cotton Plan, and the Johnston/Unified Plan. Only one plan acknowledged water scarcity and the inadequacy of water resources for a Jewish state – the Ionedis plan of 1936-1939 by a British engineer. Unsurprisingly, neither the Zionists nor the state of Israel publicized this plan. See Munther J. Haddadin, "Negotiated Resolution of the Jordan-Israel Water Conflict," *International Negotiation* 5 (2000): 264.

29. Lowi, *Water and Power*, 50.

30. Alatout, "From Abundance to Scarcity,"209; Israeli Government, *Year-Book 5715 (1954)* (Israel: Government Printer, 1954), 50. Some authors even reference this period as the specific era when Israel's demand exceed supply, though this definition is insufficient for scarcity per our definition: Wendy Barnaby, "Do Nations go to War over Water," *Nature* 458 (19 March 2009): 282.

31. Alatout, "From Abundance to Scarcity," 208-212; Alatout, "Negotiations," 153. In 1953, after Blass drilled over 200 wells to support his perception of water abundance, little evidence surfaced, and he was discredited in the public opinion. Nevertheless, certain segments of the Israeli population as well as Blass himself, still *perceived* water to be abundant. Most of Israel, however, perceived scarcity.

32. Alatout, "Negotiations," 153.

acknowledging that the water supply barely met Israel's needs.[33] Most Israeli citizens began to acknowledge this looming scarcity problem during the 1950s, as evidenced by forced changes in water leadership change, Israeli public statements, and various government responses described in the following section. In 1964, the government informed its citizenry that all of Israel's water sources would be exploited by 1972, accurately anticipating most modern scholarly opinions that Israel's water supply-demand deficit occurred in the early 1970s.[34] Even today, Israel continues to perceive a chronic water-scarcity problem. Its population quadrupled, and its irrigation increased sevenfold from state inception to 1989, leading to additional official statements of scarcity in 1994.[35] Over the past three years, the Israeli Agricultural Minister, the Knesset, and the Israeli Minister of Environmental Protection have reinforced this perception through public statements, even acknowledging Israel's 60-year challenge of managing scarce water resources.[36] Essentially, Israel was early to recognize water shortages in terms of its insufficient distribution and their access to the Negev, but only gradually developed the perception of chronic water scarcity beginning in the 1950s. Israel's perception of insufficient water threatened the fulfillment of its dual objectives—increased immigration and an agriculturally based economy.

Response to Scarcity

As Germany had, Israel also pursued multiple strategies in an effort to combat water scarcity. Israel's existential framing of water scarcity helped foster diversified approaches to its water crisis. One such response involved the creation of its National Water Carrier (NWC) through the Mekorot water utility. Begun in 1953, this project sought to reallocate water from Lake Tiberias and the Jordan River basin to arid

33. Israeli Government, *Year-Book* 5715 (1954), 50; Israeli Government, *Israel Government Year-Book* 5719 (1958), 150.

34. Joshka Wessels, "Water Crisis in the Middle East: An Opportunity for New Forms of Water Governance and Peace," *The Whitehead Journal of Diplomacy and International Relations* 10, no. 2 (Summer 2009): 131; L. Berger, ed., *The Israel YearBook* 1964 (Israel: Israel Yearbook Publications Ltd., 1964), 152; Lowi, *Water and Power*, 150.

35. Arnon Soffer, *Rivers of Fire: The Conflict over Water in the Middle East* (Lanham, MD: Rowman & Littlefield Publishers Inc., 1999), 181; Lowi, "West Bank Water Resources," 33.

36. Andrew Martin, "Can Israel Find the Water It Needs?" *New York Times* (20 August 2008), n.p., http://search.proquest.com/docview/433915119?accountid=4332 (accessed 24 March 2011); Federbush, "Israeli Waters," 400; Gilad Erdan, Israeli Minister of Environmental Protection, "Statement at United Nations Summit on Climate Change" (statement, United Nations Summit on Climate Change, New York, NY, 22 September 2009, n.p., http://www.israel-un.org/statements-at-the-united-nations/general-assembly/138-united-nations-summit-on-climate-change (accessed 7 April 2011).

settlements throughout the country, especially in the Negev desert.[37] A series of canals and pipes was initially intended to irrigate land for agriculture and immigration. The resolution of the Blass-Wiener debate ultimately enhanced the project's aim to unifying the entire country on a water grid, thereby facilitating maximum efficiency of scarce water resources.[38] Completed in 1964, the NWC was former Prime Minister Eshkol's proudest accomplishment; he attributed the country's land cultivation to NWC and Mekorot efforts.[39] Israel still benefits from this improved water access today.

A second technique unique to Israel was the invention and development of drip-irrigation technology. Unlike traditional sprinkler systems that suffer from a high level of evaporation because the ground is slow to absorb water, drip irrigation drips water directly onto plant roots through subsurface pipes. [40] Facilitated by the NWC, drip irrigation technology has come to represent a major export and revenue source for Israel, and has linked agricultural development aims to efficient water use. [41] Israel invested major intellectual and financial capital in this technology, which was copied by several other states.

Indeed, efficiency became a hallmark of the Israeli response to water scarcity. Toward this end, Israel pursued massive wastewater recycling projects and has since become the world's largest recycler of wastewater. Using this strategy, Israel built reservoirs to collect wastewater run-off until needed, then recycled and treated the water for further use.[42] When coupled with its recent shift to crops requiring less water and plans for additional water treatment and recycling plants, Israel has become the exemplar in hydrological efficiency.[43]

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37. Ahron Bregman, *A History of Israel* (Houndmills, UK: Palgrave Macmillan, 2003), 80; De Carvalho, "An Ancient Hatred," 44; Giordano, Giordano, and Wolf, "The Geography of Water Conflict," 295; Peter Rogers and Peter Lydon, eds., *Water in the Arab World: Perspectives and Prognoses* (Cambridge, MA: Harvard University Press, 1994), 279. Lake Tiberias is also known as the Sea of Galilee and Lake Kinneret.
38. Haddadin, "Negotiated Resolution," 276; Alatout, "Negotiations," 153.
39. Oren, *Six Days of War*, 49.
40. Sandra Postel, "Israel: The Thrifty Irrigator," *Natural History* 94, no. 4 (April 1985): 59; Lall, Heikkila, Brown, and Siegfried, "Water in the 21st Century," 10-11.; Erdan, "Statement at UN Summit," n.p.
41. Lowi, *Water and Power*, 151; Lall, Heikkila, Brown, and Siegfried, "Water in the 21st Century," 10-11; Martin, "Can Israel Find," n.p.
42. Federbush, "Israeli Waters," 402-3; Gleick, "Water, War & Peace," 37.
43. Martin, "Can Israel Find,"n.p.; Lall, Heikkila, Brown, and Siegfried, "Water in the 21st Century," 10; Fred Pearce, *When the Rivers Run Dry: Water-The Defining Crisis of the Twenty-First Century* (Boston, MA: Beacon Press, 2006), 172, 238; Soffer, *Rivers of Fire*, 140-145.

Not all of its policies, however, were viewed as being socially acceptable. One controversial Israeli response to water scarcity has been its double legal standards for Jews and Arabs. The Knesset permits Israelis to drill wells up to 400 meters deep for fresh water, whereas Palestinians in the same aquifer may only drill down to 70 meters; this is enforced by martial law, and has the effect of Israeli wells draining the source water that feeds Palestinian wells.[44] Similarly, the NWC construction remains contentious, particularly among the neighboring Arab states, many of whom see it as hijacking Arab water sources and violating United Nations demilitarized zone agreements.[45] In another controversial policy, Israel has expropriated all wells in the occupied territories and has charged Palestinians twice the amount for water that it charged its own citizens.[46] The double standard is further compounded by the facts that nearly 40 percent of Israeli ground water and 25 percent of its sustainable water comes from within the occupied territory of the West Bank.[47]

Another major approach Israel pursued in response to resource scarcity was to expand its territory in order to control the headwaters of the Jordan River tributaries. This concerned neighboring Arab states that feared their own water supplies would be reduced. Therefore, when Israel halted construction on the NWC in 1953 at the United Nations' request and amidst financial pressure from the United States, the affected Arab countries began to devise a counter-plan.[48] Over the course of the next decade, Jordan, Syria, and Lebanon convinced the Arab League to divert Jordan River water, upstream of the Israeli site. Israel attacked the Arab construction works upstream of its own work, to

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44. Gloria Park, "Crystal Unclear: The Challenges of Water Politics in the Middle East," *Harvard International Review* 29, no. 4 (Winter 2008): 37; Ulrich Albrecht, "War over Water?" *Journal of European Area Studies* 8, no. 1 (2000): 18.

45. Pearce, *When the Rivers*, 167; Moshe Shemesh, "Prelude to the Six-Day War: The Arab-Israeli Struggle over Water Resources," *Israel Studies* 9, no. 3 (Fall 2004): 1-3, 7-8. Essentially, Israel's initial pumping location stemmed from within the demilitarized zone established after its war of independence. Israeli efforts to divert upstream water from international sources (Jordan River and Lake Tiberias) significantly elevated regional tension, ultimately contributing to the 1967 Six-Day War. See also Daoudy, "A Missed Chance," 215-222; Oren, *Six Days of War*, 2, 19-23; Helga Haftendorn, "Water and International Conflict," *Third World Quarterly* 21, no. 1 (2000): 60-61.

46. Albrecht, "War over Water," 19; Gleick, "Water, War & Peace," 36; Pearce, *When the Rivers Run Dry*, 157-161.

47. Lowi, *Water and Power*, 185-187. Sustainable water refers to the level of water that typically replenishes itself throughout the course of the year. Weather and run-off refill aquifers, for example.

48. De Carvalho, "An Ancient Hatred," 44; Bregman, *A History of Israel*, 80; Daoudy, "A Missed Chance," 219.

prevent the counterdiversion.[49] Two months after its final airstrike and artillery attack, Israel started the 1967 Six-Day War, out of which it gained control of the Hasbani and Banias Rivers' headwaters.[50] Similarly, Israel's creation of a southern Lebanon security zone in 1982 provided *de facto* control of the Litani River headwaters, another tributary to the Jordan River.[51] Several scholars have argued Israeli territorial expansions have almost exclusively involved control over water sources.[52] In the end, Israeli territorial gains solidified upstream access, providing another buffer against water scarcity concerns.

Israel's response to water scarcity has also included the proliferation of desalination efforts; brackish water, sea water, and run-off water have all been considered for potential desalination. Although only two major desalination plants are operational, the current projects along the Mediterranean coast will include some of the largest reverse-osmosis plants in the world.[53] Israel is also investigating the costs and benefits of mobile desalination plants, providing a measure of flexible access depending on settlement and agricultural requirements.[54] Desalination is notoriously costly in terms of energy; therefore, both fixed and mobile plants are evaluated in terms of energy requirements compared to water production. Hydroelectricity, particularly with the significant elevation differences in Israel, may offer a long-term solution. Immediately prior to the 1967 war, Israeli commentators ironically hailed desalination as a potential way to increase *Lebensraum* without impinging on neighboring countries.[55] Agricultural minister Shalom Simhon believes desalination provides the most likely solution to Israel's water-scarcity problem.[56]

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49. Oren, *Six Days of War*, 20-21; Daoudy, "A Missed Chance," 220.
50. Federbush, "Israeli Waters," 401; Haftendorn, "Water and International Conflict," 60-61.; Morag, "Water, Geopolitics and State Building," 196. Actually, former Prime Minister Eshkol believed the Six-Day War started 2.5 years before June 1967, when Israel decided to take action against the Arab upstream diversion. See Randall Reed, "Dehydrated National Security: Water Scarcity, the Emerging Threat of the 21st Century," Master's Thesis (Maxwell AFB, AL: School of Advanced Air and Space Studies, June 2004), 29; Shemesh, "Prelude," 1.
51. Lowi, *Water and Peace*, 147.
52. Albrecht, "War over Water," 18; Giordano, Giordano, and Wolf, "The Geography of Water," 295; Haftendorn, "Water and International Conflict," 61; Morag, "Water, Geopolitics and State Building," 196; Wessels, "Water Crisis," 136.
53. Federbush, "Israeli Waters," 404-406; Sosland, C*ooperating Rivals*, 196-201.
54. Federbush, "Israeli Waters," 406.
55. Stevens, *Jordan River Partition*, 62.
56. Martin, "Can Israel Find," n.p.

Israel, then, has employed multiple strategies to respond to its perceived water scarcity. Although renowned for some of its pioneering technological methods, such as desalination, wastewater recycling, and drip irrigation, it has been equally criticized for its double standard against the Palestinians and aggressive control of river headwaters. Throughout its diverse approaches, Israel has maintained its goals of increased immigration and settlement, agricultural development, and the primary Zionist objective – the survival of Israel as a state. Toward these ends, Israel has truly hedged its bets by attempting to forestall water scarcity by multiple means.[57]

Consequences of Response

The success of Israel's water-scarcity strategies parallels the success of Israel as a state. Viewed holistically, they have both been successful; nevertheless, many actors contest specific methods and strategies. To wit, Israel has survived as a state for 63 years, but both exacerbation and resolution of the Palestinian conflict, of which water is a significant point of contention, could threaten Israel. It has also greatly increased its population, primarily through immigration; but it has been out-populated by Palestinians.[58] Furthermore, its policy of settling the Negev desert has proven largely unsuccessful. Similarly, Israel has made significant progress in its agricultural sector in terms of efficiency and profitability, yet it is hardly self-sufficient. Moreover, Israel has successfully implemented approaches to address both aspects of its water crisis—national access and scarcity—but unintended consequences and multiple effects have re-elevated water's priority in national policy discussions.

In terms of specific policy targets, Israel's population quadrupled, and its irrigated lands increased by sevenfold from 1948-1989; although this indicates some success in both immigration and agricultural endeavors, its national water consumption increased by eightfold.[59] This serious unforeseen consequence only augmented the stress on Israel's scarce water resources. Similarly, despite massive directed-settlement efforts, the desert comprises 60 percent of Israeli land; but the Negev is home to only 9 percent of its

57. This has included cloud-seeding, where Israeli scientists sprayed particulates into the air to encourage cloud formation and rain; fog harvesting with mesh nets; and advertising campaigns urging parsimonious consumption of water. See Pearce, *When the Rivers*, 250-252; Soffer, *Rivers of Fire*, 251; Doherty, "Jordan Rivers Conflict," 62; and Federbush, "Israeli Waters," 408-409.

58. Lowi, *Water and Politics*, 33-35.

59. Lowi, "West Bank Water Resources," 33; Albrecht, "War over Water," 17.

inhabitants.[60] These figures suggest only partial success in Israel's ruralization and settlement programs. This limited success is perhaps offset by Israel's astounding success in agricultural efficiency. Negev drip-irrigated crops have shown an 80 percent improvement of yield per acre over traditional sprinkler systems, and the nation's irrigated area expanded by 39 percent with only a 13 percent increase in water.[61] Further, Israel boasts 72 percent efficiency in terms of wastewater recycling, which comprises over 70 percent of agricultural water sources for the country.[62] Its touted NWC helped provide a 25 percent increase in water access overall and a 75 percent increase in Negev water availability.[63] Finally, Israel's desalination efforts now account for nearly 25 percent of its overall water supply, indicating significant success in creating additional potable sources.[64] Clearly, Israel's improved water efficiency and access represent positive consequences from its strategies; but its settlement, immigration, and ruralization results are more mixed.[65]

Israel's resource scarcity responses have also caused conflict, the most notable of which was the previously noted 1967 Six-Day War. Such conflict has not been resolved, as riparian access was a major negotiation point during the 1994 Madrid talks between Israel and Jordan.[66] Even the formal resolution of water allocation was open-ended because all of the allocation amounts and sources were left blank in the agreement.[67] Despite the purported resolution, the chief of Israeli military intelligence reaffirmed

60. Federbush, "Israeli Waters," 400. Initially, Israel saw a decrease in urban settlements from 52 percent in 1948 to 31 percent in 1957, but the parsimonious desert life and lack of water to maintain an adequate standard of living reversed this trend. See Morag, "Water, Geopolitics and State Building," 188.

61. Postel, "Israel: The Thrifty Irrigator," 59. The NWC increased Israeli arable land from 30,000 hectares in 1948 to over 200,000 hectares in the late 1980s: Morag, "Water, Geopolitics and State Building," 190.

62. Federbush, "Israeli Waters," 403; Martin, "Can Israel Find" n.p.; Pearce, *When the Rivers Run Dry*, 172.

63. Sachar, *A History of Israel*, 520.

64. Mekorot Water Company, "Facts and Figures," http://www.mekorot.co.il/ENG.MEKOROT/Pages/FactsFgures.aspx (accessed 15 April 2011); Mekorot Water Company, "Israel's Water Supply System," http:/www.mekorot.co.il/ENG.MEKOROT/Pages/IsraelsWaterSupplySystem.aspx (accessed 15 April 2011).

65. Even Israel's cloud-seeding efforts have met success, as it claims the longest and most successful operations in this field, particularly near Lake Tiberias. There, cloud-seeding has allegedly increased rainfall by 15 percent and has created an additional 40,000 acre-feet of water annually, for a 3 percent increase in water supply overall. Pearce, *When the Rivers*, 250; Soffer, *Rivers of Fire*, 251.

66. Haddadin, "Negotiated Resolution," 277. Jordan and Israel continued to debate the merits of the 17+ water allocation plans, stemming all the way back to Lowdermilk, Hays, Cotton, and Johnston.

67. Haddadin, "Negotiated Resolution," 277-279.

Israel's commitment to secure its water sources by force. To him, the "matter of water is more vital than other matters…if the political process leads to the loss of our control over our important water sources we are liable to find ourselves forced to alter this situation, and then Israel will be perceived as the aggressor."[68] Similarly, the division of water sources among aquifers, rivers, and lakes is another issue that resolution of the Palestinian-Israeli conflict must inevitably address. Even if Israel were to achieve water self-sufficiency through desalination and reclamation successes, it must ultimately decide whether or not it is willing to abandon the sunk costs of its NWC to permit Palestinian use of groundwater.

Perhaps the most significant of all the consequences is the public questioning and introspection concerning Israel's objectives. Many experts are noting the difference between Israel's stated policy objectives and some of its meager results. The Israeli audit office noted that intensive agriculture claimed 75 percent of all water supplies, suggesting the water crisis was human and self-imposed, rather than resource oriented.[69] Writers and scholars noted Israel uses two-thirds of its water for agriculture, which represents less than 3 percent of its GDP and less than 13 percent of the employment sector.[70] Even Israel's Agricultural Minister, Shalom Simhon, who believes recycling and desalination will solve Israel's water scarcity problem, is suspect of the cost-benefit analysis of Israel's agricultural policy.[71] In other words, Israel is beginning to question its ends.

Five Question Framework

1) Did the strategy for responding to resource scarcity predominantly involve an approach based on ends, on ways, or on means? Why was that approach chosen? Israeli strategy was truly hedged; the foci of its approaches were based in ways and in means. The wastewater recycling and drip irrigation efforts epitomize the state's efforts to improve its efficiency. Reusing water and decreasing water input for increased crop output exemplify some ways-based approaches. Most importantly, the NWC is the principal component in Israel's water strategy. It represents Israel's attempt to reallocate resources to which it already perceived access rights in the north, to water-scarce regions

68. Soffer, *Rivers of Fire*, 198.
69. Albrecht, "War over Water," 19.
70. Morag, "Water, Geopolitics and State Building," 182; Federbush, "Israeli Waters," 402; Pearce, *When the Rivers*, 172.
71. Martin, "Can Israel Find," n.p.

elsewhere in the country. This, too, is clearly a ways-based approach as no additional water was created.

However, Israel's desalination efforts are central to the means-based portion of its strategy. Israel takes unusable water from the seas or swamps, purifies it, and creates additional inputs to the national water system. Similarly, its control over the headwaters of the Banias, Hasbani, and Litani tributaries also represent means-centric approaches. By securing additional land on which the sources of the Jordan River lie, Israel ensures upstream access and precludes any other actor from decreasing Israel's water supply. In this case, Israel's pre-emptive move to secure access necessarily maximizes its ability to harvest water from the Jordan River basin. Theoretically, Israel could now take nearly 100 percent (barring rainwater or aquifer-fed sources to the river) of Jordan River waters. This represents the creation of additional means, even if the state has not yet fully capitalized on this ability. Finally, Israel has increased its relative supply and means by decreasing Palestinian access to Israel's groundwater sources. If the trend to question its objectives continues, perhaps in another decade, Israel can claim a tripartite, hedged strategy to water scarcity, focusing on ends, ways, and means.

2) Did the scarcity erupt in conflict? If so, why? If not, why not? Clearly, water scarcity has been a contributing factor to regional violence. As noted earlier, Israeli leaders have acknowledged that a major source of the Six-Day War was Israel's decision to thwart Arab water diversion plans with aggression. Moshe Dayan, a former Chief of Staff of the Israeli Defense Forces, had already declared as much in the autumn of 1959. He stated that "if the Arabs refuse to cooperate in solving the Jordan water problem we'll proceed like we did in the Gulf of Akaba and take the water by force." [72] Israel made good on this promise eight years later. As noted earlier, Palestinians and Arabs in surrounding countries have also noted water's centrality to the continued tension and conflict in the region.[73] Simply put, water is critical to biology, to the economy, and to a people's standard of living. In this case, all three factors are intertwined in the historical context. When Israel elevated water to an existential threat, when it declared force to be

72. Shemesh, "Prelude to the Six-Day War," 7.
73. See also Pearce, *When the Rivers*, 157-172; Oren, *Six Days of War*, 2.

on the table for scarcity resolution, and when its rivals sanctioned the same purpose behind violence, conflict became exceptionally likely.

3) *To what extent did the approach address the symptoms or the causes of scarcity?* Arguably, the root cause of this scarcity is Israel's desire to exist in a largely inhospitable environment. However, for a variety of reasons, humans have chosen to settle in numerous desolate areas – the Sahara, the Arctic, and Las Vegas, for example. Without ascribing a normative aspect to a settlement decision, readers must judge Israeli responses on the extent to which they facilitated their achievable objectives. Whereas Germany's achievement of economic self-sufficiency was manifestly impossible, Israel's desires to increase immigration, to settle the desert, and to bolster agriculture are feasible, though at great cost and within finite limits. Thus, Israeli strategies that created more water—desalination and territorial expansion—addressed both access and the cause of scarcity, although the morality of the expansion is certainly questionable by the international community. Similarly, Israeli strategies that sought more efficient use of extant water—drip-irrigation and wastewater recycling—were also focused on causes. An important point in any strategy, however, is the ability to recognize failure. As indicated in the consequences section, Israel did not significantly increase its desert settlements, nor the agricultural basis for its economy. Although these continue to be Zionist ideals, Israel could refocus on state survival and improving the standards of living for the currently populated areas, rather than on creating further areas of settlement. In doing so, its successes in water creation and efficient use would attract additional productive immigrants to developed areas with high living standards. Ideological objectives such as desert settlements or the ideal agricultural citizen do not appear to have significantly increased Israel's Gross Domestic Product, nor its ability to out-populate Palestinians. If Israel's state audit office is correct, an ends adjustment would ameliorate water tension. The 75 percent of water currently allocated to agriculture could be reallocated to productive industries and quality of life issues to attract additional immigrants.

4) To what degree did a state's extant capabilities impact its strategy for addressing scarcity; did it apply a previously tested strategy or did it develop a new approach? As a new state, Israel had no existing capabilities from which to draw

experience. Therefore, its technological investments, its efficiency projects, and its means-based approaches were all Israeli firsts in terms of strategy. Nevertheless, subsequent applications or refinements of strategies did exist. Establishing a southern security zone in Lebanon and securing the Litani headwaters was a repeat application of securing Hasbani and Banias headwaters in 1967. Similarly, when Israel demonstrated a capability with irrigation pipelines in the NWC, it expanded its unifying water grid to facilitate access wherever desired. Not all of Israel's repeated approaches stemmed from initial successes, however. Desalination was extremely costly and ineffective during Israel's first few years. Nevertheless, Israel persisted in developing this technology, achieving large gains in potable water production at comparable costs to other water sources.

5) How well did the state's strategy facilitate its response to further resource scarcities? Although Israel's objective of increasing its population unintentionally increased water demand and therefore scarcity, it adjusted its strategy to accommodate these additional pressures. Technically, Israel never overcame its resource scarcity and only hopes to do so following the construction of its next round of desalination plants.[74] Because Israel has continued to invest and export both drip-irrigation and desalination technology, it is likely to continue applying these approaches to further water scarcities. Further, because it is one of the most industrially and technologically advanced states in the Levant, many states are looking to Israel to pioneer these means so they can be applied around the region. Moreover, Israel's martial attitude toward perceived existential threats, including resource scarcities, has a nearly flawless track record. Regardless of the normative judgments associated with its military and security policies, Israel will likely resort to violent means-based strategies if backed into a corner, or if other solutions prove unviable. Only within the last decade has Israel begun to experience another gradual shift in perception. This time, the change revolves around easing the policy aims of agricultural self-sufficiency and settlement patterns, which could, in turn, alleviate the perception of water scarcity.

74. Martin, "Can Israel Find," n.p.

Conclusions

Israel's policy aim of populating immigrants in remote areas has been largely unsuccessful. However, its hedging of both ways-based and means-based approaches to counter water scarcity has yielded positive results; Israel has fostered and proliferated cutting-edge water efficiency technology, and has created additional water sources through expansion and desalination. In addition, Israel's perception of water as the basis of its existence, coupled with its policy of critical headwater control, has helped ensure its survival. Despite increased regional water demands, Israel has sufficiently centralized and prioritized its water control measures to counter near-term resource pressures. Whether the larger issues of the Arab-Israeli conflict threaten to overturn Israel's successful water strategy remains to be seen.

Chapter 4

Iceland: Catching the Limit

Since attaining its independence from Denmark in 1944, Iceland has staked its existence almost entirely on its fishing industry. This chapter will examine Iceland's incremental efforts to secure not only its survival, but also its high living standards, as it combatted a perceived resource scarcity in fish. Additionally, the chapter will present the context within which Iceland addressed its recurring perception of dwindling fish stocks and will address Iceland's preferred strategy of expanding both its legal jurisdiction and exclusive access to relevant waters. The discussion will show the generally positive outcome of the Icelandic responses to the scarcity faced and will conclude by applying the familiar five-question comparative framework to the evidence.

Historical Context

The circumstances surrounding the conflicts over fishing rights between Iceland and the United Kingdom from the 1950s through the 1970s are not well known. A brief history is therefore warranted. Iceland has quarreled with the United Kingdom four times over specific fishing rights in Iceland's territorial waters. These disputes coincided with Iceland's attempts to expand its jurisdiction over and legal access to the rich fishing grounds immediately surrounding the island. In 1952 Iceland extended its territorial waters from three to four miles; in response, Britain embargoed Icelandic fish until 1956.[1] In 1958, it again extended its waters from four to 12 miles; for three years, Britain dispatched Royal Navy gunboats to prevent Icelandic interference with British fishing trawlers inside the 12-mile limit.[2] In 1972 Iceland elected to declare an exclusive 50-mile fishing zone, in response to which Britain employed multiple frigates, tugboats, and

1. Bruce Mitchell, "Politics, Fish, and International Resource Management," *The Geographical Review* 66, no. 2 (April 1976): 128; Gunther Hellmann and Benjamin Herborth, "Fishing in the Mild West: Democratic Peace and Militarised Interstate Disputes in the Transatlantic Community," *Review of International Studies* 34 (2008): 485.
2. Gudmundur J. Gudmundsson, "The Cod and the Cold War," *Scandinavian Journal of History* 31, no. 2 (June 2006): 97; Gudni Thorlacius Johannesson, "How 'Cod War' Came: the Origins of the Anglo-Icelandic Fisheries Dispute, 1958-61," *Historical Research* 77, no. 198 (November 2004): 543, 556-573.

surveillance aircraft against Icelandic Coast Guard enforcement vessels.[3] Although the 50-mile limit was ratified in a November 1973 bilateral agreement, Iceland again extended its fishing limits in 1975 by declaring a 200-nautical-mile exclusive economic zone in advance of nascent international law.[4] Britain and Iceland frequently engaged in violent maritime clashes until the parties drafted another agreement in June 1976 acknowledging the 1975 expansion.[5] The conflicts of 1952-1956, 1958-1961, 1972-1972, and 1975-1976 are known collectively as the *Cod Wars*, the last three of which will serve as the backdrop for this final scarcity case study.

Before delving further into the international and domestic context behind this case, one facet of case-study-selection criteria merits reexamination. Chapter One noted that imposed resource scarcities were ineligible for consideration.[6] The Cod Wars may appear inappropriate because the Icelandic government pointed almost exclusively to foreign overfishing as being monocausal to the scarcity; that is, Iceland almost completely attributed its scarcity to external factors.[7] However, Iceland's meticulous record-keeping of fishing data, which it has maintained since 1901, belies its accusations. By its own records, Iceland caught more fish than did other states, beginning in 1955.[8] Further, as will become clear, Iceland took actions to ensure it could internally control the success or failure of its fishery policies. As a result, the Cod Wars of 1958-1961, 1972-1973, and 1975-1976 are valid cases for inclusion in this analysis.

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3. Valur Ingimundarson, "A Western Cold War: The Crisis in Iceland's Relations with Britain, the United States, & NATO, 1971-74," *Diplomacy & Statecraft* 14, no. 4 (December 2003): 94-95, 105-107, 110-112.

4. Hannes Jonsson, *Friends in Conflict: The Anglo-Icelandic Cod Wars and the Law of the Sea* (London, UK: C. Hurst & Company, 1982), 150-152; Hannes H. Gissurarson, "The Fish War: A Lesson from Iceland," *Economic Affairs* 3, no. 3 (April 1983): 220.

5. Jonsson, *Friends in Conflict*, 180-182.

6. To recap, in a 100 percent imposed scarcity situation such as the Berlin Airlift, the scarcity does not represent an ends-means disconnect, as the victim state would likely choose to address the aggressor rather than the scarcity itself. Also, by definition, an imposed scarcity does not meet the inclusion criteria for state responses; the state must wield a preponderance of ability and resolve to choose a strategy to execute.

7. Deborah Shapley, "Icelandic Fishing: Science Awash in Great Codfish War," *Science* 178, no. 4064 (1 December 1972): 965; Associated Press, "Iceland's Puzzle: Drop in Cod Catch," *New York Times*, 12 February 1984, A4; Ingimundarson, "A Western Cold War," 100.

8. See Appendix A in the Illustration Gallery, page 84. Per the Chicago Style Guide, 16th edition, sections 3.6 and 3.8, and per the Air University Style Guide, April 2005 edition, section 1.33, I have opted to collate all illustrations in a gallery for ease of reference and because of source formatting. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/fisheries-and-agriculture/World-Catch (accessed 1 May 2011).

In terms of the international context, Iceland faced legal ambiguities regarding the law of the sea and struggled with its identity in terms of Cold War security and alliances. The United Nations Law of the Sea was not codified until 1982; prior to this, state legislation and international norms set the primary precedent for legal rights to the sea's resources—both living and non-living.[9] For example, Iceland's Fundamental Conservation Law of 1948 declared Iceland's sovereignty over conservation zones within the continental shelf, and the 1951 International Court of Justice ruling between the United Kingdom and Norway reaffirmed the lack of a common international precedent applicable to a specific territorial water distance.[10] Because many states' historical customs regarding the law of the sea were in conflict, and because states were slow to specify the authority of the international legal system, Iceland attempted to avail itself of the legal seams, in pursuit of its national objectives.

Further, during the formative years of its post-war existence, Iceland struggled to establish its identity within the bipolar world. Politicians frequently sought to link fishing rights to questions on North Atlantic Treaty Organization (NATO) utility.[11] Citizens wondered why NATO refused to resolve the United Kingdom-Iceland disputes, or why the United States, as Iceland's resident defense force, should operate Keflavik Air Station if it ignored the attacks by the Royal Navy.[12] The events of the 1952 Cod War created a rift between Iceland and the West, as Iceland struck major trade agreements with the Soviets when faced with the British embargo of 1952-1956.[13] Ultimately, Iceland walked a fine line among competing security alliances, ephemeral international norms on living resource exploitation, and fluctuating legal regimes.

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9. United Nations Division for Ocean Affairs and the Law of the Sea, taken from www.un.org/Depts/los/index.htm (accessed 1 May 2011). The United States' 1945 Truman Declaration was the impetus for the Iceland 1948 conservation law; both statues affirmed states' rights to protect and exploit the resources of their continental shelves. See also Gudmundsson, "The Cod and the Cold War," 98; and Johannesson, "How 'Cod War' Came," 545.

10. Gudmundsson, "The Cod and the Cold War," 98; Jonsson, *Friends in Conflict*, 52-53; Johannesson, "How 'Cod War' Came," 546. For this reason, individual state laws

11. Reuters, "Iceland to Elect New Parliament: 'Cold War' and 'Cod War' are Issues in Balloting Today – Reds Seek NATO Split," *New York Times*, 28 June 1959, n.p.; Werner Wiskari, "Iceland's Pro-West Spirit Rises; Support for NATO is Increasing," *New York Times*, 25 March 1962, n.p. See also Mitchell, "Politics, Fish," 131-135, and Jonsson, *Friends in Conflict*, 173.

12. Valur Ingimundarson, "Fighting the Cod Wars in the Cold War: Iceland's Challenge to the Western Alliance in the 1970s," *RUSI Journal* 148, no. 3 (June 2003): 90-91; Gudmundsson, "The Cod and the Cold War," 100, 107; Ingimundarson, "A Western Cold War," 101, 109, 120-121.

13. Johannesson, "How 'Cod War' Came," 548; Gudmundson, "The Cod and the Cold War," 98, 111; Hellman and Herborth, "Fishing in the Mild West," 485.

These international tensions found their way into domestic election platforms for competing coalitions. Politicians capitalized on Iceland's ambiguous identity, merging fishing, security, economic prosperity, independence, and nationalism into a unifying image, at the top of which was the Icelandic fisherman in a hegemonic role.[14] Often, elections were won or lost based on the mechanism by which politicians promised to deliver a further extension of Icelandic fishery rights.[15] At the heart of these domestic concerns was the need to ensure the state's economic prosperity. Because fishing was Iceland's dominant industry generating roughly 15% of its GDP in the early 1960s, maintaining access to productive fishing grounds became a prerequisite for its most significant economic objective: securing the prosperity of its primary industry—fishing.[16]

Perception of Scarcity

The Icelandic government clearly perceived fishing rights as a vital interest. Former Prime Minister Herman Jonasson declared as much on 7 September 1958 and 17 March 1959; his government further codified this position in an Icelandic Fishery Question Memorandum submitted to the United Nations General Assembly.[17] This theme persisted in the 1972-3 Cod War, during which the Althing (Icelandic Parliament) passed a resolution on 15 February 1972 and transmitted an aide-memoire to the British government on 24 February 1972, both of which forcefully articulated the vital nature of Iceland's fishing interests.[18] Much more recently, the Iceland Minister of Fisheries declared sustainable fishing practices as a vital interest to the nation.[19] The Icelandic government characterized its fishing industry's prosperity as a matter of "life and death" to the United Nations Security Council on 11 December 1975. [20] Another former Prime

14. Luca Zarrilli, "Iceland and the Crisis: Territory, Europe, Identity," *Revista Romana de Geografie Politica*, 13, no. 1 (May 2011): 8.

15. Jon Blair, "Britain vs. Iceland: The Cod War is Funny Only if Serious Issues are Ignored," *New York Times*, 1 February 1976, E4; Gudmundsson, "The Cod and the Cold War," 99-100; Ingimundarson, "A Western Cold War," 97, 100, 127-128; Ingimundarson, "Fighting the Cod Wars," 89-90, 93; Peter T. Kilborn, "Iceland Dispute: More than Fish Involved," *New York Times*, 11 March 1976, n.p.; Reuters, "Iceland to Elect," n.p.

16. Central Bank of Iceland, *The Economy of Iceland*, (Reykjavik, Iceland: Gutenberg, August 2008), 26, http://www.sedlabanki.is/lisalib/getfile.aspx?itemid=6372 (accessed 28 May 2011).

17. Jonsson, *Friends in Conflict*, 7, 51, 73, 87-88, 98, 124, 173, 189, 204-205. For further corroboration, see also Johannesson, "How 'Cod War' Came," 553.

18. Jonsson, *Friends in Conflict*, 123-124. The government made further statements on 29 May 1972.

19. Einar K. Gudfinnsson, minister of fisheries and agriculture, Iceland, address, 25 September 2008, http://www.fisheries.is/address (accessed 1 May 2011).

20. Gissurarsson, "The Fish War," 220; Jonsson, *Friends in Conflict*, 165-166.

Minister, Olafur Johannesson, concurred, labeling fishery extensions a matter of life and death, because fish products comprised over 80 percent of Iceland's exports at the time. [21] Ensuring the prosperity of its fishing industry was therefore an existential matter for Iceland. Tying its economic survival to the fate of its fishing industry inextricably bound Iceland's prosperity to the abundance or scarcity of its fish stocks.

Iceland's fish crisis resembled Israel's water crisis, as each state perceived both access and scarcity challenges. Iceland believed it had insufficient access to fish stocks in its surrounding waters. It assessed that foreign trawlers were primarily responsible for harvesting fish to the exclusion of Iceland's fishermen. In 1958, Herman Jonasson's government wanted to increase the Icelandic standard of living by decreasing the yield of foreign fishermen from Icelandic waters.[22] Because the foreign proportion of fish caught near Iceland was 47 percent and 49 percent in 1957 and 1958, respectively, Jonasson sought to increase Icelandic access at the expense of foreign competitors.[23] In 1972 the former Icelandic Foreign Minister Einar Agustsson argued that "fish stocks in Icelandic waters were threatened with imminent ruin from overfishing by the world's distant water fleet."[24] He perceived an imminent move of foreign fishermen from the Barents Sea to Icelandic waters, further denying Icelandic fishermen access.[25] In the 1975 Cod War, the Ministry of Fisheries released a white paper citing foreign fishing as causal to fishery disputes and declaring a desire to curb foreigners' access.[26] A decade after the final Cod War, Iceland's government continued to adhere to its traditional scapegoat of foreign fishermen.[27] Perceived access problems were clearly recurring Icelandic strategic communication themes.

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21. "Iceland Pushes Out Her Fishing Limits, Risking 'Cod War'," *New York Times*, 2 September 1972, n.p.
22. Jonsson, *Friends in Conflict*, 74-57.
23. See Appendix A in the Illustration Gallery, page 84. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/fisheries-and-agriculture/World-Catch (accessed 1 May 2011).
24. Hellman and Herborth, "Fishing in the Mild West," 492; Jonsson, *Friends in Conflict*, 126-127.
25. Shapley, "Icelandic Fishing," 966; Jonsson, *Friends in Conflict*, 126-127. Limited access was not just endemic to Icelandic leadership; the population perceived this too. See Ingimundarsson, "A Western Cold War," 100; "Cod War II," *New York Times*, 28 May 1973, n.p.; Alvin Shuster, "Iceland Will Hold Talk with British: Neither Side is Optimistic on Settling Fishing Dispute," *New York Times*, 10 April 1973, n.p.; Alvin Shuster, "Iceland: Making the Fish Nervous," *New York Times*, 3 September 1972, E5; "To Trawlermen, Iceland 'War' is Hot," *New York Times*, 3 June 1973, n.p.
26. Jonsson, *Friends in Conflict*, 158-160.
27. Associated Press, "Iceland's Puzzle," A4.

Icelanders also saw declining fish stocks as a scarcity with which they had to contend. Throughout the Cod Wars, one of Iceland's critical premises was that Iceland was committed to addressing scarce fish resources because it was the country most affected by already endangered fish stocks.[28] In a memorandum submitted to the Council of Europe in September 1954, Iceland outlined its concerns over the "progressive impoverishment of fishing grounds."[29] Herman Jonasson's government noted the decline in harvest of certain types of fish and argued in a 7 September 1958 press interview that his government had foreseen and witnessed the decline in fish stocks over the past 10 years.[30] In the subsequent decade, herring stocks precipitously declined and contributed to a 16 percent drop in per capita income between 1966 and 1968.[31] Iceland's citizens would likely have viewed this change as further confirmation of a decrease in economic prosperity. When analyzed in light of Iceland's meticulous record keeping and governmental transparency, the concerns regarding the perceived scarcity in the Second Cod War are hardly surprising.

In 1972, Jon Jonsson, director of the Iceland Marine Research Institute (IMRI), highlighted the economic impact of Iceland's declining herring stocks. He attributed the decrease to greater fish mortality and the harvest of increasingly younger fish, echoing Icelandic sentiments that the total catch of fish had drastically fallen between 1954 and 1972.[32] Icelandic citizens were indeed alarmed over the perceived depletion of their fish stocks.[33] The most public manifestation of these feelings was the Icelandic Government Press Release of 20 August 1971. In this statement, the Foreign Minister Agustsson noted "clear signs that the coastal waters of Iceland are already too seriously overfished. Total catches of haddock and herring have fallen and now the cod is threatened."[34]

These perceptions changed little prior to the 1975-1976 Cod War. Iceland continued to provide its version of statistical evidence to demonstrate that its waters were already overfished, referring to the latest IMRI studies and even the findings of a joint

28. Gissurarson, "The Fish War," 220.
29. Jonsson, *Friends in Conflict*, 53-54.
30. Jonsson, *Friends in Conflict*, 73-75, 87-88, 214.
31. Hellman and Herborth, "Fishing in the Mild West," 485.
32. Shapley, "Icelandic Fishing," 965.
33. Robert Alden, "High Seas Fishing is No Sport: The Annual Fish Harvest Cod War," *New York Times*, 3 June 1973, n.p.; Associated Press, "Wider Fish War?" *New York Times*, 29 June 1973, n.p.
34. Jonsson, *Friends in Conflict*, 126.

team of Icelandic and British scientists.[35] In a statement by former Icelandic Prime Minister, Geir Hallgrimsson, the Icelandic government further acknowledged popular fears of an irreversible decline in fish stocks, particularly in the cod and herring populations. He argued, "The fish stocks in the waters adjacent to Iceland are in such danger of extinction that it would, indeed, be a matter of heavy responsibility" to delay governmental action.[36] In his 11 December 1975 letter to the UN Security Council, he again emphasized Iceland's coastal fisheries as being an essential condition for the existence of the Icelandic people.[37] In sum, Iceland perceived problems of both access to and security of its most vital economic resource—fish.

One apparent counterpoint must, however, be mentioned. Iceland's statistical data generally do not appear to support the perceived scarcity. In terms of total fish caught in Icelandic waters during the Cod Wars, only from 1966-1968 do data show a marked decline in the fish harvest.[38] It was not, however, the total tonnage of fish caught that defined the resource scarcity in this case. Rather, it was Iceland's perception that the primacy and prosperity of its fishing industry were inadequate. Clearly, Iceland's public and official sentiments in this regard are sufficient to demonstrate an ends-means disconnect. Similarly, in terms of the foreign percentage of total catch, except for 1957-1958 and 1967-1972, data show progressively decreasing foreign catch percentages.[39] These reversals in trend data are likely partial, if not proximate, causes of the Cod Wars of 1958 and 1972. As noted earlier, it is the perception of scarcity, even in the face of contradictory data, that is central to state decision making and strategizing. Therefore, despite record keeping that questions the quantitative nature of the shortage, Iceland's perceived fish scarcity was qualitatively sufficient to validate continued analysis of its response.

35. Blair, "Britain vs. Iceland," n.p.; Mitchell, "Politics, Fish, and International Resource Management," 137; Gudmundsson, "The Cod and Cold War," 108; Ingimundarson, "Fighting the Cod Wars," 92; Kilborn, "Iceland Dispute," n.p.

36. Doug Lieb, "The Limits of Neorealism," *Harvard International* Review 26, no. 1 (Spring 2004): 27-29; Hellman and Herborth, "Fishing in the Mild West," 491.

37. Jonsson, *Friends in Conflict*, 165-166.

38. See Appendix B in the Illustration Gallery, page 85. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/fisheries-and-agriculture/World-Catch (accessed 1 May 2011).

39. See Appendix A in the Illustration Gallery, page 84. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/fisheries-and-agriculture/World-Catch (accessed 1 May 2011).

Response to Scarcity

Iceland's approach to its fish scarcity was multifaceted. It attempted to secure control over additional fish stocks; it pursued a variety of fish conservation efforts; and, within the last decade, it has diversified its economic base. Iceland's principal strategy, however, was to expand incrementally its legal basis or prioritized right to fish certain areas, and to enforce this newfound jurisdiction. In order to secure access to new stocks or more exclusive access to existing areas, Iceland extended its span of control through legal regimes. Thus, the broadening of Iceland's territorial waters to four miles in 1958, the expansion of its fishery zone to 50 miles in 1972, and the establishment of its exclusive economic zone at 200 miles in 1975, exemplified Iceland's incremental response to scarcity.[40] Iceland specifically argued that through these measures, it could regain control of its fish stocks, thwarting foreign overfishing.[41] In all three cases, the Althing unilaterally passed the extensions, notifying affected states as a matter of courtesy.[42] In the 1958 unilateral expansion, Iceland referred to the Geneva Conference on the Law of the Sea, its internationally uncontested 1948 Conservation Law, and its failed efforts to effect negotiations within NATO.[43] Essentially, it argued the 12-mile extension was consistent with existing international law and customs. In 1972, Iceland provided the United Nations General Assembly justification for nullifying the island's 1961 agreement with the United Kingdom and Germany and for rejecting the International Court of Justice's jurisdiction, arguing that circumstances had changed.[44] As noted earlier, Iceland claimed an imminent need to control and protect fish stocks,

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40. Reference footnotes 1-4. See also James P. Brown, "Reykjavik's Fish Gambit," *New York* Times, 22 August 1972, n.p.; Jonsson, *Friends in Conflict*, 3-5, 83, 130; Gudmundsson, "The Cod and Cold War," 100-101, 107-108; Hellman and Herborth, "Fishing in the Mild West," 485-487; Kilborn, "Iceland Dispute," n.p.; "Iceland Pushes," n.p.; Lieb, "The Limits of Neorealism," 26-72. An exclusive economic zone grants a state sovereign rights to exploit, conserve, and manage the living or non-living natural resources of the waters, of the seabed, and of the subsoil. It includes any activity for economic exploitation, even the production of energy, for example. See articles 55-75 of United Nations, *UN Convention on the Law of the Sea*, New York, NY: United Nations, http://www.un.org/Depts/LoS/convention_agreements/texts/unclos/unclos_e/pdf (accessed 23 April 2011).

41. Shapley, "Icelandic Fishing," 965.

42. Jonsson, *Friends in Conflict*, 71-72; 120-123.

43. Jonsson, *Friends in Conflict*, 52-3, 71-72.

44. Mitchell, "Politics, Fish, and International Resource Management," 129; Jonsson, *Friends in Conflict*, 123-127. Some scholars believe the 1961 Agreement was made under duress, since British warships were immediately outside of Icelandic Waters, threatening violence if Iceland and the United Kingdom failed to reach an agreement: Gudmundsson, "The Cod and Cold War," 101; Hellman and Herborth, "Fishing in the Mild West," 486; Ingimundarson, "A Western Cold War," 97.

which precluded Iceland from awaiting the codification of international law. In the final Cod War of 1975-1976, Iceland justified its actions with several relevant regimes: the Scientific Council for the Organization of African Unity, the Sea-Bed Committee within the United Nations, and over 100 states that had already recognized a 200-mile exclusive economic zone as a norm.[45] Simply put, Iceland used national law and international regimes to achieve a legal basis for exclusive access to fishery zone waters.

However, Iceland was not content with a mere legal framework. In the last three Cod Wars, it employed its Coast Guard to enforce the exclusion zones, often resorting to violence against the infringing trawlers or the Royal Navy.[46] In the 1958 war, Iceland equipped its gunboats with trawl-wire cutters, designed to cut the fishing lines of offending foreign vessels; it employed these measures successfully dozens of times in the 1972 and 1975 Cod Wars.[47] British trawlers adjusted their fishing tactics, and Royal Navy ships resorted to ramming the Icelandic vessels in order to thwart the Coast Guard's effective enforcement.[48] Both sides notoriously escalated tensions. On one occasion, Iceland allegedly opened fire on a British trawler within the 50-mile zone; on another, a British tugboat repeatedly rammed an Icelandic Coast Guard vessel to prevent the cutting of British fishing lines.[49] On other occasions, Iceland boarded British trawlers, threatened to shell British ships below the water line, and held foreign fishing captains as prisoners.[50] In a twist of irony, Iceland fell victim to the very tactics it had pioneered. In 1994, Norway and Iceland experienced a brief cod war, in which two Norwegian Coast Guard vessels cut four Icelandic trawler nets that were within Norway's 200-mile economic exclusion zone.[51] Clearly, Iceland's enforcement mechanisms were effective and enduring. Protecting rights and access to resources has frequently resulted in violence, particularly when fish have been on the proverbial line.

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45. Jonsson, *Friends in Conflict,* 155-160.
46. References footnotes 2, 3, and 5. See also Gudmundsson, "The Cod and Cold War," 100-101; Hellman and Herborth, "Fishing in the Mild West," 485, 487; "Cod War II," n.p.; Shuster, "Iceland: Making the Fish Nervous," E5.
47. Shuster, "Iceland Will Hold Talk," n.p.; Ingimundarson, "Fighting the Cod Wars," 90.
48. Ingimundarson, A Western Cold War," 118-119; Gudmundsson, "The Cod and the Cold War," 97.
49. Alden, "High Seas Fishing," n.p.
50. "To Trawlermen," n.p.
51. Tony Samstag, "Cod Wars: Showdown between Iceland and Norway," *Scandinavian Review* 83, no. 1 (Spring 1995): 37-38.

Another Icelandic response to perceived fish scarcity was to increase its conservation measures. These efforts demonstrated Iceland's desire to control as many aspects of the fish industry as possible.[52] Iceland struck separate agreements with multiple nations, some of which were renewable, to limit the fish harvest with regard to tonnage, size, location, equipment used, and even type of vessel.[53] Frequently, these agreements arose from the settlement of a cod war; the 1961 agreement with Britain and Germany, for example, created seven rotating areas in which Britain could fish only during specific months of the year.[54] Similarly, the 1973 and 1976 agreements with Britain set tonnage quotas, specified location restrictions, delineated acceptable fishing timeframes, and limited the permissible types of netting and trawler vessels.[55] Although these agreements ended the violence and the enforcement conflicts among the states, they codified conservation measures that Iceland perceived to be in its best interests. Moreover, on occasions that Iceland perceived an increase in fish scarcity, it imposed conservation measures on its own fishermen, limiting size, species, quotas, and time periods permissible for fishing.[56] Iceland asked its own fish industry to cut back on catches to permit stocks to rebuild, with the head of the Government Marine Biological Institute noting the "supply of fish is so precarious that we have to reduce our own catch."[57] To bolster conservation efforts, Iceland relied on scientific data. Iceland's biologists recommended a 230,000-cod quota for 1976 to sustain the population, stricter catch limits, more stringent rules on net-mesh sizes, and specific weight restrictions to conserve stocks.[58] Former Icelandic President Vigdis Finnbogadottir also acknowledged a need for government-imposed reductions of fish catches despite the economic impact to Iceland's fishing industry, stating, "We have been so dependent on fish for our national survival. We now have to face the fact that we can't fish as much as we did before."[59] Iceland continues to employ conservation methods with quotas for mackerel and other

52. Shapley, "Icelandic Fishing," 966. Iceland believed it had achieved a modicum of success in regulating whale populations in its waters; it sought the same approach to conserve fish stocks.
53. Mitchell, "Politics, Fish, and International Resource Management," 130.
54. Jonsson, *Friends in Conflict,* 105.
55. Ingimundarson,"A Western Cold War," 120; Jonsson, *Friends in Conflict,* 150-152, 180-182.
56. Gissurarson, "The Fish War," 221; Jonsson, *Friends in Conflict,* 170-171, 210.
57. Kilborn, "Iceland Dispute," n.p.
58. Associated Press, "Iceland's Puzzle," n.p.; Blair, "Britain vs. Iceland," n.p.
59. Associated Press, "Iceland's Puzzle," n.p.

burgeoning species.[60] Over the past 50 years, Iceland's restrictions and limitations in terms of total fish caught have represented a curtailment of Iceland's objective of maintaining a prosperous fish industry. These measures were short-term sacrifices intended to ensure the primacy and longevity of a crucial economic base. Israeli water restrictions and German rationing represented the same approach.

Only in the last decade has Iceland begun diversifying its economic base and relinquishing, in part, its commitment to the primacy of its fishing industry. In 2004, fishing products were still 60 perent of Icelandic exports, but the industry represented a mere 5 percent of Icelandic Gross Domestic Product.[61] Icelanders clearly perceived the depopulation of fish and international competition as dangers to economic stability and their quality of life. But, as one scholar notes, Iceland has recently undertaken measures of economic diversification. Luca Zarrilli, a professor of economics and history at the University G. D'Annuzzio in Italy, argues that Iceland's expansion to the aluminum, renewable energy, tourist, and financial sectors has represented a gradual move away from its traditionally hegemonic fisherman identity.[62] Zarrilli suggests Iceland's move into these various sectors has demonstrated its desire to preserve prosperity, hedge against European Union influence and regulation, and balance against uncertainty in the ecological and fishing realms.[63] Another scholar believes Iceland has not completely lost its reliance on fish, as it turned back to the fish industry following the country's financial collapse in 2008.[64] Nevertheless, during the period of the Cod Wars from 1958 to 1973, it is clear that Iceland perceived the primacy and prosperity of its fishing industry as its dominant concern. In sum, Iceland's approach has centered primarily around near-exclusive access to fish stocks and secondarily around the conservation of its various fish populations.

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60. Lowana Veal, "Europe: Getting Into a Stew over Mackerel," *Global Information Network*, 13 September 2010, n.p., http://search.proquest.com/ (accessed April 24, 2011).

61. See Appendices C and D in the Illustration Gallery, pages 86-87. Data sources: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/External-trade/Exports (accessed 1 May 2011), and Icelandic Ministry of Fisheries and Agriculture, http://www.fisheries.is/media/skjal/graph/9-gdp-(g)-fisheries-persentage-of-total-(statice).png (accessed 1 May 2011).

62. Zarrilli, "Iceland and the Crisis," 1-3, 8.

63. Zarrilli, "Iceland and the Crisis," 6-8. Former Prime Minister David Oddson supported this argument in a statement at the Centre for European Studies in Brussels.

64. Veal, "Europe," n.p.

Consequences of Response

The above analysis clearly indicates that the primacy and prosperity of Iceland's fish industry met with short-term success and long-term failure. First, Iceland's total Gross Domestic Product (GDP) showed a very steady increase from 1952-2004; it had accelerated growth from creative financial investments from 2004-2008, then experienced a financial disaster and near bankruptcy in 2008.[65] Although this does not speak precisely to the prosperity of Iceland's fish industry, it does suggest a relatively healthy national economy with long-term stability. Further, the data show the 1958 and 1972 territorial water and fishery zone expansions at the center of the Cod Wars did not appreciably affect the overall GDP; however, the 1975 exclusive economic zone extension ended a minor one-year stagnation.[66] In terms of fish as a percentage of Iceland's GDP, detailed data is only available from 1973 to the present. These data show the fishing and fish processing industries comprised between 7%-17% of total GDP.[67] A brief drop in 1983-1984 probably reflected disappearing cod stocks before Iceland adopted additional conservation measures and began shifting to other species. A general downward trend is also apparent after 1997, as the fish industry's total percentage of GDP was halved and as the fisheries themselves dropped to only 8 percent of Icelandic GDP.[68] Again, the territorial extensions and ensuing Cod Wars appeared not to have affected fishing's primacy. Only around the turn of the century did disappearing fish populations and intentional diversification affect the industry's central role.

Although total tonnage of fish caught does not necessarily represent prosperity, it does speak to the industry's overall health. Icelandic data show three trends: an overall

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65. Zarrilli, "Iceland and the Crisis," 2-3. See Appendix E in the Illustration Gallery, page 88. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/National-accounts-and-public-fin/National-accounts-overview (accessed 1 May 2011). This steady growth is based on an index in which the Icelandic kronur, from the year 2000, represents 100.

66. See Appendix E in the Illustration Gallery, page 88. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/National-accounts-and-public-fin/National-accounts-overview (accessed 1 May 2011).

67. One author (Jonsson, *Friends in* Conflict, 7, 127) provided insight into the periods prior to government data, suggesting fishing represented 15%-20% of Icelandic GDP during the 1960s and 1970s. See Appendix D in the Illustration Gallery, page 87. Data source: Icelandic Ministry of Fisheries and Agriculture, http://www.fisheries.is/media/skjal/graph/9-gdp-(g)-fisheries-persentage-of-total-(statice).png (accessed 1 May 2011).

68. See Appendix D in the Illustration Gallery, page 87. Data source Icelandic Ministry of Fisheries and Agriculture, http://www.fisheries.is/media/skjal/graph/9-gdp-(g)-fisheries-persentage-of-total-(statice).png (accessed 1 May 2011).

increase in fish caught from 1944-2008; significant but temporary reversals in 1966-1968, 1982-1983, and 1991; and the beginning of a decline in total harvest after 2001.[69] Respectively, these trends suggest the following: that Iceland's fishing efforts increased as more efficient technology emerged; that fish populations may not be entirely manageable through conservation and regulation; and that industrial diversification correlates to a decline in the fishing industry's primacy. Nevertheless, Iceland remains the world's leading country in per capita volume of fish caught.[70] Slightly more illuminating is the total value of Iceland's annual fish harvest, though again, data are only available after 1993. Iceland's fish industry more than doubled its earnings from 1993-2009; its earnings increased from 50 million kronur to 115 million kronur per year.[71] Thus, Icelandic fish in this time period may indicate a classic economic trend – an increase in prices to counter a fall in supply. An extrapolation of this data backward in time would not be sufficiently accurate to be instructive. It does seem, however, that the 21st century Icelandic fishing industry's decrease in percentage of GDP, when coupled with falling tonnage and increasing earnings, point to stable prosperity but decreased primacy. In other words, even in the long term, Iceland may have succeeded in one objective and failed in the other.

Two additional statistics provide analytic value: fishing man-hours and exports. In 1944, roughly 17 percent of Iceland's total work hours were attributable to the fishing industry. By 2006, this number had steadily decreased to about 6 percent.[72] Prior to the turn of the century, this likely corresponded to more efficient fishing and processing practices. Since then, however, when paired with the decline in total fish caught, decreased work hours most likely represents evidence of the diversification of the Icelandic workforce, an additional indicator of the decline in fishing's primacy. Similarly, Iceland's fish exports paralleled this trend. From 1944-1969, fish represented 80%-97% of Iceland's exports; from 1970-1999, fish comprised between 67%-82% of its

69. See Appendix F in the Illustration Gallery, page 89. Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/ Fisheries-and-agriculture/Catch-and-value-of-catch (accessed 1 May 2011).

70. Zarrilli, "Iceland and the Crisis," 2.

71. See Appendix G in the Illustration Gallery, page 90. Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/Fisheries-and-agriculture/Catch-and-value-of-catch (accessed 1 May 2011).

72. See Appendix H in the Illustration Gallery, page 91. Data source: Icelandic Ministry of Fisheries and Agriculture, http://www.fisheries.is/media/skjal/graph/9-employment-(g)-percentage-in-fisheries-(statice).png (accessed 1 May 2011).

exports; and from 2000 forward, fish commodities slid from 63 percent to 39 percent of Iceland's total exports.[73] In other words, securing incrementally exclusive access to fish in its surrounding waters helped Iceland retain its fish industry's primacy. But, decreasing fish stocks and increasing industrial diversification since the turn of the century point to a conscious decision to abandon the fish industry's primacy in favor of long-term prosperity.

The short-term successes of Iceland's strategies did lead to some undesirable consequences. As has become apparent from the historical context and the repeated foreign discord accompanying its policies, Iceland bears partial responsibility for temporarily damaging its relations with Britain, Germany, the United States, NATO, and the European Union. In the long term, the 2008 financial crisis it experienced may seem to indicate a misguided decision to diversify into the financial sector. But because economic survival and independence are fundamental state needs, remaining dependent primarily on fishing was an untenable strategy. The ensuing bankruptcy resulted from excessive borrowing with insufficient financial reserves and was temporally, rather than causally, related to Iceland's diversification strategy.[74] Furthermore, both Iceland's strategies and its objective seem flawed. A strategy based partially on conservation measures is liable to fail when the resource in question is ephemeral. In other words, a living resource whose health is, at best, difficult to predict, and at worst, impossible to control, may present too complex a problem for effective management. Similarly, an objective that espouses primacy in a single industry may reflect a competitive advantage that is more perceived than real. This objective focused on a mobile resource and was subject to complicated, unpredictable ecological factors, such as sea temperature, that are beyond a state's ability to control. Although Norway, Russia, and the Faroe Islands claim their unchanging fish quotas provide a semblance of population control, Iceland was shortsighted in basing its economy on a resource over which it had only marginal influence.[75] Iceland perhaps began to realize this problem as it began violating Norway's waters and the very legal jurisdiction Iceland helped establish in order to harvest more

73. See Appendix C in the Illustration Gallery, page 86. Data source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/External-trade/Exports (accessed 1 May 2011).
74. Zarrilli, "Iceland and the Crisis," 2-5.
75. Samstag, "Cod Wars," 38-40; Veal, "Europe," n.p.

fish.[76] Despite the variety of unintended consequences and the recent shift in strategies, Iceland's responses to its unique resource scarcity successfully and consistently preserved its fishing industry's prosperity, even if its primacy was temporary.

Five Question Framework

1) Did the strategy for responding to resource scarcity predominantly involve an approach based on ends, on ways, or on means? Why was that approach chosen?

Iceland's primary strategy was means-based, as it worked to secure new fish stocks or more exclusive access to the existing ones. By expanding its territorial waters to 12 miles and by unilaterally declaring exclusive economic zones ultimately to 200 miles, Iceland obtained additional resources. This epitomizes an approach based on means. Its secondary strategy, conservation measures designed to preserve the long-term health of the fish populations, was ways-centric. By accepting short-term decreases in fish harvests and by limiting its immediate economic gain, Iceland optimized its long-term approach to fishing. It increased its fishing efficiency by committing to the prosperity of the fishing industry in the long run. Temporarily restricting fishing locations and equipment does not immediately provide additional resources to exploit, nor does it represent an abandoned objective. It does, however, provide an efficient governmental solution to the problem of overfishing, constituting a useful example of the Tragedy of the Commons. [77] Nevertheless, Iceland's industrial diversification over the past decade does represent a curtailment of ends – fishing's primacy is no longer paramount. However, Iceland initially chose strategies based on means and ways precisely because it was unwilling to adjust its ends. Recognition of fish stocks as vital interests, an ambiguous and favorable international legal environment, and nature

76. David E. Pitt, "U.N. Envoys Fear New Cod Wars as Fish Dwindle," *New York Times*, 20 March 1994, Section 1, 6; Samstag, "Cod Wars," 37-38.

77. The Tragedy of the Commons refers to the phenomenon in which individual actors rely on a shared resource to which they do have neither exclusive rights, nor limits on usage/access, nor any requirement to replenish what is consumer. The result (i.e., the "tragedy") is that everyone will take as much as they can or want, and the resource will cease to exist. A shepherd's livestock grazing a shared pasture is one example. In this case, competing Icelandic fishermen pursue fish that are, by definition, a shared resource for Icelanders within the relevant economic zone at the time. Assuming no spoilage and infinite demand, each fisherman would benefit from catching additional fish. At some point, however, overfishing hurts the population and limits future harvest, just as permitting overgrazing denies feed to future flocks. No individual actor would choose to limit his harvest in the short term, even if it guaranteed long-term profitability. Thus, the government intervention is an efficient means by which this dilemma can be resolved. See Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (13 December 1968): 1243-1248.

conservation pressures provided Iceland with maneuvering room in which to pursue legal regime change and conservation efforts. Increasing means and improving efficiency thus seemed obvious choices to placate domestic interest groups without sacrificing economic prosperity.

2) Did the scarcity erupt in conflict? If so, why? If not, why not?

By definition, the Cod Wars were violent conflicts stemming from disagreements over fishing rights and access. The Royal Navy forcibly intervened in response to Icelandic Coast Guard enforcement efforts. Intentional collisions, trawl-wire cutting, armed boarding parties, alleged gunshots, and even an indirect death during damage repair were characteristic of the three conflicts.[78] The Icelandic violence stemmed from the perception of an existential threat against its primary industry and economic base. British violence represented a reluctance to yield influence in setting international norms. Again, it is important to note that the violence was most prominent as a result of the means-based strategy, rather than as a response to curtailed ends or more efficient conservation. Even though fishing was hardly a vital interest to the United Kingdom as a state, the government succumbed to vocal interest groups and mounting national pride in its armed response.

3) *To what extent did the approach address the symptoms or the causes of scarcity?*

Iceland's approach appeared to focus on addressing the symptoms, because the root cause of the declining fish stocks was largely unknown. Certainly, overfishing may have been a contributing cause; but so might have changing sea temperatures, pollution, or unidentifiable independent variables. As an example, Iceland's recent poaching of fish in Norway's waters indicates Iceland's failure to address the scarcity's root cause. Again facing dwindling stocks in its own waters, Iceland chose to exploit Norway's fish. Iceland's policies did target foreigners and, to a certain extent, its own fishing regulations and conservation measures. But it was the forced primacy of a single industry – fishing – that was central to the perceived scarcity. Until recently, Iceland's failure to hedge its strategies and diversify its economy pushed the health of its fishing industry into the

78. Gudmundsson, "The Cod and Cold War," 100, 106; Hellman and Herborth, "Fishing in the Mild West," 485.

realm of vital interests. In hindsight, it appears that a more measured political objective that was less polarizing and less fundamental to Icelandic identity might have more effectively alleviated the ends-means disconnect.

4) To what degree did a state's extant capabilities impact its strategy for addressing scarcity; did it apply a previously tested strategy or did it develop a new approach?

Iceland developed a new strategy and adhered to it. By helping to formulate international laws and norms through the various regimes described earlier, Iceland pursued a novel approach. When the strategy appeared successful in 1952 with the initial expansion from three to four miles, Iceland repeated this approach with impressive success. The nationalistic support behind the codification of exclusion zones signified a winning strategy to Iceland's policy makers. Similarly, in terms of enforcement, Iceland developed and retained a new technology – trawl-wire cutters. Although these were deployed in the 1958 Cod War, they were not successfully employed until the 1972 and 1975 Cod Wars. Ironically, Norway validated this strategy as it defended itself against Iceland's encroachment on Norwegian waters.[79] Although the success of Iceland's conservation measures is still debatable, no compelling evidence to the contrary existed at the time. As a result, Iceland continued to turn to the conservation strategy as a supplement to its territorial aggrandizement.

5) How well did the state's strategy facilitate its response to further resource scarcities?

Despite the success of Iceland's incremental expansion policies, the international community became loath to support additional economic zone extensions. While some states have argued for exclusive resource rights to the edge of their continental shelf, or down to a certain depth, the prevalence and acceptance of the 1982 United Nations Convention on the Law of the Sea make further expansions unlikely.[80] Because the efficacy of conservation measures is more open to debate, Iceland has employed this communication theme and strategy far beyond the four Cod Wars. When faced with further scarcities of fish, Iceland has repeatedly turned to conservation methods, but these

79. Samstag, "Cod Wars," 37-38.
80. Jonsson, *Friends in Conflict*, 113, 193-194.

steps do not seem to have yielded long-term success. Iceland's total tonnage of fish has not reversed its downward trend since 2001. To the contrary, Iceland has taken to poaching in Norwegian waters, courting international fish agencies such as the Marine Research Institute and the International Council for the Exploration of the Sea, and diversifying its economic base away from fishing.[81] Simply put, its strategies proved relatively successful in the context of the Cod Wars but were not recipes for advantage regarding future scarcities.

Conclusions

Iceland's policy aim of securing primacy and prosperity for its fishing industry was wholly successful in the short term; in the long run, however, fishing's primacy took a backseat to prosperity. Expanding its legal basis for fishing within the context of inchoate international law was a clever, means-based approach. But it was Iceland's questionable success in conservation that ultimately forced its hand toward a diversified modern economy. The ways-centric portion of its strategy revealed the unrealistic political objective of a unipolar, vulnerable fishing economy. The challenges of managing a living, mobile resource and of balancing its cultural insularity with the stability of modern interdependencies will prove pivotal to Iceland's success as a state. Acknowledging both its inability fully to control a dynamic resource and its obligation to integrate with the greater international community, Iceland had to decide whether to fish or cut bait.

81. Samstag, "Cod Wars," 37-38; Veal, "Europe," n.p.; Zarrilli, "Iceland and the Crisis," 1.

Chapter 5

Analysis and Policy Implications

This chapter elucidates the similarities and differences among Germany's, Israel's, and Iceland's approaches to resource scarcity. First, it analyzes the three states' strategies through the five-question framework, in order to identify potential lessons. Next, it examines several recurring themes that emerged throughout the case studies. After presenting several conclusions to suggest how states should respond to resource scarcity, it will propose three policy implications and areas for further research.

Analysis

The five-part framework employed throughout this work provided a useful basis for comparison and contrast among the three case studies. By reframing these questions to reflect a comprehensive, comparative approach, we can gain useful insights.. Our first reframing reflects a combination of questions one and two. Has one type of approach (ends, ways, or means) proven more successful than others in addressing resource scarcity and conflict? The short answer is no, although states that hedged their strategies appeared to fare better than those employing one-dimensional approaches. For example, the German strategy was primarily means-centric through territorial aggression and substitute goods. In conjunction with a classic failure of strategic overreach, this response resulted in Germany's failure to achieve autarky and its government's failure to survive. Israel's dual approach based on ways and means offers a clear contrast. Recycling, drip irrigation, the NWC, desalination, and securing river headwaters were components to a truly multifaceted approach. To its credit, Israel has largely succeeded in its objectives. It increased its population and agricultural productivity but failed to settle its desert regions. Iceland, too, responded to its scarcity with both means and ways. Its short-term success in the primacy and prosperity of its fishing industry and its long-term success in the industry's prosperity, stem from its expansion of exclusive fishing zone access and its conservation measures. In these three cases, success appears to follow hedged strategies.

Additionally, conflict over resource scarcity seems to arise mainly when states pursue means-based approaches. Interstate violence did not emerge from Germany's waste reduction measures, its coal hydrogenation procedures, or the closure of nonessential industries. Rather, it ensued directly from territorial expansion – a strategy based on means. Similarly, Israeli ingenuity in desalination and wastewater recycling did not foster armed conflict. Instead, it stemmed from Israeli efforts to divert water to which other countries claimed a right. Iceland's means-based approach, too, was the proximate cause for the Cod Wars; unilaterally extending fishing zones to the exclusion of other states sparked violence. Its internal conservation measures limiting equipment or permissible fish size did not cause conflict. An interesting international relations implication also follows from the Iceland case. Democratic peace theory argues that mature democracies do not fight each other, instead choosing to resolve differences by other methods. One journal qualified this statement in terms of resources: democracies do not go to war with each other, except over fish.[1] Although factually accurate, the journal failed to note that the violent acts were relatively limited in scope.

The case studies suggest another generalization regarding the type of strategy a state employs. It appears states are very reluctant to adapt or curtail their ends, preferring to pursue strategies based on ways and means. Germany held to its autarkic ends until it was defeated. The Israeli government only recently considered relinquishing its Zionist aim of settling the desert and making it bloom. Heightened regional tensions and public cost-benefit analyses helped Israelis question their government's ends. Iceland refused to upset its fishing industry's hegemony until international law had been codified and conservation measures proved ineffective. These actions, coupled with a perceived threat to its economic survival caused Iceland recently to choose industrial diversification. States avoid curbing their ends when resources are involved.

Reframing the third part of the framework yields another question. Has addressing the root causes or the symptoms behind a resource scarcity been effective in resolving that scarcity? It may seem obvious that addressing a long-term root cause is preferable to combating a short-term symptom. Yet states may find root-cause analysis a

1. "Zero-sum Wars," *The Economist* 332, no. 7876 (13 August 1994): 45-46. The article noted that six democracies have all resorted to limited violence against other democracies over fish.

difficult pill to swallow for a variety of reasons. Domestic pressures to alleviate immediate symptoms, an inability to identify the primary cause of the scarcity, or an unwillingness to admit an unachievable objective are all potential obstacles. In our three cases, only Israel addressed the root cause, and only Israel was fully successful.[2] Its strategies created additional water and more efficiently used existing water. Further, its objectives were both reasonable and achievable, though as noted, the method of territorial expansion is questionable on moral grounds. In contrast, Germany's ends-means disconnect arose from its unachievable objective; no state has completely achieved economic self-sufficiency. Regardless of how many symptoms Germany addressed, resolving their root cause was beyond reach without a modified objective. Similarly, Iceland's strategies focused on symptoms, because the fish scarcity's root cause was unknowable. Its expansion of economic zones, its conservation measures, and its enforcement of both were all guesses concerning the health and accessibility of fish populations. In other words, neither Germany nor Iceland recognized a failing strategy that may have reflected unwise ends. Root causes are preferable targets for scarcity strategies, but uncertainty and impossibility may redirect efforts toward symptoms.

Parts four and five of the framework offer another comparative synthesis. To what extent can other states draw conclusions from the resource crises our three states addressed? First, templating strategies does not always yield success. Germany applied its territorial aggression strategy from previous wars to address its perceived scarcities during World War II. It failed. Israel, however, succeeded by templating its strategies. It perceived a successful counter to water scarcity in the Six-Day War's capture of the Hasbani and Banias headwaters. It also demonstrated access and efficiency successes with the NWC and recycling. As a result, capturing the Litani headwaters in Lebanon and additional irrigation pipes were natural extensions of Israel's playbook. However, no additional headwaters exist, and no significant irrigation destinations remain un-watered. Thus, Israel abandoned its playbook in favor of desalination and other technological investments. Iceland, too, reapplied its expansion of fishery exclusion zones and copious conservation regulations. With international support for further economic zones unlikely

2. Iceland began to address the root cause of its scarcity at the turn of the century when it diversified away from an unreliable and potentially declining resource. However, in the historical context of the Cod Wars from 1958-1973, Iceland primarily addressed symptoms.

and with its conservation measures insufficient to ensure the long-term health of fish stocks, Iceland discovered that templating strategies has its limits. Therefore, other states should conclude that successful strategies are sufficiently dynamic to adapt to a changing environment: static templating is unlikely to prevail.

States should glean the lesson that legal regimes can provide appropriate forums in which to pursue one's national interests. Despite the disagreement among theorists and policy makers regarding the utility of international agencies and intergovernmental organizations, states can still find utility in regimes like NATO and the UN. Iceland, for example, exploited the seams in inchoate international norms to shape the law of the sea for its benefit. Israel, too, has availed itself of conflicting international norms over the priority of riparian access – whether upstream or downstream states should dictate distribution. These same legal regimes may restrain state strategy concerning their strategy selection. Germany's territorial aggression, in large part for additional resources, made a blatant land grab an untenable approach to addressing scarcity. International regimes that provided the justification for an armed response, primarily due to international norms formed after Germany's defeat.

States should also conclude from our case studies that long-term foci are generally preferable to short-term strategies. Germany and Iceland both achieved significant short-term success but failed to sustain these objectives in the long run. Germany's expansion immediately augmented its petroleum, foodstuffs, and metals and consequently, its production capacity. However, it failed to recognize additional sustenance requirements for conquered lands that ultimately led to even fewer resources. Iceland's 12-, 50-, and 200-mile exclusion zones for fishing rights ensured the primacy and prosperity of its fishermen. But with no further exclusion likely and with the unpredictable effects of its conservation measures, it ultimately realized its fish industry's primacy was no longer possible. A parallel discussion could exist today for fossil fuels. Many states seek methods to keep fuel prices low, to secure new oil sources, and to preserve their immediate access. A more appropriate long-term focus might be significant investment in renewable energy and its infrastructure, thus addressing both long-term objectives and the root causes of energy scarcity.

A final question addresses the issue of pre-emptive war. Should states be content to wait until scarcity develops before acting, or are imminent threats sufficient to warrant a response? On the one hand, National Socialist Germany perceived it had an extant scarcity; it repeatedly argued that insufficient resources existed to ensure economic self-sufficiency. Despite its unachievable end, the scarcity had already developed. On the other hand, both Israel and Iceland perceived imminent scarcities and chose to act based on these perceptions. As noted earlier, Israel slowly changed its opinion on water availability from abundance to scarcity during its first 11 years of existence. It was the conflicting schema of the Mekorot Water Company and the Israeli Ministry of Agriculture that publicized the debate over imminent scarcity. For Israel, imminent scarcity was a sufficient cause to act. Iceland's leaders also described multiple looming threats to its fish stocks, claiming distant water fleets would imminently destroy Iceland's only natural resource. It even argued that unilateral expansions were required prior to the codification of international law to avert an imminent disaster to North Atlantic fish populations. Imminence again sufficed for action. Although perceptions of existing scarcities are more compelling arguments for state responses, imminent threats can and should sometimes translate to action. One distinction in the latter case may revolve around an important additional criterion—whether or not a state perceives the scarcity to affect its vital interests. It is precisely this concept of vital interests that is the first emergent theme.

Emergent Themes

Several themes emerged from the three case studies, suggesting certain commonalities among states facing resource scarcity. First, a state's vital or existential interests represent those causes for which a state will employ every available method. By definition, a state considers a vital interest a life and death matter. Hitler communicated food shortages as an existential threat to Germany in *Mein Kamp,* and thereby rallied the German people behind his *Lebensraum* strategy. Similarly, Israeli leadership portrayed water as a vital national interest, as Israel's lifeblood; therefore, water scarcity became an existential threat its long-term viability. Iceland, too, perceived fishing rights as a vital interest. The Althing passed resolutions overtly stating this opinion, and modern Icelandic ministries still categorize fisheries as life and death matters. The consequence

of these existential labels was both domestic support for governmental policies and international justification for pre-emptive responses to scarcities. A second theme revolves around states' recurring desires for self-sufficiency. Germany's stated end was autarky, or economic independence. Israel's policy statements and Zionistic ideals involve a certain measure of agricultural self-sufficiency. Iceland's desire for economic independence was more nuanced. Its incremental expansions in terms of exclusive access to fish stocks and its ambivalence over NATO and the European Union reflected two desires. Iceland wanted to control its own economic fate and it sought to preserve its ability to make independent decisions regarding relevant fish populations. All three countries have pursued some level of self-sufficiency and freedom of action in the economic realm. This indicates a hesitancy to become dependent on others. Although economic self-sufficiency is unachievable, to varying degrees, many states still pursue this objective. For example, some United States policy makers have stated goals of energy independence; similarly, the French decision to avoid the Eurofighter consortium or the British reluctance to adopt the Euro as currency reflect modern self-sufficient tendencies.

The third emergent theme was the appearance of unforeseen consequences, or unanticipated second-and-third-order effects. In the German case, leaders overlooked the inevitable need to feed and supply the additional foreign citizenry that came under German control. Israel, too, failed to account for the increased water demand that additional settlers would place on an already strained system. Iceland failed to realize its fish stocks could dwindle in the face of its self-assured expansions and conservation measures. It did not foresee how dependence on a living resource could tie its fate to an uncontrollable ecological entity. The insight for other states may be that every strategic input to a system, especially a system in which resources are scarce, will carry unforeseen consequences. In some cases, the effects were not seen as salient during the making of policy with Germany and Israel as obvious exemplars. In other cases, the system is too complex to predict a linear outcome. Adapting to unpredicted consequences is the mark of a sound strategy.

A tendency to turn to technology is the fourth theme. Germany invested heavily in coal hydrogenation technology like the Fischer-Tropsch process, and substitutes like

Buna rubber. Israel pioneered drip irrigation technology, and has remained at the forefront of desalination efforts. Iceland engineered trawl-wire cutters to enforce its fishery exclusion zones. Although certainly not a panacea, technology proved a successful tool or mechanism by which states could implement strategies based on ways and means.

A perceived ability to control the environment is a fifth theme that emerged from the case studies. It goes hand in hand with any means-centric or ways-centric approach because these imply an ability to use a given set of means to effect the stated end. Germany assumed its territorial acquisition, its production efficiency increases, and its governmental planning would manipulate the economic system adequately to achieve self-sufficiency. Israel also assumed it could exercise sufficient control on the water system to mitigate the perceived scarcity. Eshkol stated that control over water sources would bring about the Zionist dream. Israel pursued this control by acquiring river headwaters and by passing laws centralizing government management of water resources. It believed that if it could control all aspects of the water system, scarcity could be eliminated. Iceland, too, assumed its conservation measures and exclusionary tactics would yield a known outcome in the system. It believed it could control a living resource and dynamic ecological system. The assumption a state can fully control its environment represents a fundamental strategic error. At best, it can exert a modicum of influence.

The final emergent theme from the three case studies is the state's need to market the perceived scarcity to its population. Hitler published *Mein Kampf,* in which he outlined the inadequacies of German resources; German leaders communicated this theme to the rank and file of National Socialist Party with regard to *Lebensraum*. In the Israeli case, former Prime Ministers Ben-Gurion and Sharett, and the former Chief Engineer of Mekorot Water Company, Aaron Wiener, repeatedly communicated their perception of scarcity to the public. As noted earlier, even Israel's official government yearbooks communicated its perception to its citizenry. Iceland was no different. The Althing's white papers, former Prime Minister Jonasson's and former Foreign Minister Agustsson's public statements, and multiple governmental press releases all communicated the perception of fish scarcity to Iceland's citizens. Clearly, public

awareness helps bolster a nation's strategy, so consistent strategic communication themes become pertinent.

How Should States Respond to Resource Scarcity?

Based on the historical cases presented, five approaches merit consideration. States should hedge their bets, and adopt multifaceted strategies based on all three categories: ends, ways, and means. Since success appears to have followed those resource-scarce states that pursued hedged approaches such as Israel and Iceland, similarly balanced strategies seem wise. Likewise, states should not hesitate to curtail their ends, as an objective may be unachievable or overly impractical based on the strategic context. States should not simply attempt to find more of a scarce resource; often, the pursuit of efficiency will yield satisfactory gains without the ensuing conflict from a means-based approach.

States should carefully evaluate whether or not the resource in question is a vital interest, one whose dearth provides an existential threat to the nation. In other words, policy makers must include the importance of the resource as a salient factor in their decision making. Motivating the public by communicating the significance of the scarce resource can solidify both domestic and international support.

States should respond to scarcities cautiously and incrementally, as second and third order effects are inevitable within complex systems. Unintended consequences appear to be the norm as interdependence and globalization increases connections between actors. As a result, states would be wise to adopt provisional strategies that leave options on the table for policy makers. *All in*, drastic policies may win public support, but fence in future state options.

States should pursue flexible strategies that they can quickly adapt to changing circumstances. The context or environment framing their scarcity can change, as can the amount or nature of the resource itself. Even a stated objective can change, so a strategy must be sufficiently accommodating to account for these adjustments. A static strategy based on sunk costs and stale decision making is doomed to be suboptimal.

States should consider response options early, before scarcity is imminent or worse yet, present. Time facilitates preventive measures, long-term foci, and root cause analysis. Imminent scarcities facilitate pre-emptive action, a search for immediate

solutions, and myopia on the resource scarcity's symptoms. Staving off ends-means disconnects through frequent policy and resource analysis can minimize negative impact. Although this collection of platitudes does not represent a universal solution to resource scarcity, it reflects the hard-fought lessons from previous actors in similar situations.

Policy Implications

This analysis of resource scarcity in Germany, Israel, and Iceland logically suggests three policy implications. All three relate to the type of strategy selected. First, policy makers must consider how their state operates on the spectrum of international cooperation and competition. In a hedged approach that includes some means-based components, leaders may opt to exploit seams in legal regimes or to risk interstate conflict. A state's policies both drive and are driven by its desired image on the cooperation-competition spectrum. Therefore, policy makers should evaluate the extent to which their strategy fosters or inhibits their desired level of cooperation or competition. Such image manipulation also affects both domestic identity and international perceptions of a state's cooperativeness.

A second implication involves a state's force structure. How a state orients itself on the cooperation-competition spectrum of international relations drives how well resourced its competing domestic agencies are. A state whose strategies typically favor means-based acquisition of resources, enforcement of international norms, and zero-sum competition will need to structure its armed forces to enable these approaches. Similarly, a country whose strategies often reflect ways-based efficiencies, cooperation with intergovernmental organizations, and whole of government components will need to resource its agencies and departments with sufficient engineers, ecologists, and scientists. Furthermore, how a state funds its various departments is in and of itself, a strategic communication message. Well-resourced diplomats and scientists signal different intentions than do a technologically-outfitted military.

The final policy implication balances the tension between self-assessment and sunk costs. Since strategies must be agile and dynamic, states must repeatedly assess how well a chosen approach bridges the ends-means disconnect that comprises the resource scarcity. Feedback mechanisms and agencies that provide strategic assessment are indispensable policy tools for revising and improving state strategies. Resource

scarcity strategies are no different. Policy makers should actively consider the need for course corrections and should avoid the pitfalls of the oft-heard sunk cost argument. Leaders may have difficulty accepting the cost-benefit analysis of past investments from third parties, but outside perspectives may forestall further blindness to a failed strategy.

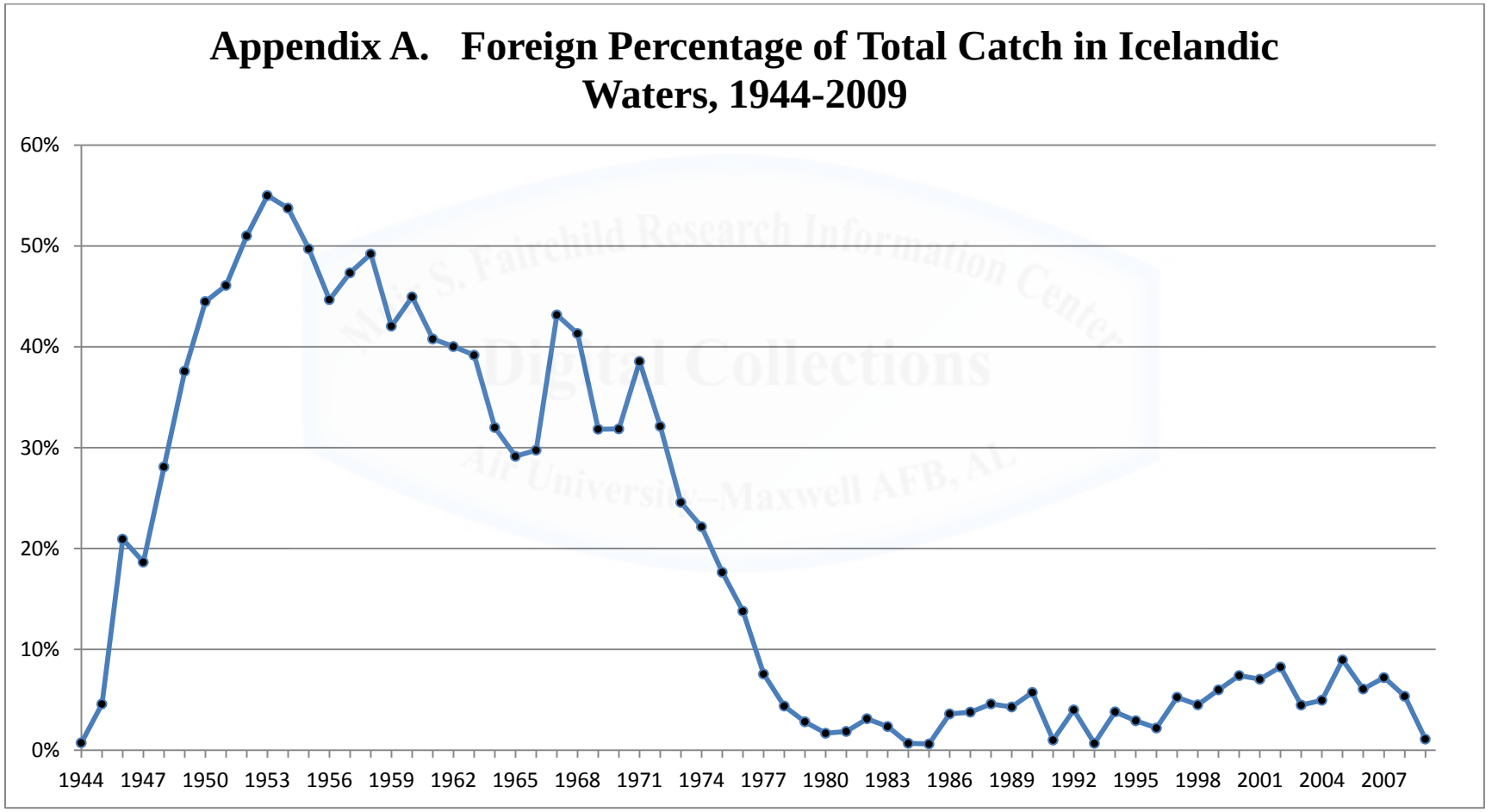
Further Research

No analysis or investigatory methodology is comprehensive; thus, suggestions for further research are usually warranted. Because this study involved three developed, Western states, future research would benefit from a selection of Eastern countries to solidify conclusions or to provide culturally specific alternatives. Next, researching how resource scarcity approaches develop among an inner circle of policy makers would permit more robust analyses. With the declassification of data, improved access to governmental meeting minutes, and increased transparencies among societies, such analyses would facilitate stronger conclusions. Another area for further research is the intersection of intrastate and interstate scarcities. Copious amounts of research exist regarding resource scarcities internal to states; dissecting the insights gained and applying the same robustness of research efforts to interstate conflict would greatly enhance the field of study. Finally, the field of resource scarcity would also benefit from an investigation into the differences between perceived and objective resource scarcity. Culling data that best represent the stocks of a given resource at a specific point in time may shed light on how citizens and policy makers form perceptions of scarcity. This research may highlight the ways in which seemingly erroneous perceptions prevail despite contradictory objective data. Dubious perceptions may lend credence to more tempered state responses.

Conclusions

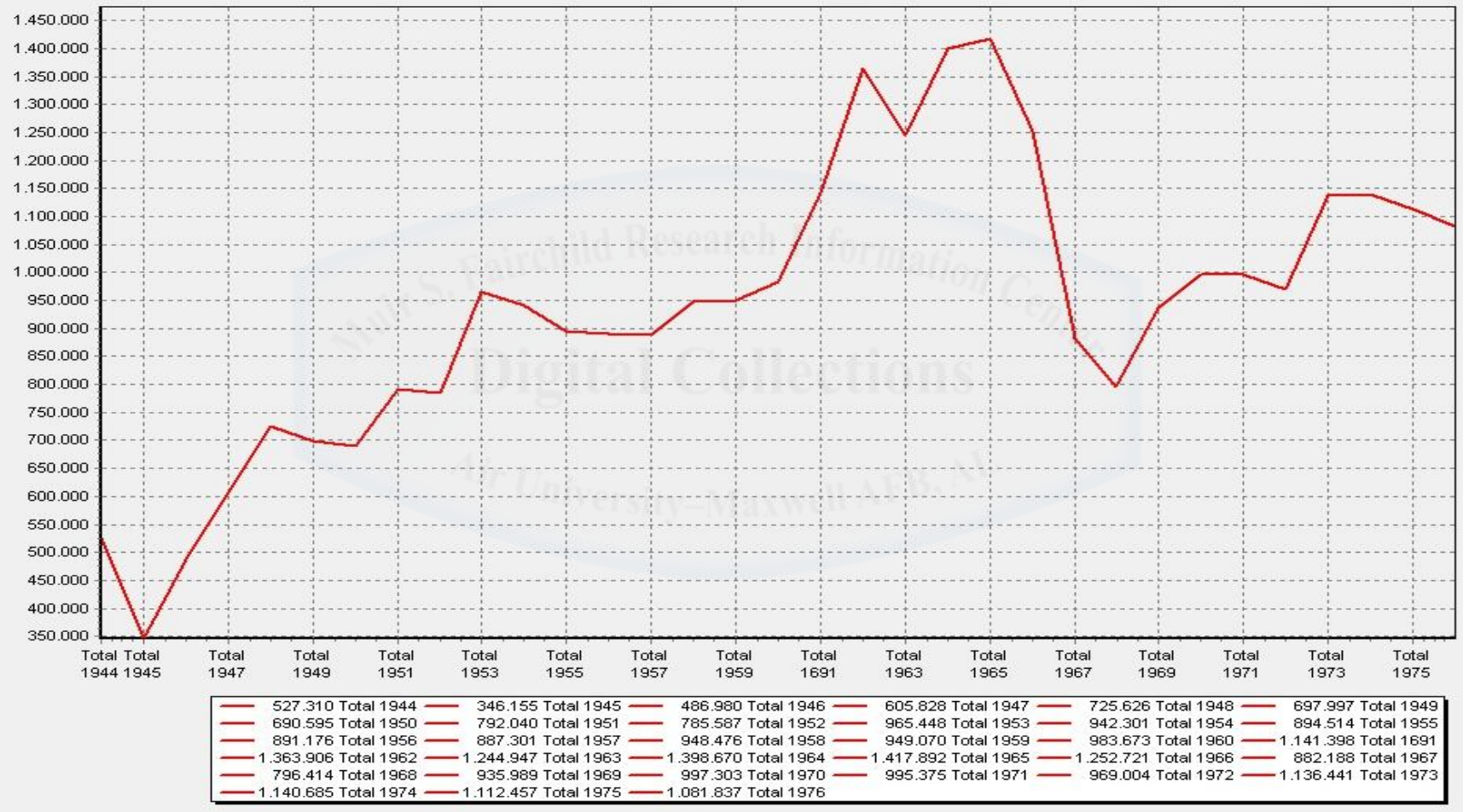
This thesis has asked and answered the question of how states should respond to resource scarcity. Clearly, no universal answer exists. The three-part case study of Germany's food, petroleum, and metal shortage, Israel's water shortage, and Iceland's fish shortage provided ample historical data from which to draw applicable conclusions. Multifaceted, cautious, flexible, and proactive approaches to address a state's vital interests are the strategies most likely to meet success in the increasingly complex global environment. Bridging the gap between a state's objectives and insufficient resources

may not be a simple matter of developing a clever, unifying strategy. It will probably involve humility in curtailing one's ends, precision in pursuing efficiencies, and some combination of negotiation and steadfastness in securing additional or alternate resources. One thing remains clear. States will never possess all the resources they desire; as a result, resource scarcity will continue to trouble states in one form or another. This thesis has presented pitfalls of which statesmen should be aware and approaches that will at least be suggestive as the basis for sound strategies.

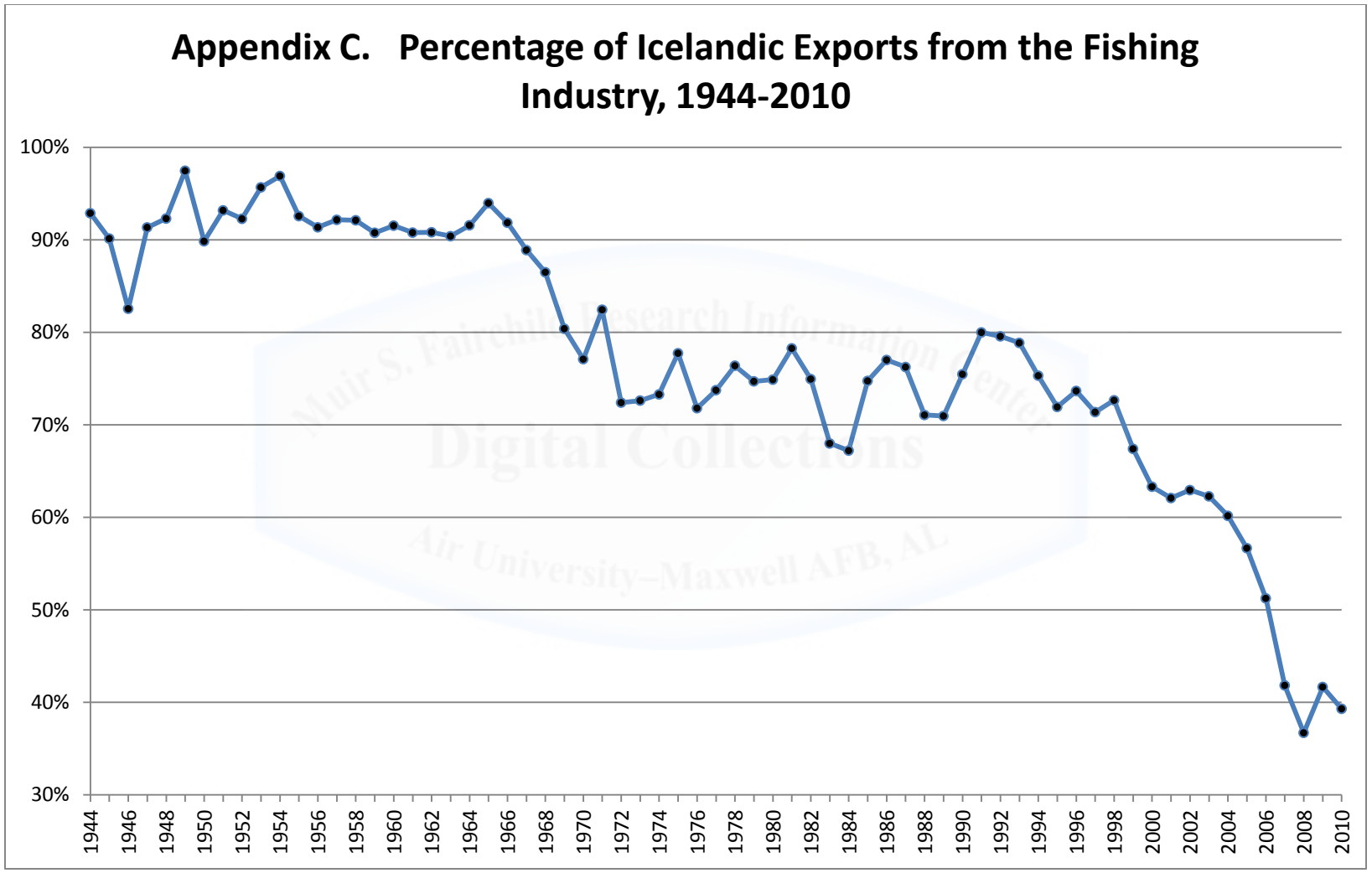


Data Source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/fisheries-and-agriculture/World-Catch (accessed 1 May 2011).

Appendix B. Total Catch in Icelandic Waters, 1944-1976 (Tons)

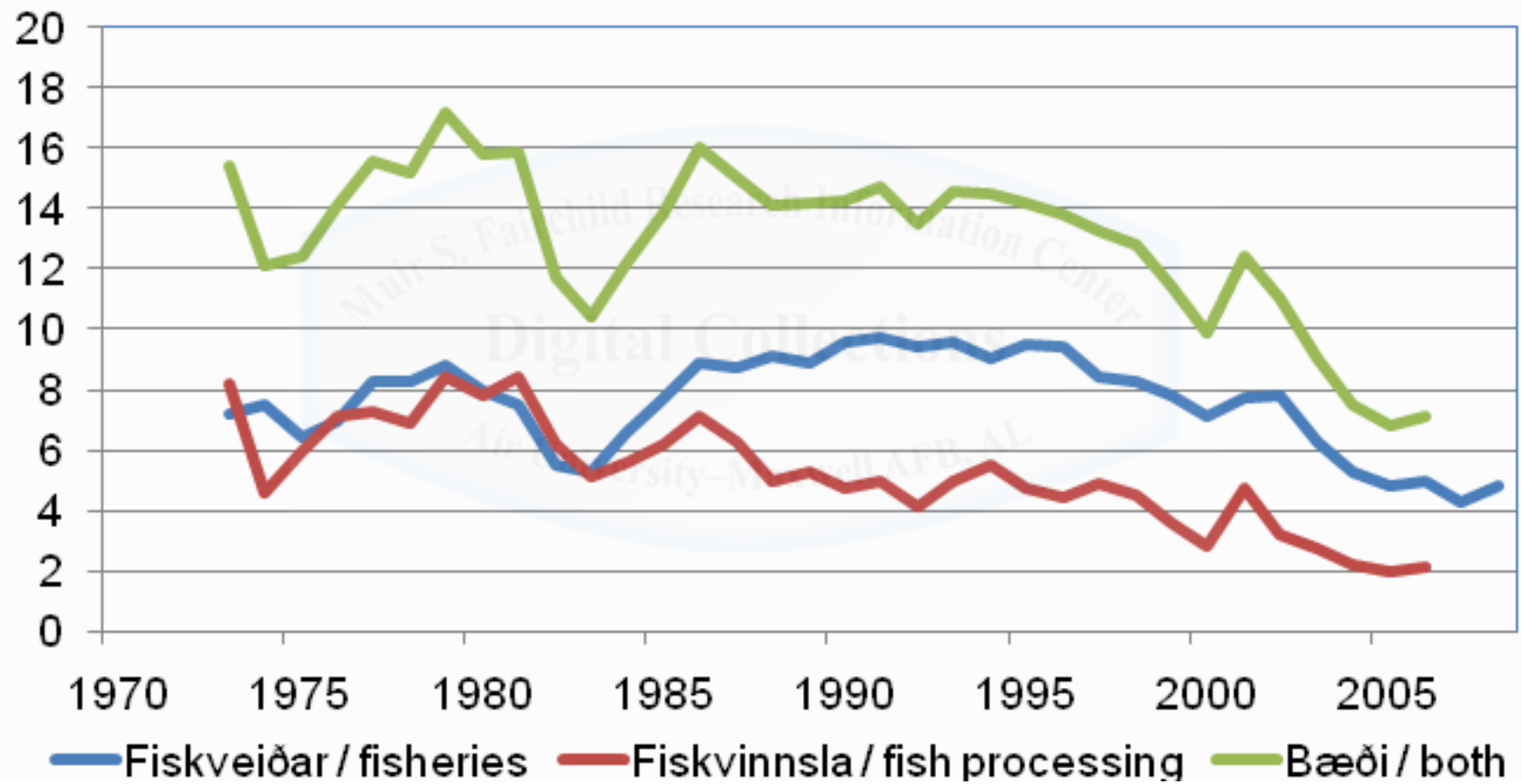


Adapted from Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/fisheries-and-agriculture/World-Catch (accessed 1 May 2011).



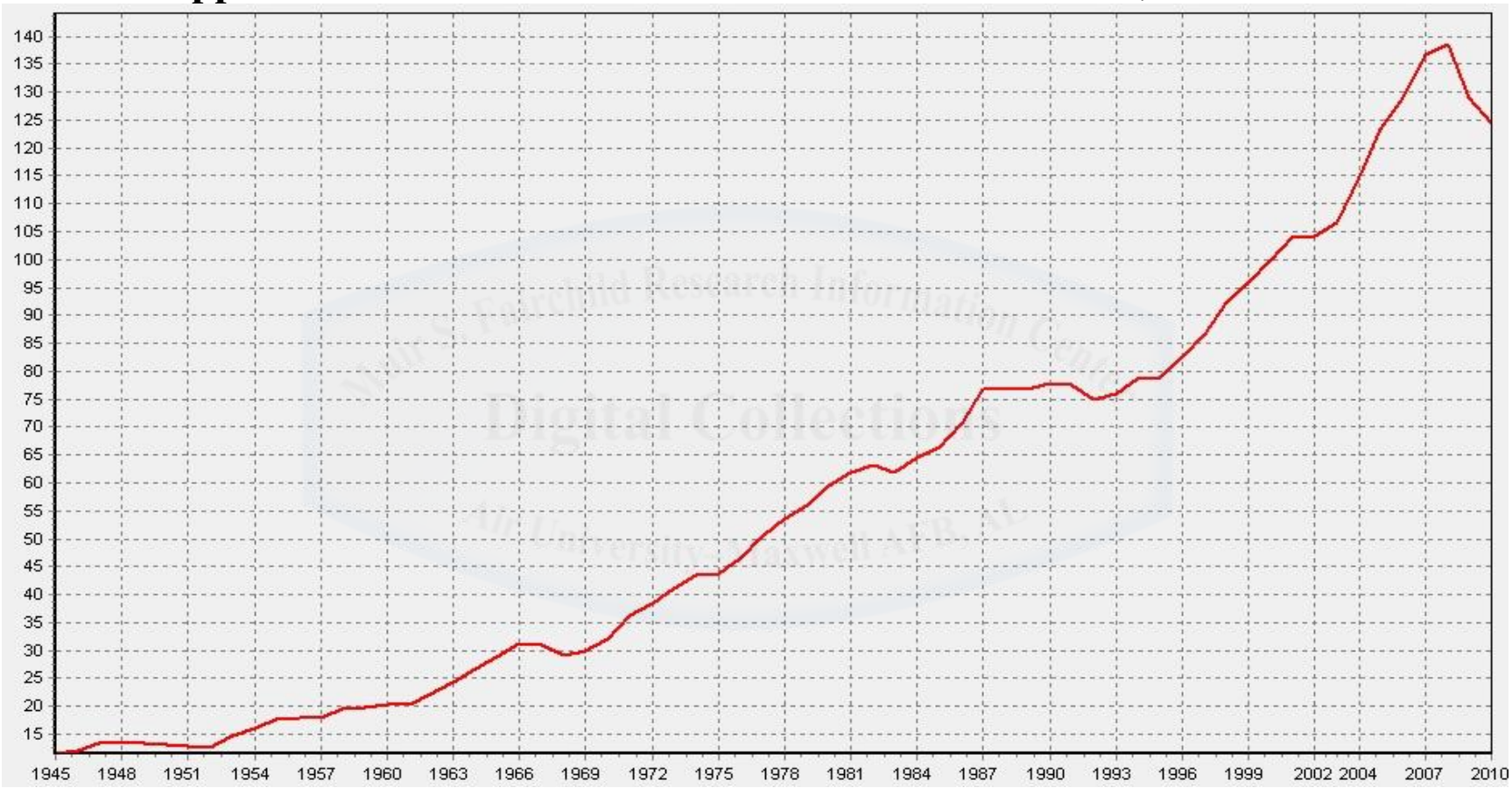
Data Source: Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/External-trade/Exports (accessed 1 May 2011).

Appendix D. Percentage of Icelandic GDP from the Fishing Industry, 1973-2007



Adapted from Icelandic Ministry of Fisheries and Agriculture, http://www.fisheries.is/media/skjal/graph/9-gdp-(g)-fisheries-persentage-of-total-(statice).png (accessed 1 May 2011).

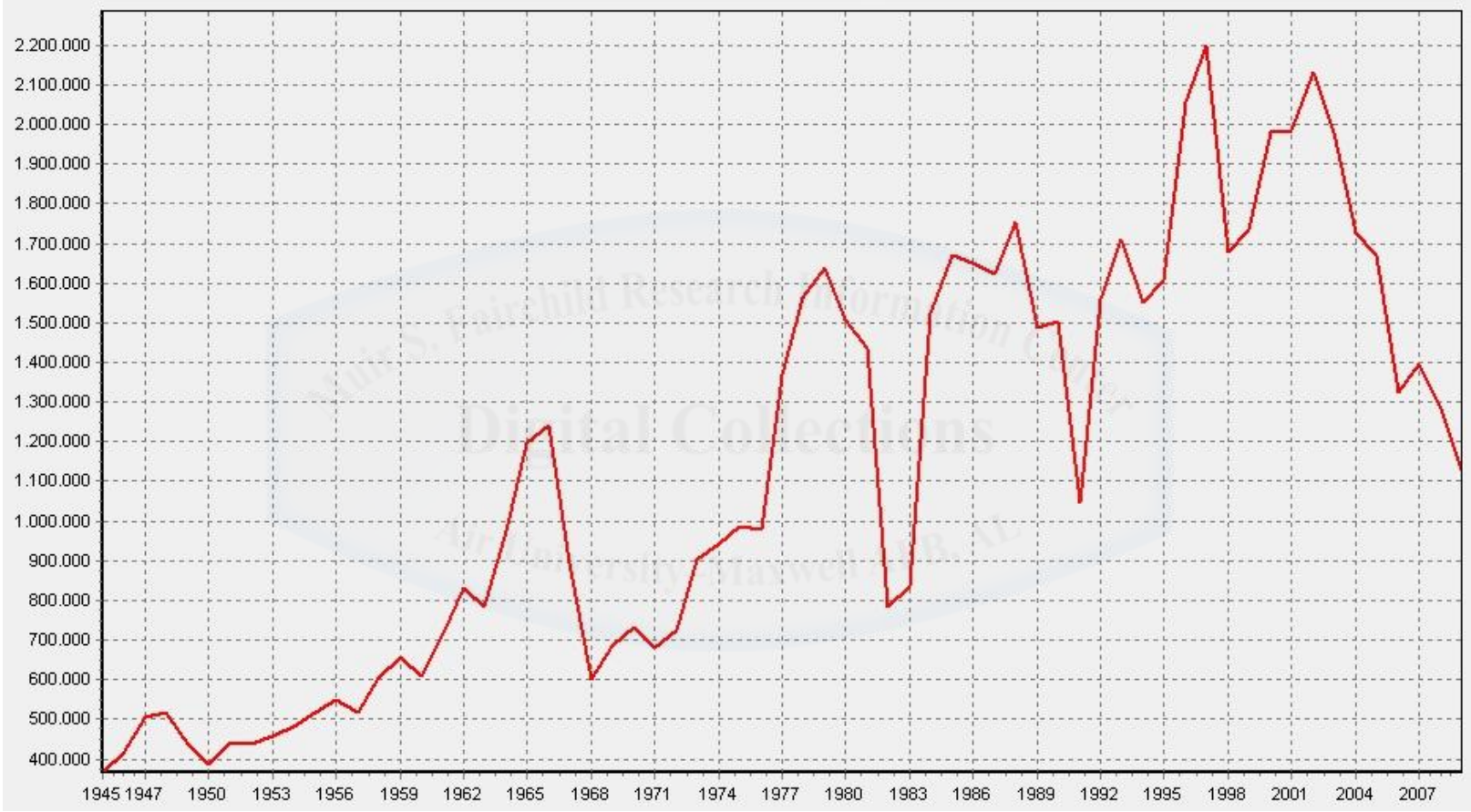
Appendix E. Icelandic Gross Domestic Product Index, 1945-2010



Note on Index: 2000 = 100.

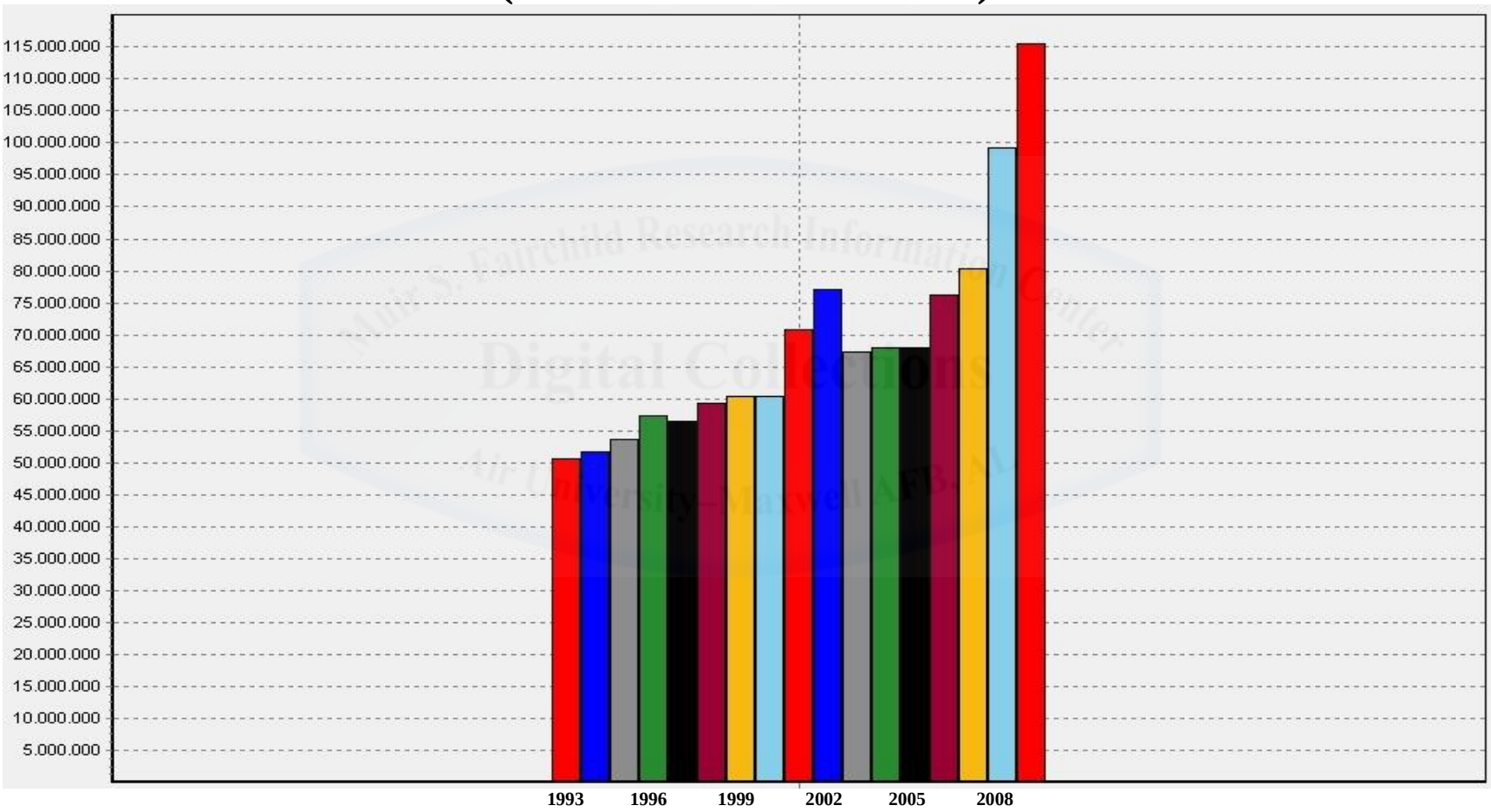
Adapted from Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/National-accounts-and-public-fin/National-accounts-overview (accessed 1 May 2011).

Appendix F. Catch of Icelandic Vessels from All Fishing Areas, 1945-2009 (Tons)



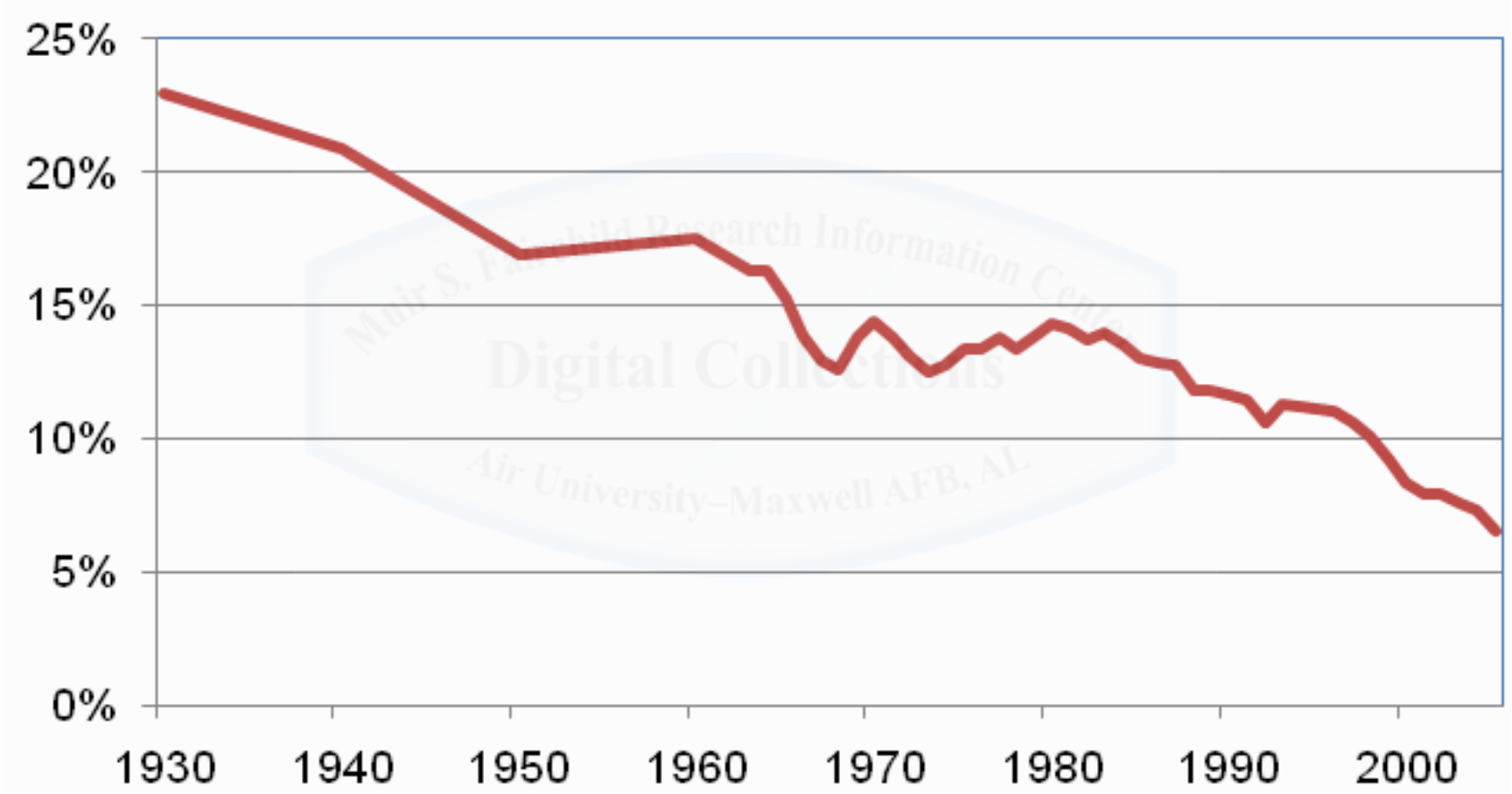
Adapted from Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/Fisheries-and-agriculture/Catch-and-value-of-catch (accessed 1 May 2011).

Appendix G. Catch Value of Icelandic Vessels from All Fishing Areas, 1993-2009 (1000s of Icelandic Kronur)



Adapted from Icelandic Government, *Statistics Iceland*, http://www.statice.is/statistics/Fisheries-and-agriculture/Catch-and-value-of-catch (accessed 1 May 2011).

Appendix H. Percentage of Icelandic Work Hours Attributable to the Fishing Industry, 1930-2006



Adapted from Icelandic Ministry of Fisheries and Agriculture, http://www.fisheries.is/media/skjal/graph/9-employment-(g)-percentage-in-fisheries-(statice).png (accessed 1 May 2011).

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