The Evolution of an Idea and an Institution: The Progress of the Army Corps of Engineers in Ecosystem Restoration and Cultural Change in the Florida Everglades

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Abstract

Large-scale ecosystem restoration came to national attention with passage of the Comprehensive Everglades Restoration Plan ten years ago. The lead federal agency implementing the plan, the Army Corps of Engineers (Corps) has long been criticized for its environmental practices in traditional mission areas such as flood control and wetland fill permitting. But the new mission of ecosystem restoration represents in many ways a departure from those "old" lines of work, both in terms of skills and objectives and in the constitutive process of decision making.

The culture of an agency is deeply engrained, and slow to change. However, a more adaptive institutional culture will provide increased opportunities for positive environmental outcomes via a constitutive decision-making process that is oriented towards the common interest of humans and ecosystems. I sought evidence of such a cultural shift by interviewing fifty individuals involved in the field of Everglades restoration and assessed their attitudes regarding the Corps and its progress towards both cultural change and restoration. The results of interview analysis paint a picture of an agency gradually adapting to its new mission of environmental restoration, but confined primarily to the district level. The Jacksonville district is gradually learning to balance a wide variety of competing priorities and political tensions as it seeks to restore the Everglades to a healthy and productive ecosystem. However, they may not be making such changes quickly enough to succeed in restoring the greater Everglades ecosystem, and I did not find substantial evidence that these shifting attitudes and expectations have yet more than superficially filtered out to other branches, missions, or districts within the Corps.

To my parents and brother, watery adventure companions.

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Contents

Glossary

§404 Section 404 of the Clean Water Act, grants the Army Corps authority to review permits for the filling-in of wetlands for development. Authority is shared with the EPA and stems from the constitutional definition of "waters of the United States" over which the Corps has regulatory jurisdiction.

8.5SMA The 8 1/2 square mile area was a parcel of privately-owned land just to the northeast of Everglades National Park that planners intended to purchase for restoration project purposes but whose residents refused for years to sell.

ACF Sabtier's Advocacy Coalition Framework.

ASA Civil Works The Assistant Secretary of the Army for Civil Works is appointed by the President to advise and supervise the Army Corps' directorate of civil works regarding administrative priorities and policy.

ASR Aquifer Storage and Recovery is a controversial part of CERP that envisions injecting fresh water deep into the aquifer for storage (rather than flushing it out to the coasts for flood control purposes) and later recovering it for use by the ecosystem or humans.

CEQ White House Council on Environmental Quality.

CERP Comprehensive Everglades Restoration Plan. Authorized by Congress in the Water Resources Development Act of 2000.

CSF The Central and Southern Florida Flood Control Project began in the 1940s when President Hoover directed the Army Corps to drain the northern Everglades for public safety and agricultural development.

CWA Clean Water Act.

Decomp Short for "decompartmentalization," a restoration project designed to return natural sheetflow to some of the areas of the Everglades where it has been fragmented by flood control and water storage structures and reservoirs.

DOI Department of the Interior. Manages Everglades National Park.

EAA Everglades Agricultural Area. Just south of Lake Okeechobee, this profitable area is planted in sugarcane, corn, and citrus and is protected from flooding by the Herbert Hoover Dike around the Lake.

EG Everglades.

EIS Environmental Impact Statement.

ENP Everglades National Park.

EPA US Environmental Protection Agency.

ESA Endangered Species Act.

FACA Federal Advisory Committees Act.

FL DEP Florida Department of Environmental Protection.

FL FWC Florida Fish and Wildlife Commission.

FWS US Fish and Wildlife Service.

GAO US Government Accountability Office.

GEER Greater Everglades Ecosystem Restoration conference.

JAX Jacksonville District of the Army Corps of Engineers. Manages water resource projects in Florida and the Antilles.

MAP Monitoring and Assessment Plan for CERP.

Mod Waters Modified Waters Delivery Project. A pre-CERP restoration project designed to improve the water flow to Everglades National Park.

NAS National Academy of Sciences.

NEPA National Environmental Policy Act.

NOAA National Oceanographic and Atmospheric Administration.

Glossary

NPS National Park Service.

NRC National Research Council.

P&G Principles and Guidelines for Water Resources Development. Issued by the White House Council on Environmental Quality and interpreted by Army Corps policy staff to guide project implementation.

PIRs Project Implementation Reports.

QQTD Water "Quality, Quantity, Timing, and Demand." The shorthand mantra used by many in South Florida to describe the goals of restoration.

RECOVER Restoration Coordination and Verification program of CERP.

Restudy The Army Corps was commissioned to do a "Restudy" of the Central & Southern Florida Flood Control Project from 1996–1999, which resulted in the CERP.

ROG River of Grass. Shorthand for Florida's plan to buy out US Sugar Corporation and use land in the EAA for Everglades restoration.

SFWMD South Florida Water Management District.

SLR Sea level rise due to climate change.

SSR System Status Reports.

TT Tamiami Trail.

UNESCO United Nations Education, Scientific, and Cultural Organization.

USACE US Army Corps of Engineers.

USGS US Geological Survey.

WRAC Water Resources Advisory Commission.

WRDA Water Resources Development Act.

Yellow Book Nickname for the published version of CERP.

1

Introduction

The Army Corps of Engineers manages most of the water resources infrastructure of the United States. The agency originally received its jurisdiction as a security concern, and later concentrated on providing economic value via aids to navigation and safety via flood control. Over time, however, many of its structural solutions to water resource challenges have been shown to have undesirable environmental consequences, and the Corps has been pressured to take ecosystem health into account when it pursues its traditional mission areas. In response to this pressure, the agency has taken on the additional mission area of ecosystem restoration, with the Florida Everglades at the fore. This thesis builds on the theory that an institution capable of performing ecosystem management will demonstrate a culture in line with the values of flexibility, adaptation, and responsiveness that are considered valuable in environmental management. If the Corps is truly becoming "greener" in response to external pressure, it will demonstrate such a cultural shift. This thesis seeks evidence of a cultural change primarily in the Florida Everglades as a case study at the cutting edge of environmental awareness within the Corps.

Section 1 introduces concepts related to the theory and practice of ecosystem restoration, the Everglades system, institutional culture and theories of change, and the structure of both the Army Corps and water resources management in the United States. Section 2 outlines the problem statement and research goals, section 3 describes the methodology of data collection and analysis, and section 4 describes the qualitative and quantitative results of analysis. Section 5 discusses the implications of and connections among results, and finally section 6 concludes the thesis and offers policy recommendations, as well as directions for further study.

1.1 The Evolution of an Idea

Ecosystem restoration has long been an environmental, political, and policy goal in densely-populated South Florida. Growth and development have injured the iconic Everglades via water abstraction, habitat loss and fragmentation, channelization and drainage, toxin and nutrient pollution, overharvesting of fish and bird species, the introduction of invasive species, and much more. Describing the destruction of the "River of Grass" in 1947, Marjory Stoneman Douglas predicted some of the challenge of restoration: "The Army Engineers have now taken the initiative...How far they will go with the great plan for the whole Everglades will depend entirely on the co-operation of the people of the Everglades and their willingness, at last, to do something intelligent for themselves" (1947, 385).

Following Douglas' clarion call, generations of Floridians have worked to save and restore the Everglades, using their powerful Congressional delegation to bring the issue to national attention. Major initiatives at the local, state, and federal levels eventually culminated in the 2000 authorization of the Comprehensive Everglades Restoration Plan (CERP)[1](WRDA, 2000). The Army Corps of Engineers (Corps), the lead federal agency for flood control and water resources management and the organization responsible for successfully draining the Everglades, drew up plans for restoration and was given the task of overseeing implementation of CERP (see figure 1.1 for maps of historic, current, and planned water flow in the Everglades). Armed with national approval and federal dollars, the Corps set about undoing its previous work and embarked upon a cultural change that its leadership called the "greening of the Corps" concurrent with Everglades restoration (Grunwald, 2000d). The past decade has been marked by political struggle to shape and implement the plan, with a diverse set of stakeholders deeply invested in restoration outcomes. Economic, ecological, climactic, policy, and fiscal pressures have shifted possible project trajectories in real time, generating uncertainties and ensuring surprises.

In the eleven years since CERP was authorized very few projects have concretely begun, making it difficult to measure true ecological progress towards restoration success. This thesis proposes that the procedural work done thus far by the Jacksonville District of the Army Corps may reflect new institutional priorities, directions, and structures that underpin cultural change within the ecosystem restoration branches of that District. However, the Corps controls large portions of the water resource infrastructure in the United States, and a true cultural change would reflect a detectable mission shift across the organization and at all levels of the leadership structure. This thesis finds preliminary results that indicate that such a shift is not yet occurring, and significant institutional barriers remain in place that prevent information sharing and policy learning across the agency.

[1]For all abbreviations and acronyms see the glossary on page vi.

1.1.1 Ecosystem Restoration

America is a land of second chances, where religion promises the opportunity to be born again and our frontier mentality and high mobility has long allowed individuals to start their lives over. The field of ecosystem restoration embodies that mentality, providing opportunities for engineers, scientists, and resource managers to right past wrongs and recover lost ecosystem services, functions, and other values. Attendant upon this view of nature, however, is a certain hubristic assumption that humanity is capable of reshaping the environment in our image—or, more positively, a pragmatic recognition that humans are and always have been part of and managers of the landscape (Gross, 2003). Logically, it follows that if we are able to make such dramatic destructive changes by developing and fragmenting nature, we should be able to fix it. However, the reality is often far more difficult, with one study in Massachusetts finding that the majority of constructed wetlands failed to meet state requirements for permit mitigation, and that none of the reviewed mitigation sites were able to restore the most highly-desired ecosystem type, forested wetland (Brown & Veneman, 2001).

The promise of large-scale restoration is often supported by the visible success of the Kissimmee River restoration, another Everglades project designed to put the bends back into a meandering river that the Corps had straightened for flood control. The straightened canal dumped nutrients and sediment into Lake Okeechobee at the northern end of the Everglades ecosystem, eutrophying the lake and destroying its native fish communities. "It is good to know that we can restore complicated wetland and riverine ecosystems as well as we can, but the compressed time frame of the Kissimmee restoration—the fact that the impoundments were barely dry before people began demanding their removal—tempers any belief that restoration is salvation" (Higgs, 2003, 68). It is always preferable and less costly to preserve and conserve rather than restore, especially if the initial destruction continues unchecked (Cairns, 1995, 2). The temptation is real to see successes in ecosystem restoration as a panacea for ongoing environmental destruction.

"By restoration we do not mean returning the system to the way it used to be, but rather renewing its vitality by reuniting the systems' functions" (Gunderson et al., 1995a). The Florida Everglades will never again be the "river of grass and sweet water that [has] given meaning and like and uniqueness to this whole enormous geography" as Douglas so lyrically described it (1947). The Everglades today are an experiment in massive ecosystem management, a multi-billion dollar risk with uncertain chances of success. With success will come the area's continuing ability to sustain a booming population. With failure, the consequences could be devastating to a unique ecosystem and "economically there is a whole bunch of South Florida that's not going to survive if we don't do this" (Collins, 2000). Overland freshwater flow in the Everglades recharges the aquifers that sustain South Florida's population and agricultural industry, modulates dry season fire risk, holds back the saltwater that threat-

ens to penetrate aquifers with sea level rise (SLR), supports fertile fishing grounds in Lake Okeechobee, Florida Bay, and other estuaries, and underpins the wealth of a community that relies heavily upon recreation and tourism.

The provision of these ecosystem services exists uneasily as a goal alongside the ideal of a return to historic conditions. Traditionally, the environmental movement has focused on historical conditions and ecosystem functioning as classic markers of restoration, while they have been able to make common cause with the business, development, and political communities by championing projects that promise the provision of ecosystem services for human use. A return to a past reference point is both acknowledged to be an impossibility and, for many people, an emotional goal that is hard to separate from pragmatic reality.

1.2 The Evolution of an Institution

Through much of American history, wetlands have been considered useless at best and menacing, disease-ridden swamps at worst. As a result, for many decades national and local policy focused on draining or "reclaiming" them for agriculture and development. Epitomizing "authoritarian high modernism" (Scott, 1999) in its drive to simplify and structure the natural landscape, the Army Corps of Engineers has long participated in the destruction of wetlands under its traditional mandate to protect and facilitate navigation in the nation's waterways and provide flood control. With the rise of ecology as a scientific discipline this conception began to shift, and the current scientific consensus is that wetlands are extremely valuable to ecosystem health and for human use. We now have regulations to preserve wetlands, even on private property, and a national policy of "no net loss" under the Clean Water Act that requires developers to replace or "mitigate" destroyed wetlands with preserved or restored ecosystems elsewhere.

The Corps is a largely civilian-staffed agency directed by the Department of the Army that has long been responsible for the maintenance of navigation in our nation's waterways. Under section 404 of the Clean Water Act (CWA), it was granted authority in conjunction with the Environmental Protection Agency (EPA) to administer a permit system for development in sensitive wetlands. In practice, the Corps approves the vast majority of the development permits it considers, especially in Florida, leading to continuous wetland habitat loss in small parcels (Pittman & Waite, 2008). The EPA rarely vetoes §404 permits because "state officials [approve] the projects," and almost never exercises its oversight power (Pittmann & Waite, 2005).

In addition to its role in managing the wetlands development permit system, the Corps is also now the lead agency managing several large restoration projects at the behest of Congress and state governments. Two notable projects, both in Florida, are the ongoing CERP as well as the Kissimmee River restoration, widely considered a success and an im-

portant factor in the Corps' new conservation-friendly image (Layzer, 2008). In 2001 the National Academy of Sciences (NAS) found that the Corps had a "a systemic bias in favor of large-scale construction" (Grunwald, 2001), which makes sense considering that until the 1980s, most of the Corps' work had involved draining, diking, and dredging. The agency was known for large pork-barrel projects authorized by legislators to bring jobs to their districts that often included inflated benefit assumptions and inaccurate cost-benefit analyses (Grunwald, 2000a). Many have called for "Corps reform" over the past decade to address these and other perceived problems, but no significant external restructuring has taken place (Carter et al., 2005). The Corps did reorganize its leadership structure along mission-based business lines rather than geographically, and contends that additional reform is not needed because of this structural clarification and the addition of ecosystem restoration as a business line and goal (Carter et al., 2005).

These restoration projects are extremely complex, landscape-scale ecosystem interventions with enormous amounts of uncertainty due to the tremendous scope of the systems in question and the difficulty of correctly predicting outcomes involving biology, geology, hydrology, climate change, and human ecology. This complexity and uncertainty drives up costs by requiring more complicated modeling and planning and more extensive construction, and makes flexibility and adaptability in management essential. The prospects for real restoration in any large ecosystem are limited by the planners' necessarily imperfect knowledge of what a goal or endpoint might look like, and by the impossibility of fully restoring a system that has simply lost much of its natural land area and buffering capacity (Doyle & Drew, 2008). The Corps, however, has determined that it is capable of such restoration following several large studies, in particular the Comprehensive Review Study of the Central and Southern Florida Project (known as the "Restudy," this report forms the basis of CERP) (USACE, 1999). Outside researchers, reviewing site-based plans and projects based on such criteria as economics (Weisskoff, 2005), adaptive management (NRC, 2004), adaptive governance and learning (Folke et al., 2002; Gunderson & Light, 2006; Gunderson et al., 1995b; Kiker et al., 2001), and historical precedence (Grunwald, 2006) have found mixed evidence that the Corps will be able to achieve its ambitious goals in the Everglades, and, by extension, elsewhere in the country.

1.2.1 Army Corps History and Structure

The Corps is the oldest federal agency in the nation, founded during the Revolutionary War to build roads, bridges, and fortifications for the Continental Army. It added civilian and commercial water infrastructure development to its military mission in 1819 and took on an important regulatory role in administering the Clean Water Act in 1972 (USACE, 2007b). Today, the agency has six "'business lines': deepwater harbors, inland navigation, coastal

protection, flood protection and innovation, hydropower, and aquatic ecosystem restoration" (Salt, 2010). These business lines are commonly referred to as "missions," but the overall official mission of the agency currently is to "Provide vital public engineering services in peace and war to strengthen our Nation's security, energize the economy, and reduce risks from disasters" (USACE, 2011b). Not only does the Department of the Army see the nation's harbors and waterways as strategically important, the Corps supports commerce in the form of barge shipping and is able to keep its military engineers and leadership employed on domestic projects between deployments. Corps leadership is composed of a complex intertwining of civilian and military officials, ensuring both presidential support via civilian appointments and consistency in leadership due to recruitment from within (Clarke & McCool, 1985).

1.2.1.1 The Jacksonville District

In 2008 the NAS expressed disappointment in the progress of Everglades restoration to date (NRC, 2008), but since then several factors have increased the rate of construction progress and provided reason for optimism to those engaged in restoration, in particular the engagement and full funding of the federal government (NRC, 2010, 51-53). In 2007, a high-level directive from Corps led to a reorganization of the Jacksonville district in a "reset" that moved the CERP and other restoration management branches into the newly formed Everglades Division. Previously, a Restoration Program Branch under the Planning Division housed four different aspects of restoration management: South and Central Florida restoration, the Restoration Coordination and Verification program (RECOVER)[2], and Restoration Programs Management, with CERP housed under the Constructions-Operations Division (NRC, 2004, 39). The 2007 "reset" was considered by Terrence "Rock" Salt, at the time Everglades policy advisor to the Department of the Interior and former Jacksonville District Engineer, "to be the next step toward the agency becoming more environmentally friendly" (Cox, 2007). This reset "enabled the cultural change [in the Jacksonville district]...[by] co-locating teams" working on all aspects of Everglades restoration rather than having employees on different program areas separated by hallways, floors, or counties (Ulrich, 2010).

Project managers, engineers, planners, and biologists who work on Everglades-related projects, including pure infrastructure efforts like the restoration of Lake Okeechobee's Herbert Hoover Dike, are now all co-located in the Jacksonville office in the Everglades Division. Despite the synergistic benefits conferred by the 2007 reorganization (the last of several since CERP authorization), the regulatory division is still separate from restoration programs and, according to numerous interviewees, has minimal contact with restoration staff members or coordination with restoration objectives. As of 2004, "with the exception of the Socio-Economics Branch in the Planning Division, the social science expertise that could

[2]For all abbreviations and acronyms see the glossary on page vi.

help address issues related to Florida's rapid population growth is limited. Biologists are still based primarily in the Regulatory Division, although they also have a presence in the Planning Division" (NRC, 2004, 39). This dearth of biologists was also noted by several interview respondents to this research, who compared the district's biology capabilities unfavorably to those of the state agency, SFWMD.

1.2.2 Institutional Culture and Change

Following Peterson & Spencer (1990), I define institutional culture generally as "the deeply embedded patterns of organizational behavior and the shared values, assumptions, beliefs, or ideologies that members have about their organization or its work" (as quoted in (Kezar & Eckel, 2002, 437)). By its very definition, however, culture is hard to spot—assumptions, beliefs, and ideologies are generally deeply rooted within the unspoken structures of an organization. Organizations often invest effort in developing a mission and vision that reflects its values, but the other, deeper components of culture tend not to be identified until one has "transgressed [their] bounds and severe conflicts or adverse relationships ensue" (Tierney, 1988, 4). Tierney defines a six-part framework for making organizational culture explicit which, once identified, can be more deeply studied: external environment, mission, socialization, information, strategy, and leadership (1988, 8). This framework presents a static lens for viewing institutional culture, and so to understand how such a culture might change one must bring a framework such as Sabatier's Advocacy Coalition Framework (ACF) (1988).

ACF characterizes policy "systems" (such as water resources management in the United States) which can be broken up into "subsystems" (such as Everglades restoration under the Corps of Engineers). Actors within any system are motivated by fundamental values and beliefs and make policy decisions within the subsystem that reflect those values. Primary values are deep-seated, core beliefs that change over a decadal time span (if at all) and may consist of fundamental views on such things as the appropriate role of the federal government in society. "Policy core" beliefs are manifestations of deep core beliefs, such as how highly protection for endangered species should be prioritized in policy-making. Finally, secondary aspects of a value system relate to the specific ways that decisions are made—it is these secondary beliefs that are most open to change and persuasion, and often compromise or deal-making does not alter values above this level. Actors form coalitions with other entities who hold similar values, and work together to improve the policy subsystem in line with those values in a process called "institutional learning." The learning process consists of making decisions and compromising and realigning secondary and policy core beliefs towards the goal of attaining outcomes that manifest deep core beliefs. An organization's deep core beliefs generally do not change unless the system is shaken by a strong external force, for instance the rise of environmentalism and the incorporation of younger, greener professionals into the

Army Corps. (Bennett & Howlett, 1992; Sabatier, 1988; Sabatier & Brasher, 1999)

While the Tierney and Sabatier frameworks provide a theoretical understanding of culture and how it changes, policy science allows one to ask specific questions about myth-making, power relationships, and the nature of the constitutive decision-making process (Clark, 2002). For instance, the Corps is a proud and confident organization, with its motto "Essayons!" (French for "Let us try") and its leadership exhortations towards "Deeds, not words!" (Brig. Gen. Schroedel, 2007) indicating a rootedness in a sense of power and a desire to make things happen. These are deep core values that have led to a set of policy decisions to stabilize and reduce variability in nature, particular with regards to flooding (NRC, 2004, 4).

With the ground-breaking Congressional incorporation of adaptive management (Holling, 1978) into CERP (NRC, 2004), many have assumed that the Corps would be able to adapt this resilience-based theory into its management of water resource restoration objectives (ibid.). The difficulty of implementing adaptive management on a large scale in a complex socio-political system has been demonstrated in the Everglades (Boesch et al., 2006) and may reflect an inherent mismatch between the flexibility of adaptive management and the size and mixed histories of federal bureaucracies (Light, 2006). If anything, South Florida's boom-and-bust development history has imparted such a high degree of socio-political resilience to the associated federal agencies that they have lost their capacity to truly change in the ways required to impart some ecological resilience to the natural system (Zellmer & Gunderson, 2008).

Much of the rhetoric with regards to the evolving work of the Corps towards more environmentally-beneficial outcomes stresses the external environment (e.g., Congressional directives), mission, and leadership. However, this view of change within the institution prioritizes external factors at the expense of internal ones. While strong external perturbations are often needed to shake up a system and push it towards a new course (Sabatier & Brasher, 1999), the internal cultural groundwork must be well-laid for the change of course to truly stick. "Where strategies for change violate cultural norms, change most likely will not occur" (Kezar & Eckel, 2002, 456).

> Institutions certainly are influenced by powerful, external factors such as demographic, economic, and political conditions, yet they are also shaped by strong forces that emanate from within. This internal dynamic has its roots in the history of the organization and derives its force from the values, processes, and goals held by those most intimately involved in the organization's workings. An organization's culture is reflected in what is done, how it is done, and who is involved in doing it. It concerns decisions, actions, and communication both on an instrumental and a symbolic level. (Tierney, 1988, 3)

This thesis represents an attempt to explore the cultural norms of the Corps, especially

within the Jacksonville district, and document their evolution in this time of budgetary and environmental pressures.

1.3 The Everglades System

The historic Everglades make up only part of the Kissimmee-Okeechobee-Everglades system, extending 449 km north to south and 100 km east to west before human drainage (Light & Dineen, 1994, 51) (see figure 1.1 below). A product of South Florida's subtropical and peninsular geography, the flat wetlands complex would swell with water from north to south during the wet season, with the Kissimmee River draining central Florida and emptying into Lake Okeechobee. The Lake would gradually fill its banks and flow over its southern lip, forming the headwaters of the Everglades and generating a sheet of shallow water that flowed more or less evenly southward across the landscape. This sheetflow (which still exists over less spatial area today) is deeper in some places ("sloughs") than others, and is interrupted by highly diverse tree islands. Only a layer of non-oxidizing vegetative peat lies in between the surface flow and the underlying porous limestone topography, ensuring that the slow and steady wet season flow recharges the shallow aquifer.

The central Everglades is characterized by its extreme oligotrophy, with nutrient inputs coming almost exclusively from direct rainfall. Phosphorous concentrations in the predrainage water are estimated to have been particularly low[3], resulting in a vegetative system dominated by *Cladium jamaicense* (sawgrass)(Davis, 1994, 359). Today's levels of phosphorous and other nutrient inputs are much higher, resulting in selection for invasive species such as *Typha spp.* (cattails), which do not provide appropriate native habitat. This natural phosphorous number, 10 parts per billion (ppb), is now a legally binding target for some treatment schemes and has been the subject of substantial litigation (Sklar et al., 2005).

1.4 Looking Ahead

Besides its unparalleled biological diversity, recognized with a designation as a UNESCO World Heritage site (and listed on the UN's 'in danger' list for 2010), the Everglades is one of the largest marshes in the world (Schwartz, 2005, 280). The human-driven impacts of drainage and overdevelopment have drastically injured not only the natural functioning of the system and its inherent ecological values, but they have also threatened the viability of the ecosystem services that those functions provide to humans. The motivation for restoration is two-fold: first, to expunge the sins of overdevelopment and prove that it is possible to restore an endangered ecosystem to something like its former glory, and second, for the much more

[3] as little as $0.01mg * L^{-1}$

prosaic purpose of protecting the resiliency of a system that provides clean drinking water for an ever-growing human population. For example, the drained Everglades increases fire risk to nearby inhabitants and sheetflow recharges the already overdrawn aquifers. Additionally, climate change and the threat of sea level rise introduce tremendous risk and uncertainty into the process of restoration, guaranteeing that over CERP's 50-year timespan significant changes will need to be introduced into the plan to cope with these threats.

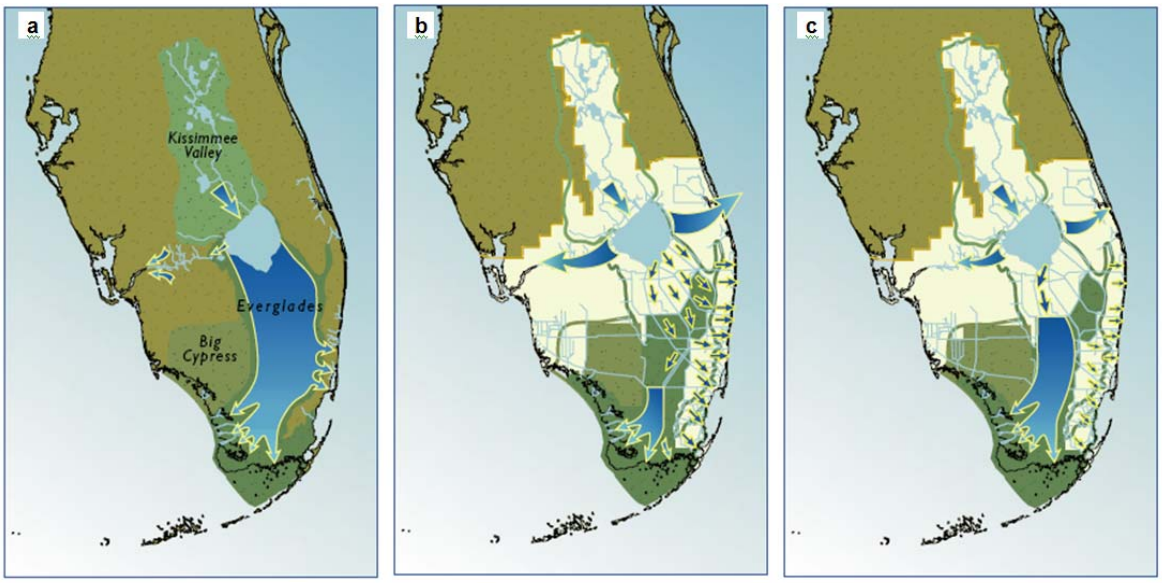

Figure 1.1: (a) Past, (b) present, and (c) planned restored flows of water through the Everglades (NRC, 2010, 22).

> The Corps of the future will not be the nation's dam-building agency as it was during the 1950s and 1960s...But the Corps will continue to operate a multi-billion dollar infrastructure that controls a large portion of the nation's hydrologic systems. The agency today is thus in a transition from a past, construction-based mode to a future, management-based mode. In a management-based setting, the alternative to proactive, science-based, collaborative water management is reactive management, with fixed policies and practices not designed for evaluation and change. The latter is likely to lead to organizational rigidity and increasing conflict. (NRC, 2004, 51)

Therefore, assessing the progress of restoration is about more than agreements signed, pump structures designed, or tieback levees constructed. If the Corps and its partner agencies hope to have a chance at keeping up with the continuously intensifying challenges of growth, development, hurricanes, and sea level rise, they must be flexible, adaptable, and fully committed to restoration. It is these qualities that I seek to assess in this thesis.

2

Problem Statement

2.1 Problem: Difficulties in Measuring Progress

How do you measure the progress of a large-scale ecosystem intervention meant to produce measurable ecological outcomes when, ten years in, there have been little to no concrete ecological changes? The Corps, the South Florida Water Management District (SFWMD), and their partners are aware of this issue, and have been addressing it largely from the standpoint of preparing solid scientific measures. The Restoration Coordination and Verification program (RECOVER[1]) has been supporting the development of performance metrics, including an extensive suite of ecological indicators[2]. The RECOVER team reports progress of CERP implementation and the overall Monitoring and Assessment Plan (MAP) in System Status Reports (SSRs). The team makes clear, however, that "as CERP implementation has just begun, the information provided in the 2009 [SSR] report assesses baseline information" (RECOVER, 2009).

Given the difficulty in measuring outcomes on the ground, how are the Corps and its partners doing on outputs (e.g., time and money invested, workshops and training sections held, staff hired, etc.)? Here, again, while extensive information is available on the topic in the form of annual synthesis reports, monthly progress reports, and meeting minutes and public hearings, it is a challenge to correlate these outputs with desired outcomes. Furthermore, when viewed through the lens of the policy process (Clark, 2002), the entire restoration project is a potent political myth-making activity, as well as a symbol of hope in addressing the destructive powers of humanity. The power and resources of the Corps in Florida and its ability to remain strong as an organization are dependent upon showing success in this

[1]For all abbreviations and acronyms see the glossary on page vi.

[2]Each of the following develops and presents baseline information for a different indicator: Boyer et al. (2009); Browder & Robblee (2009); Doren et al. (2009a,b); Frederick et al. (2009); Gaiser (2009); Harwell & Sharfstein (2009); Lorenz et al. (2009); Madden et al. (2009); Mazzotti et al. (2009); Trexler & Goss (2009); Volety et al. (2009)

new and ambitious venture of ecosystem restoration. Economically, politically, and psychologically, the people of Florida and the Army Engineers are heavily invested in this project. Therefore, while the National Academy of Sciences (NRC, 2006; 2003; 2008; 2010) and others (United States Government Accountability Office (GAO), 2007) have developed frameworks for assessing these outputs of human energy and investment, I submit that the progress of restoration and concomitant cultural change should be addressed and assessed at a deeper level, using such frames as the policy process and institutional learning, the experiences of those involved in restoration and the greening of the Corps, and an orientation towards the future that makes explicit the extremely high levels of uncertainty inherent in the CERP policy arena.

McCally (1999) laid out three socio-ecological goals for the Everglades restoration project, which apply to similar projects across the country: it should include a restoration of the complete hydrologic regime, a re-education of the public to include coastal and upland regions as part of the vision of the Everglades, and a political restructuring emphasizing political sustainability and the end of lobbyist domination. One way or the other, we must remember that an assumption underlying the entire project of ecosystem restoration is that the very concept of an ecosystem is a positivist, constructed concept defined by humans (Clark & Cherney, 2011). McCally's goals for restoration make explicit the distinctions between hydrologic functioning and human support and interaction, and this thesis does as well. Many professionals involved in ecosystem science and management operate at the level of ordinary decision making: they seek facts and make management decisions based on those facts. However, the constitutive decision making process is often a latent one, with decisions about who will manage and in what ways left to powerful actors or simply decided by default based on the long-term culture of an institution (Cashore, 2010; Clark, 2002). It is the evolution of this culture and its reflections upon the constitutive decision making process that this thesis addresses.

2.2 Research Goals

2.2.1 Assessing Progress of Everglades Restoration Ten Years On

Despite the preparation, described above, of baseline studies that will allow charting of progress in the future, few clear measures of ecological progress assess the eleven years since authorization of CERP. Additionally, while CERP is essential to restoration of the central heart of the Everglades, various other entities have undertaken numerous other Everglades restoration projects and initiatives.[3] Therefore, even among Everglades practitioners, it can

[3]For example: the State of Florida has fast-tracked eight non-CERP projects with the Acceler8 program; the 1994 Everglades Forever Act created the Everglades Construction Project and the Long Term Plan, as

be difficult to separate out Everglades restoration progress due to CERP and progress due to these other or prior initiatives. Furthermore, new challenges and surprises continue to appear, such as invasive species and new science on target nutrient levels. In light of this entanglement of project goals, I chose to address the broader issue of overall success in Everglades restoration, inclusive of but not limited to progress on CERP. The Corps is involved in many of the other projects and all the projects affect one another in various ways, so I focused on asking about the Corps' successes and challenges in restoration, whether or not within the context of CERP.

2.2.2 Assessing Progress of Cultural Change in the Army Corps

More than an examination of a specific ecosystem or project, this thesis is an analysis of the institutional culture of a large organization, focusing in on only one of its 45 districts in 9 divisions across the nation and overseas. As its leadership has made clear over time (USACE, 2003), the Corps sees itself as an agency transitioning to face a future of different priorities in cost control, deficit reduction, and ecosystem protection. The agency hopes to leave behind its image as "the nation's premier development organization...regularly denying the SFWMD the permits it needed to undertake Everglades restoration and...widely seen as impeding such efforts," and move on to a greater focus on ecosystem management (Layzer, 2002, 298-299). Oliver Houck writes that "the direction of the Corps is one of the classic enigmas of political science," and describes the agency entering

> a certain stage of schizophrenia. On the one hand, it attempted to justify these [Mississippi River sediment-laden water] diversion projects on the basis of the high values of coastal marshes. On the other hand, it continued to permit and construct projects that destroyed those same marshes, downplaying the very impacts it was up-playing for coastal restoration. (Houck, 2006, 1258)

(Grumbine, 1994, 34) points out that implementation of ecosystem management requires no less than a "seismic shift" in attitudes and mindsets, demanding of policy makers that they familiarize themselves with ecology and managers and scientists that they take the full extent of the public interest to heart. Ecosystem management is at bottom about the values that humans assign to ecosystems, and the Corps has a long history of "capitaliz[ing] both on...military and engineering mystiques" (Clarke & McCool, 1985, 10) to maintain its values of identity, power, and reputation. These institutional values sit at a far remove from the openness, flexibility, and protectiveness that may be called upon in ecosystem management,

well as several other initiatives; the Department of the Interior (DOI) and Corps are required to complete the Modified Water Deliveries (Mod Waters) project before some components of CERP construction can begin; the pathbreaking Kissimmee River restoration is still ongoing; then-Governor Charlie Crist in 2008 announced a deal (the River of Grass initiative) to purchase large tracts of land in the Everglades Agricultural Area (EAA) from the US Sugar Corp. for water treatment and storage; and the EPA has recently been drawn into enforcement activity related to nutrient pollution standards.

but conversely are the very values required to maintain the existence and strength of the organization (Scott, 1998). With the historic culture of the agency opposed in many ways to the needs of ecosystem management and adaptive governance, cultural change was not going to be easy—if it were ever to be truly attempted.

In 2000, reporter Michael Grunwald wrote a well-known series of articles in the *Washington Post* accusing the Corps of cronyism with developers, contractors, and Congressional delegations across the nation, an unreformable agency that freely manipulated its cost-benefit assessments and permitted extensive wetlands destruction while at the same time making declarations from the top that the agency was turning from "brown" to "green" (e.g., Grunwald, 2000b,c,d).

The legacy of "brown" was particularly problematic in the Everglades, where the Corps produced a propaganda film in the 1950s called *Waters of Destiny: Taming the Everglades* that described the agency's plan to "get the water in the right place at the right time" and handle the "vicious scourge of mankind...we had to control the water–make it do our bidding" (USACE, Late 1950s.). Today, the Corps' work in the Everglades represents the first ever Congressional authorization of specific funding for adaptive management in water resources policy, but according to the National Research Council "Adaptive management in [CERP] is currently more of a concept rather than a fully-executed management strategy" (2004, 58).[4]

Other observers and scholars continued to identify this tension within the competing priorities of the Corps. The Government Accountability Office reported that "there is little assurance that the Corps' [2007] revised sequencing plan, when it is final, will lead to a CERP project implementation plan that will provide restoration benefits as early as possible and in the most cost-effective manner" (GAO, 2007, 7). Gunderson noted in 2006 that "the [Everglades restoration] management system is trapped in a structure that is not only resistant to change, but able to withstand change" (Gunderson & Light, 2006, 324). That same year, Grunwald published an account of Florida's relationship with its ecosystem, *The Swamp*, that has influenced public thinking on the issue. He quoted a Jacksonville district leader, Richard Bronner, describing his work in the 1960s on the C&SF as "'You didn't join the Corps because you wanted to save the earth...you joined the Corps because you wanted to build something'" (Grunwald, 2006, 251). In Grunwald's damning and lengthy assessment, today "the agency is still unrestrained and unreformed" (Grunwald, 2006, 373). Examining the wetland permit process in Florida rather than restoration, two St. Petersburg reporters, Pittman and Waite, came to largely the same conclusion in 2009: beholden to developers and under pressure to process permits, the Corps is like "a convoy of truckers driving across

[4]Since 2004, the Corps and the South Florida Water Management District have worked to address this failing in the use of adaptive management by reviewing procedures and publishing implementation documents (e.g. RECOVER (2010)). The National Academy of Sciences recognized progress on this front in 2010, but found room for improvement in "put[ting] theory into practice" (NRC, 2010, 202).

country with no map or compass. They had no clue where they were going or where they had been. But they would never stop for directions. That might slow them down." (Pittman & Waite, 2008, 138).

Grunwald and Pittman make these comments on institutional culture within the frameworks of much broader treatments of Florida environmental issues, and do not focus primarily upon the cultural issues that Grunwald first identified in his *Post* series. Gunderson and other longtime Everglades scholars primarily examine the management regimes and program implementation. My primary research goal falls in between these perspectives, as I seek to assess explicit perceptions of culture, goals, progress, collaboration, and environmental orientation among restoration practitioners working on the ground, in task force meeting rooms, or in the halls of Congress today. While leaders and policy makers may promise reform or cultural change, that change is only truly valuable in terms of environmental outcomes if it reaches the level of implementation and decision making.

For this thesis I sought evidence of cultural change and institutional learning and transition at multiple levels throughout the Corps, partner agencies and organizations, advocates, and outside or retired observers. I pursued a qualitative, interview-based research strategy in order to fully include a diversity of perspectives and to provide opportunities for those engaged with restoration on a day-to-day basis to describe their work and interaction with the Corps.

2.3 Hypothesis

Given that practices influenced by the traditional culture of the Corps have often led to negative environmental outcomes, a more adaptive institutional culture will provide increased opportunities for positive environmental outcomes. This cultural change may eventually influence all aspects of the Corps' missions, but it seems likely to manifest itself first in those districts and teams working most intensively on environmental issues—in particular, the Jacksonville district, home to the Everglades Division and CERP. This thesis explores whether evidence of this cultural change can now be detected—and what might need to be done to further the new ecological mission of the Corps of Engineers.

3

Methodology

3.1 Rationale

The previously discussed difficulties in measuring ecological progress towards Everglades restoration make it infeasible to test my hypothesis that a more adaptive institutional culture will result in improved environmental outcomes. However, it is possible to examine whether or not the sort of change that would underly such a transition to a more adaptive institutional culture is occurring. While others have taken up the challenge of measuring progress in the overall Everglades restoration project (GAO, 2007; NRC, 2003; NRC, 2006; 2008; 2010) and in the use of adaptive management in water resources development (NRC, 2004), I chose to focus specifically on the question of cultural adaptation and change given the external forces driving the Corps to work on restoration and environmental protection. To assess this cultural change, I sought out and interviewed members of the Corps at both the Jacksonville district and national levels, members of partner organizations in Florida and in Washington, DC, and journalists, academics, and agricultural interests who have a stake in restoration. By conducting lengthy (hour-long) interviews and asking open-ended questions, I gave respondents the opportunity to describe their thoughts on the Corps of Engineers honestly and comprehensively.

3.2 Data Collection

I collected data by conducting 50 extensive interviews with reporters and authors, employees and leaders of the Corps and other local and national agencies, restoration workers, contractors, and scientists, businesspeople, and local citizens and advocates. I located respondents via two techniques:

- Snowball sampling, with several key informants playing essential roles in pointing me

towards additional research participants; and

- By reaching out to all the members of an inter-agency policy group, the South Florida Ecosystem Restoration Task Force, and requesting interviews from task force members or colleagues within their agencies.

I reached out to participants via email, mail, and phone, and scheduled 45-60 minute semi-structured interviews between April and September 2010. Most (~ 30) interviews were conducted via Skype and the remainder were conducted on three field visits—one each to Washington, DC, Jacksonville, and Miami, FL. I triangulated[1] the interview responses with an extensive literature review and agency document research. I recorded and transcribed interviews when possible (with subjects' consent), and carefully notated them when transcription was not possible. Table 3.1 lists the interviews conducted by category affiliation.

Interviewee Category		**n**
USACE		16
All Non-Corps		34
	Non-Corps Subcategory	
	Federal–Other	7
	State of Florida	11
	Academia	3
	Environmental Organization	6
	Tribal	1
	Agriculture	2
	Other	4

Table 3.1: Interviewees by category

3.2.1 Interview Procedures

I conducted in-person interviews in a location of the participants' choosing, often in his or her office but occasionally in the field or at a cafe. I asked six questions consistently of all participants (Q1-Q6) and seven additional questions depending on available time and applicability of the question to the particular respondent. I varied the wording of questions somewhat as the style of the interviews was semi-structured and conversational, but the general template I used for questions is as follows:

Q1 What is your vision of success in Everglades restoration?

Q2 What, in your opinion is the Corps' vision of success in restoration?

Q3 How do you measure progress towards success personally and/or professionally?

[1] Triangulation refers to the process of supporting qualitative results with multiple sources of data.

Q4 Do you think success will be achieved? If so, when?

Q5 What are some examples of successes the Corps has achieved in restoration so far, either procedurally or on-the-ground?

Q6 What are some examples of challenges or failures the Corps has encountered?

Q7 What is the relationship of restoration to the 404 permitting process? [2]

Q8 How would you describe the day-to-day and long-term interaction among the various agencies involved in CERP?

Q9 How is science incorporated into the restoration planning and implementation?

Q10 How will the River of Grass/US Sugar purchase affect restoration plans? [3]

Q11 How is public input incorporated into planning and implementation?

Q12 How is adaptive management incorporated into planning and implementation?

Q13 Why, in your understanding, have restoration progress and the target completion date been delayed?

The interviews were generally conversational in style and tone, with the vast majority of respondents eager to discuss their work on Everglades restoration and provide balanced assessments of the Corps. In several cases interviewees introduced me to their colleagues within the office and I was able to immediately conduct additional impromptu interviews. One conversation took place entirely within the pickup truck of the biological manager of a major restoration site as we toured the site, another took place in an elegant waterfront hotel, and one was at the Pentagon. Phone interviews provided me the opportunity to take detailed notes in real time from afar, but in-person interviews enabled visual communication and a more personal relationship with respondents.

3.3 Analysis

3.3.1 Atlas.TI

I manually coded and analyzed each interview for themes and subjects (*codes*) using Atlas.TI qualitative analysis software. This database management tool allows the researcher to collect and organize textual data, classifying quotes and comments from each document and hierarchically organizing this classification in order to find trends and patterns. As a qualitative rather than a quantitative analytical process, coding allowed me to build connections

[2] The Army Corps has day-to-day responsibility for managing the permit process under Clean Water Act section 404(b), either permitting or denying the filling in of the wetlands under national jurisdiction.

[3] In 2008, Florida governor Charlie Crist announced a $1.75 billion plan to purchase 187,000 acres of land owned by the U.S. Sugar Corporation, the largest sugar grower in the Everglades Agricultural Area. Since that time, funding realities led to plans for the purchase being scaled back repeatedly, but a final agreement in August 2010 resulted in a contract for a $197 million purchase of 26,800 acres of strategic land with the option to later acquire the remainder (SFWMD, 2010).

in my understanding of the interview data, easily find, sort, and group quotes and response texts, and better interpret the output of the quantitative topic modeling process described in section 3.3.2 below.

I used reliability procedures such as verifying interview transcripts for accuracy, regularly comparing previously-coded data with emerging codes, and applying consistent search techniques to uniformly identify codes across documents (Creswell, 2009). As per Creswell (2009), I chose codes to describe characteristics and themes that emerged from the interviews, that were reflective of my expectations for responses given the literature and known issues regarding Everglades restoration,[4] and finally to reflect unusual or interesting trends that arose in some interviews. See Table 3.2 for a complete listing of codes used in Atlas.TI. I used several categories of codes, including:

- Broad responses to my questions
- Relationships and social structures identified by interview participants
- Subject-related codes, such as projects, water-related issues, etc.
- Policy issues and recommendations identified by participants

The coding process allowed me to organize my data and manually identify trends, easily find quotes, and get a general sense of my results. It allowed me to easily find relevant quotes and develop a framework for understanding the qualitative results and interpreting the topic model results, as described below.

3.3.2 Topic Modeling

To triangulate my qualitative results with unbiased quantitative evidence, I employed a textual analysis model that found which topics appeared with what probabilities within the response to each major interview question. The model generated a list of topics (shown in 3.3, along with descriptive names and categories based on my analysis of topic keywords) that are interpretable given my qualitative understanding of the interviews. Along with generating the topics themselves, the model outputs the probability that each topic appears in each analyzed document (in my case, the text of each interview response for each interviewee). This process essentially parallels the manual coding process described above but does so automatically, allowing me to glean insights and find relationships among ideas and respondents that I may not have previously noticed. Topic modeling does not replace qualitative analysis but rather supplements it, producing comparable quantitative results that can be assessed

[4] If a subject discussed issues such as nutrient treatment marshes, growth of invasive species due to increased phosphorous levels, and residual pesticides found in farm runoff, I might use my knowledge of the literature and known issues in the Everglades to categorize all of these subjects under the code "Water Quality."

Question Responses
Q1 Vision of restoration
Q2 Corps vision of restoration
Q3 Measure of Progress
Q4 Future of CERP/Restoration
Q5 Corps Successes
Q6 Corps Challenges
Q7 Relationship of Restoration to Permitting
Q8 Relationships among agencies
Q9 Science
Q10 River of Grass
Q11 Public Input
Q12 Adaptive Management
Q13 Delay

Projects
ASR
Decomp
Kissimmee
Mod Waters
Non-CERP projects
Picayune

Participants
ENP
Enviro groups
JAX
Media
Miccosukee
RECOVER

Issue Areas
8.5SMA
Agriculture
Cultural Resources
Development
Endangered Species
Fishing/Rec
Gulf coast oil spill
Rising Sea Levels/Climate Change
Tamiami Trail
Wading birds

Policy
WRDA
Congress
Corps Mission
Economy
FACA
Federal-State Relationship
Mitigation
Principles & Guidance
White House/ Administration

Water
Estuaries
Flooding/Flood Control
QQTD
Water flow
Water Quality
Water storage
Water supply

Process
Corps Culture
Accountability
Advisory Groups
Commitment
Complexity of Everglades Restoration
Complexity of USACE Process
Corps Authority
Corps Turnover
Cost share
Decision Making
Disagreement/Controversy
Engineered solutions to problems
Institutional knowledge
Lawsuits
Leadership
Money
Monitoring
Political Influence
Public awareness/attention
Uncertainty

Restoration
Ecosystem Functioning
Ecosystem Services
Getting the water right
Historic conditions
Nature, ideas of
Pre-human

Table 3.2: List of codes manually produced in Atlas.TI, organized by category.

without the challenges of researcher bias and inconsistency that are inherent to the manual coding process.

Using the topic modeling function of the MALLET software package, I processed the text of my interviews to find which words appeared in relationship to one another with high probability throughout each question response.[5] The MALLET toolkit (McCallum, 2002) incorporates latent Dirichlet allocation, which

> is a three-level hierarchical Bayesian model, in which each item of a collection is modeled as a finite mixture over an underlying set of topics. Each topic is, in turn, modeled as an infinite mixture over an underlying set of topic probabilities. In the context of text modeling, the topic probabilities provide an explicit representation of a document. (Blei et al., 2003, 993)

In other words, the model finds latent *topics* (as distinct from *codes* as discussed above),

[5]The model does not analyze stop words such as "and," "if," "the," "he," "she," etc.

which are made of words and probabilities. The number of topics may be constrained by the user (in my case, $t = 50$). Statistical topic models reduce researcher bias due to the unsupervised nature of the process. Unsupervised models do not require pre-coded training data for calibration: the researcher simply inputs the document text. Researcher bias may, however, be introduced as a human must examine and interpret the word clusters associated with each topic after model processing. (Anthes, 2010; Steyvers & Griffiths, 2007)

In many cases the topics produced by the model algorithm quite neatly parallel the codes that I defined manually. For instance, note that topic 27, *"Old" Corps*, is very similar to the code *Engineered solutions to problems*. Topic 5, *Congressional Funding*, has parallels in the codes *Congress*, *WRDA*, and *Political Influence*. Finally, the orientation of this thesis towards culture and process is apparent in both the topics and the codes, which each have great diversity and subtlety within the process- and policy-related categories and less within the issue area and ecology-related categories.

In chapter 4 I present and contextualize the quantitative and qualitative results of both analytical methods, and in chapter 5 I discuss their implications in light of my hypothesis.

#	Topic Name	Cat.	Topic Keywords
0	–	U	CERP problems folks district plan staff plans interior general northern EPA Corps cost parties looked judge southern DEP SFWMD
1	–	U	people things thought decomp flexible realize deal brought completed project controversy forever programmatic handle construction conference
2	General Goals	T	restoration ecosystem goals big supply means conditions focus historical defining won responsibilities functions maintain interests characteristics gonna JAX
3	Science-Based Goals	S	science targets model program based changed achieve constraints measure performance individual data target human pick models
4	–	U	people understand sit managers field biological everglades systems face made positions urgency subjective finished affects contributions
5	Congressional Funding	P	money funding WRDA time year congress authorized needed big passed authorization ready appropriations fast faster authorizations bill congressional
6	Research Funding	S	answers start research reason delay taking fighting policymakers extent fund contracts friends managers nutrients bought qual
7	–	U	work projects find regulatory part benefit places rest ways life biggest means restoring civil resource resolve basin greatest
8	Local Initiative	P	local clear things asked initiative priority rehab dike answer expected commission gvts manage ROG leave frustrated safety expectations
9	Scientific Understanding	S	monitoring projects understanding data building term important make scientific emphasis assessment struggle everglades expect produce uncertainty lot shift
10	Project Progress	P	review part project peer haven construction months approved report external NAS taking reqts reports takes single pending costs
11	–	U	involved glades coast place important action small structure responsible country operation amazing live completely business sediments
12	Ecology	E	system level ecological perspective result indicators levels works key increased required flow nutrient depends sea hydrology loading
13	National Corps Missions	T	env coastal protection LA structural wetlands mitigation marshes programs basis central groups primarily tough damage NOAA hurricane navigation
14	Community Decision-Making	P	making talk decision end make community table beginning processes lots meeting prevent highly factor meant
15	State Agencies/Resources	T	agency SFWMD agencies bring resources resource agree FWS engineer missions WMD NPS partner expertise orgs major
16	Politics	T	plan political happen lack thing deal lawsuit expensive changing office won perfect fight comprehensive constantly moved sign
17	–	U	move forward ground build set step fine knew realistic fact points staff push order potential national perfect
18	Project-Based Goals	P	restoration challenge projects working line ag years feel finish waters mod individual turn fed sense pre return vision
19	Procedural Effort	P	effort coming made major past worked local happening high partnership speak land forces governor procedures require provide growth
20	Historic Conditions	E	back system years parts times put restored flows lost question middle road difference quickly respond managed
21	–	U	change knowledge ground problem standpoint started dedicated monitor identified kinds completing designed managers defined distraction river

#	Topic Name	Cat.	Topic Keywords
22	–	U	things good job mgt ideas law largely end bad requirements guys NEPA care tension budget gonna figure
23	Process Delays	P	process lot years folks fix starting opinion couple earlier congress ways env put implement frustration processes hoping explain
24	–	U	projects study reservoirs development number opportunities place pilot flows hydrologic modeling feasibility recently florida management ecosystems lower seepage saving
25	Federal Projects	T	park bridge book called support congress built yellow wanted TT million problem letter beneficial miles Dade homes
26	River of Grass	E	land CERP storage EAA sugar treatment ASR acquisition lands flowway buy reservoir purchase piece concerned property legal tools complete
27	"Old" Corps	T	restoration engineering flood control mission point put side focused view Kissimmee function bunch solutions complex thinking week taxpayer institution
28	Federal Agencies	T	corps role DOI FWS army act share experts country led pulled simple contractor directed supposed atlantic fly trouble reps
29	–	U	big lot good goal person provide participation amount canals paralysis letting stop shows mile levees ESA adaptive fish average
30	Wading Birds/Wildlife	E	success measures birds wading leads bird bay areas fish meeting restoring dams impact nature GEER effects thought QQTD
31	Corps Leadership	P	project env engineers interest idea leadership natural huge call economic responsibility embrace straight dredging pressure mitigate
32	"Process" Process + Picayune	P	corps working CERP report picayune huge dealing talked conflicts work scale requirements breaking processes good guidance
33	Florida's Everglades	E	everglades FL restore continue river close florida grass half wet helps functioning hope run flora climate
34	Permitting	T	corps permits permit rock industry case permitting litigation district mining development area purposes wetlands politics EPA acres pollution
35	Planning Process	P	process planning difficult team analysis early built real good restudy approach interagency bringing problematic felt alternatives fit environmental
36	Science-Based Decision-Making	S	science scientists decisions task based group force don integrated questions makes learn make west information happen disagree rules
37	Water Quality	E	water quality natural lake south flow estuaries ENP solution north longer center structures harder clean Lucie maintaining
38	Organizational Learning	P	terms culture lot learned wrong necessarily organization define worked build collaboration interesting future side funded biggest cultural
39	–	U	project CERP years species started large design slow phase entire wildlife coordination partnership aware challenges critical indicator
40	Doubt and Difficulty	P	time long takes moving room direction head delays fairly doubt hard contentious reached legislature kind
41	Costs/Funding	P	project benefits put cost pieces added problem dollars ecosystem services happened key increment cases extra conflict schedule sell
42	–	U	policy kind stuff back plan real program implementation hear easy answer period document governance mix important numbers
43	–	U	state agencies fed federal gvt lead experience set basically sort figure WRAC problem give drainage difficulties Bush strong

#	Topic Name	Cat.	Topic Keywords
44	Technical Issues/Surprises	P	issues issue technical large place year mine eye finding plenty determine computer surprised thrown knowledge oriented meet
45	–	U	habitat species understand show islands measure tree specific told outcomes manage full creating lawsuits law ecosystem cypress
46	Project Construction	P	project area progress pretty picayune river construction Tamiami strand Trail made canal great site successes Corps capacity EIS
47	Positive Thinking	P	thing recover good great implemented idea locked projects status mgt entities influence rid basically represented respect
48	–	U	public meetings input FACA frustrating comment open opportunity stakeholder stakeholders involvement work PIRS taking teams drive changing discussion outreach
49	–	U	corps make hard years day successful ago world give WMD open recommendations gates flooding talking couple planned operations

Table 3.3: List of topics within interview questions produced by MALLET topic model, as described in section 3.3.2. The model produced topics defined by their keywords, I added descriptive names and categories for clarity. Categories: E (Ecosystem-related), P (Process-related), S (Scientific Method-related), and T (Traditional/General view of Corps role)

4

Results

The interviews paint a portrait of an agency committed to restoration at the district level in Jacksonville but held back by a traditional hierarchical culture and structure on the national level. Quantitative and qualitative results gathered from the interviews indicate that the Corps as a whole is not undergoing a significant cultural transition that would allow it to prevent environmentally destructive projects before they get built, but the Jacksonville district is showing improvement at focusing on fixing such projects and beginning to look ahead at preventing them. Following the thesis that an organization's culture may transition as a result of successes, failures, and progress that encourage institutional learning, I will examine in particular interviewee thoughts on goal-setting, leadership, successes and challenges, and institutional lessons learned. These quotes were gathered largely in response to questions 1-6 (see section 3.2.1 for a full listing of interview questions), but I will discuss them by examining the different components of institutional culture and how they may be shifting in response to the pressure to manage ecosystems more naturally. I will first examine "the deeply embedded patterns of organizational behavior and the shared values, assumptions, beliefs, or ideologies that members have about their organization or its work" (Peterson & Spencer, 1990). I will then turn to Tierney's six-part framework for making organizational culture explicit: external environment, mission, socialization, information, strategy, and leadership. Separating quotes and topics into Corps and non-Corps categories proves instructive in understanding differing perspectives in how the members of the Corps see their agency and how others (partners with whom it is essential for the Corps to work closely) see it.

4.1 Broadly defining institutional culture

4.1.1 Shared values, assumptions, beliefs, and ideologies

As my methodology for this thesis consisted of conducting open-ended interviews, talk often turned to the explicit discussion of institutional culture within the Corps. Most discussions of this nature focused on issues of values, assumptions, beliefs, and ideologies, with both Corps and non-Corps members describing the agency as experiencing generational turnover as it incorporates younger engineers who have grown up during the era of the environmental movement. While Corps' members understanding of restoration ranged from a focus on providing healthy ecosystem services to lyrical descriptions of a historical functioning Everglades, all were personally committed to their goals and prepared to work long hours in the service of restoration. While several interviewees noted that the Corps works at the behest of Congress, the values of the organization turn on hard work, pride in a job well done, and for those in the Everglades Division, a sense of excitement at being on the forefront of new science and management techniques.

The first question I asked of all interviewees was "what is your definition of restoration?" The responses to this question, shown as topic model probabilities in figure 4.1, indicate that the members of the Corps are quite project-oriented, even in their restoration work. While the agency has numerous biologists, hydrologists, and other scientists on staff many interviewees explicitly described structuring their personal vision of success in response to the work of scientists or "client" natural-resource agencies such as the Fish and Wildlife Service. Overall, Corps members were far more likely to discuss project-based goals and interactions with state agencies, while employees and leaders of partner organizations or other interested parties were more likely to discuss ecosystem-related goals such as ecology, returning to historic conditions, the uniqueness of the Everglades to Florida, and water quality.Note that the topic model output does not take into account whether a topic was discussed positively or negatively—however, a sense of what respondents were thinking in this regard can be gleaned from a careful review of the topic keywords in table 3.3 and in quotes such as the following:

> A restored Everglades is when the ecosystem as a whole is functioning in a balanced way and that the flora and fauna [that] is representative of the Everglades is restored and protected. —Greg Knecht (State, FL DEP)

Employees of the Corps generally described restoration within limited boundaries, noting the facts on the ground of intense urban and suburban development and the need to maintain flood control and drinking water for the human population. They also focused heavily on project construction. Representative is the following quote from a Corps employee:

> I think it's subjective. We're never going to achieve what some people define as restoration—never going to go back to the way it used to be, in the Everglades and more for in coastal Louisiana...[the vision of success is] different to everybody, I don't think the federal government has the right to say what success is. That's one of the biggest challenges, how we all work collaboratively to try to define what we're trying to achieve. How can we get closer to it. I think success in the immediate future is starting to build projects, to start seeing what restoration projects will do in this changed environment. —Anonymous (Corps)

Many respondents (including the one above), when they discussed historic conditions, did so almost wistfully, acknowledging that given the reduction in spatial extent of the Everglades historic conditions would be impossible to attain while simultaneously defining ecological success in terms of how the system used to function. This tension between defining restoration in terms of past function or potential future provision of ecosystem services in a no-analog world (as discussed in section 1.1.1) makes for an inconsistency in the application of personal restoration goals to professional ones. The easiest way to allow these personal and professional values to coexist may be to avoid the controversy inherent in discussing them explicitly and instead use broad, vague language to define institutional values related to restoration goals. This pattern (alluded to by several respondents) can be seen by the preponderance with which the vague topic "General Goals" is discussed by Corps members when they describe their organization's vision of restoration, as discussed below.

4.1.2 Patterns of organizational behavior

The civilian scientists and engineers that staff the Corps often stay in their jobs for long periods of time, but as a hierarchical organization many opportunities for advancement require leaving either restoration implementation or a district. More importantly, the colonels and lieutenant colonels who lead each district serve on strict three-year rotations before moving on to other domestic or foreign districts or into policy offices. One Corps employee neatly summarized the challenges of this work schedule:

> The 3-year rotation is an unnecessary evil. They come in as colonels, and in order for the next group of colonels to gain experience they need a district to open up so they can later compete for generalships. So they have to leave regularly to open up the positions for others. It would be strange to have a colonel who would be willing to just stay in the position and do a good job without hoping to be promoted to general. Others come in hoping to be promoted and focus on the short term gains that make their career look good. It adds to the tension, complexity, and inconsistency of developing long term relationships with our other partners. We have a local sponsor—and they expect that the colonel is engaged enough to participate in decisions where policy is concerned. So to do that they

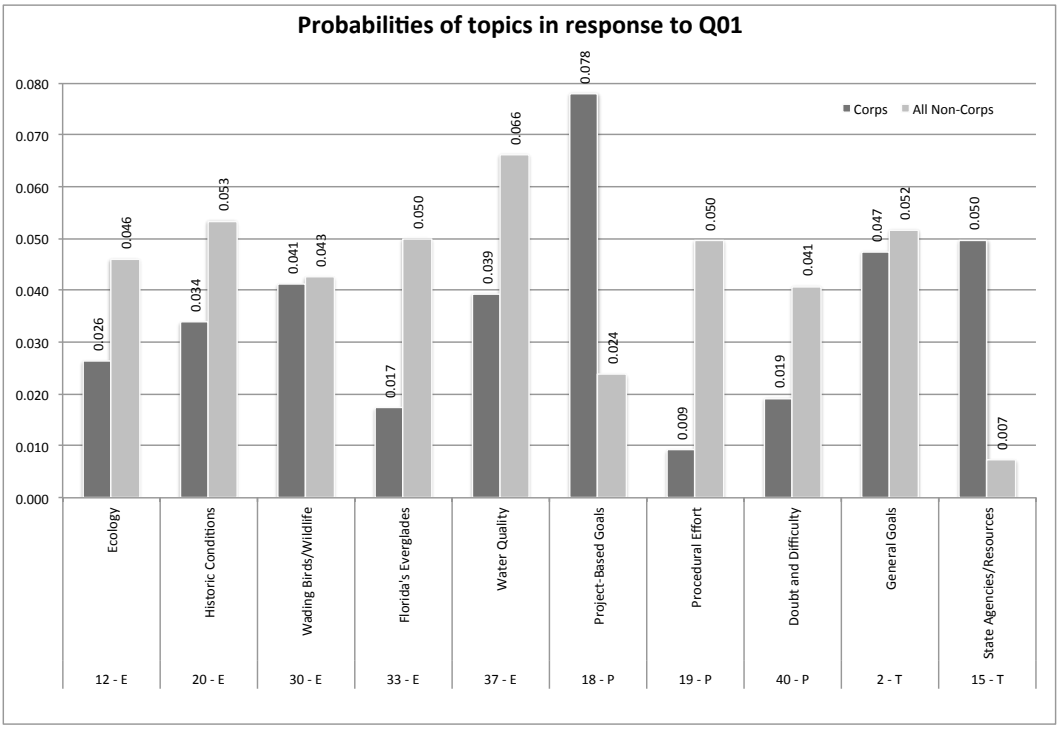

Figure 4.1: Probabilities of topics in response to question 1, "What is your vision of success in Everglades restoration?" The y-axis shows probability of words in each topic appearing in documents that respond to the question, while the x-axis shows topic names, topic numbers, and topic category letters. Dark grey bars indicate mean topic probability for current or former Corps employees at all levels (n = 16), light grey bars indicate mean topic probability for all other non-Corps interviewees (n = 34, see table 3.1 for details). All 50 topics listed in table 3.3 were present in all documents, but for clarity only those 10 topics with the highest probabilities for one or the other group are shown. The 10 topics shown account for 36.1% of all words in response to question 1 for the Corps group, and 43.1% for the non-Corps group. Topics are divided into four categories, denoted by letters next to the topic numbers: E (ecosystem-related), P (process-related), S (scientific method-related), and T (traditional/general view of Corps role).

> need to be informed almost day to day of the projects going on. The director of SFWMD and director of DEP don't expect to be engaging with a lower-level staff person. —Anonymous (Corps)

While this frequent leadership turnover presents challenges at the district level, another Corps employees reflected on the situation differently, noting that while they do lose the good colonels quickly they also do not have to wait long for bad colonels to rotate out. Numerous members of partner agencies commented on the difficulty of engaging with the high-level district leadership due to this issue as well. One potential benefit of such a system, however, may be that colonels who are rotated away from Jacksonville's unique restoration projects bring the expertise they learned there to other districts and positions, facilitating information-sharing and cultural diffusion across the agency.

Both Corps and non-Corps respondents commented on the issue of turnover as an organizational pattern, but there is a deeper, more structural pattern that affects the ability of the organization to respond flexibly to ecological surprises—the bureaucracy, size, and rigidity of aspects of the organization. For example, numerous interviewees identified the Corps' interpretation of the Federal Advisory Committee Act (FACA)[1]as among the most conservative across federal agencies. Academics expressed frustration at their inability to have informal conversations with Corps planners (they must instead attend public meetings and restrict their comments to the same short time slots as other members of the public), and the overall result of the Corps' interpretation of FACA was generally described as a phenomenon of "opinion noted"—Corps planners do not satisfactorily respond to public concerns and comments but simply note them and only cursorily address them. Similar structural barriers have hindered formal implementation of adaptive management, not only in restoration projects but across other business lines and mission areas (NRC, 2004, 58).

4.2 Components of organizational culture

4.2.1 External environment

The Corps of Engineers often works in a highly politicized environment, juggling economic pressure and heavy criticism from environmentalists and sustainability advocates for their history of pro-growth development. Economic pressure stems from the desire of the development community to have regulatory §404 permits processed quickly and in their favor, and also from the Corps' mandated need to perform cost-benefit analyses on all projects to ensure that they are in the economic interests of the nation. Furthermore, in a pro-growth state like Florida the cost-sharing requirement contributes to the political bargaining inherent in the process of any water resource development, and restoration in particular. The Corps shares the cost of all CERP projects 50/50 with the South Florida Water Management District, which is funded through a special property tax levy on South Florida. As Florida has no state income tax, property taxes are the major driver of the state budget and therefore (as was alluded to by several interviewees) the SFWMD is in the position of championing both restoration and development to finance it.

Aside from the macro-scale tension between growth and environmental protection that impacts the financing process, restoration is a political process at the micro-scale as well. Many of the major environmental groups (the Audubon Society, National Parks Conservation Association, and Everglades Foundation, among others) are protective of Everglades National Park and support restoration goals to restore the health of the Park itself. The Park and other federal lands comprise a major portion of the federal interest in the project, and hence

[1]For all abbreviations and acronyms see the glossary on page vi.

the Corps' involvement. However, some groups oppose this limited scope of restoration, as described by one interviewee:

> I think the DOI only cares about the park. Maybe the [Arthur Marshall Loxahatchee National Wildlife] Refuge—but [mainly] the park. I believe they see Everglades as Everglades National Park, and the Indians don't see Everglades that way. To them it's Kissimmee, Lake Okeechobee, both estuaries...all the way down to Florida Bay. That's just not happening in practice. There's a lot of folks who have come to agree with us over the years—I think for example the Water Management District agrees with us. But DOI, FWS is doing it anyway, and the Corps is following along.
>
> —Gene Duncan (Miccosukee Tribe[2], Water Resources Director)

Operating in such a tense socio-political system requires the Corps to tread a fine line, as in this and other restoration projects they are in a sense engaging for the first time with their historic enemies. Before the cost-sharing requirement was in place, the Corps generally came in to do federally-authorized projects with resources and expertise that overwhelmed local communities. Now, though, several interviewees noted that not only has the state of Florida spent more on Everglades restoration than the federal government so far, but the scientific and engineering expertise housed within the South Florida Water Management District is at least equal to and in some areas superior to that of the Corps. Playing in such a dynamic arena has occasionally left the Corps sidelined, as when the state devised the Accelr8 program to speed up eight priority projects largely without federal input. External factors prompted the Corps to consider managing for ecosystem values and incorporating restoration into their mission, and external factors have and will continue to shape the ways that the Corps is able to develop this mission.

4.2.2 Mission

The formal mission and business lines of the Corps were alluded to in section 1.2.1, but these official guidelines do not necessarily reflect the true institutional mission that members operate under in regards to ecosystem management and restoration. To assess the sense of direction and guidance that Corps members operate under (and how that is perceived by outsiders), I asked interviewees to describe what they perceive the Corps' goals and vision to be in regard to restoration.

[2]The Miccosukkee Tribe of Florida is one of the only communities within the Everglades itself. Their reservation lies just north of Everglades National Park and south of the Water Conservation Areas, making their land vulnerable to flooding when water is released through the Park to provide flood control for the developed east coast. The Tribe has felt excluded from restoration decision-making, both by the engineering and environmental communities, and has responded by retaining highly skilled counsel and suing the state, the Corps, the EPA, and other parties to enforce various aspects of conflicting environmental laws.

When respondents were asked, in contrast with their personal goals for restoration, how they thought the Corps envisioned success in restoration (question 2), differences emerged. Figure 4.2 shows topic model output for direct responses to that question. Over 11% of Corps' members responses to the question of how they perceive their own organizations goals was accounted for by topic 2, General Goals. This is a particularly vague category, defined by words such as "restoration," "goals," "big," and "focus" (see table 3.3 for the full topic description).

Besides being more concrete in their understanding of the agency's goals, non-Corps members were more likely to discuss topics such as the traditional role of the Corps in federal projects and alongside other federal agencies than Corps members were. Strikingly, ecology-related topics, so important in the personal vision of restoration for both Corps and non-Corps respondents alike, accounted for only one high-probability topic when discussing the restoration goals of the Corps as an institution. This topic, Water Quality, is a particularly thorny policy issue for the Corps and the state and so may almost be thought of as a process-related topic (see section 1.3). This shift from ecology to processes as one moves from the individual (values) to the institutional (mission) levels of the Corps shows how the agency is enmeshed in lawsuits, conflicting legislation, and funding prerogatives that constrain its ability to shift course in response to the needs of ecosystem management, even when individual values align with ecological needs. Overall, respondents from both within and outside of the Corps see the agency as operating in a context of rules, regulations, and procedures more than actual ecological outcomes. Historically engaged in managing ecosystems but not in ecology-oriented *ecosystem management*, the Corps has maintained power and status precisely by focusing on process and construction, not on outcomes and maintenance (Clarke & McCool, 1985; Reisner, 1987). Interview results support the continuation of this constitutive trend.

In particular, members of the Corps see their agency as playing a balancing or "honest broker" role, performing commissioned work on behalf of other arms of the federal government and trying to bring together competing goals and interests.

> I believe the ecological and hydrological goals are our fundamental goals, but there are many other agencies and entities that have other goals and we sometimes have to be the honest broker to end up with something that can be authorized.
>
> —Anonymous (Corps)

Playing this mediator/implementer role continues the pattern of fragmenting the vision of restoration that the Corps operates with. Defining the overall mission vaguely and in terms of working through agreements and processes with other agencies reinforces at the mission level the project– and process–orientation of shared values at the individual level. While this may be the reality of the Corps' mission and values in terms of institutional culture, it is quite

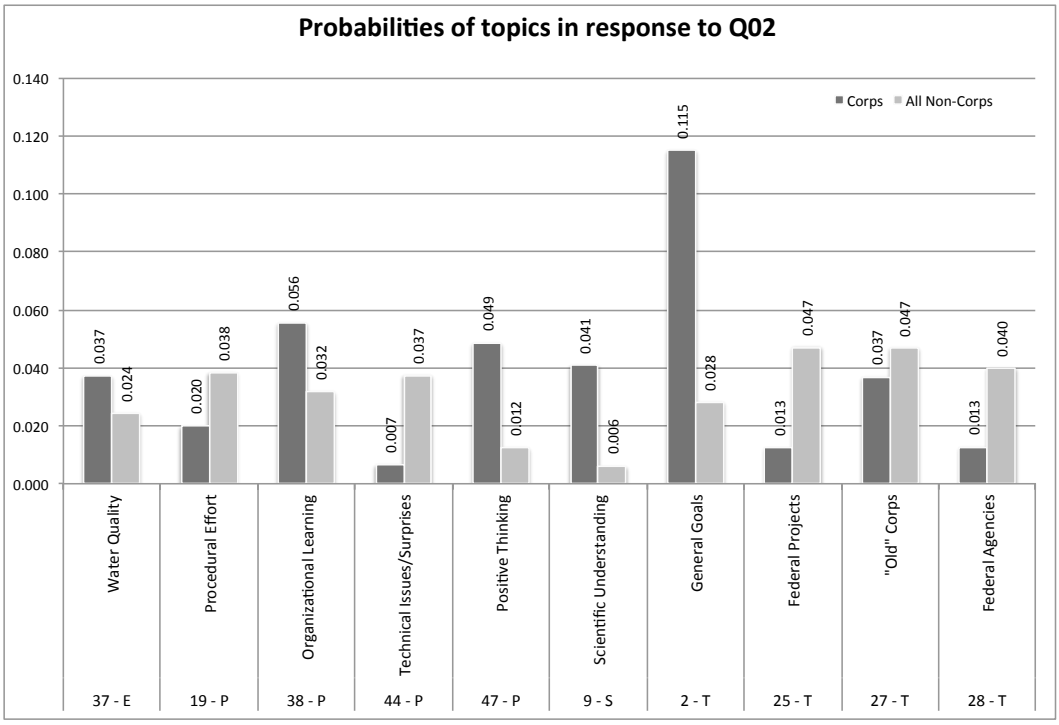

Figure 4.2: Probabilities of topics in response to question 2, "What, in your opinion is the Corps' vision of success in restoration?" The 10 topics shown account for 38.6% of all words in response to question 2 for the Corps group, and 31.2% for the non-Corps group. Two topics, 21 and 22, also appeared with approximately 4% probability in one group or the other but were uninterpretable and so omitted for clarity. See caption in figure 4.1 for a full description.

different from how many non-Corps partners and outsiders see the agency. Outsiders assign the Corps more agency for its role in driving the goals and practices of restoration than the Corps does. Non-Corps members see an institution grounded in an engineering/construction mentality that, while its members are committed to restoration and working hard for positive ecological outcomes, is hampered by bureaucratic processes and linear thinking. Indeed, some respondents specifically described a perceived rigidity in the values and training of engineers that created a barrier to forming a more adaptive institutional culture.

> They seem to have...a lot of engineered solutions to problems as opposed to a more natural approach to resolution of issues. That is their culture—after all, it's the Army Corps of *Engineers*. So they have an engineering solution to most problems. A lot of problems require engineering expertise but not engineering solutions. [emphasis original] —Anonymous (State of Florida)

> Pretty tied into a system—a bureaucratic system of how this all transpires...There's processes by which they have to take all of these components and walk them

> though a process and get the chief to sign off on them and so on. Unfortunately the Army is pretty locked into this process of getting these approvals and having to get these agreements and so on.
>
> —Anonymous (Environmental Organization)

The reality is that despite the protestations of the Corps that they simply serve a contractor role to natural resource client agencies, the bulk of restoration funding from the federal government is channeled through them and this wealth gives them tremendous institutional power among the federal and state players in ecosystem management.

4.2.3 Socialization

Many interviewees commented on the deep roots of the Corps in traditional structural engineering and flood control, evidenced by the prevalence of topic 27, "Old" Corps, in the top ten topic model results (see figures 4.2, 4.3, and 4.4). Non-Corps interviewees discussed this topic more frequently across questions than did Corps interviewees with the exception of the question regarding the challenges and failures of the agency (see figure 4.4). Here Corps interviewees were more than three times as likely as non-Corps respondents to talk about the "Old" Corps topic, indicating that while this traditional engineering mindset colors perceptions of the Corps among outsiders across interactions and subject areas, it stands out to Corps members as a challenge confronting their agency as it transitions to a culture compatible with ecosystem management. The challenge of this traditional socialization is apparent to outsiders across their assessments of the agency:

> The staff is primarily engineers, that's who runs the organization, [they're] still very focused on flood control issues and very very traditional. They tend to recruit people with very traditional perspectives...At the very lowest levels now they are starting to bring in people who have a range of views...They also haven't really worked very hard at bringing non-engineers into their decision-making process. So for example, biologists don't really have much of a voice there, from what I can tell. When you talk to managers about their issues they see biology as the problem, the obstacle in their way. For example, in a beach renourishment project there might be a "turtle problem."...If the Corps had environmental mission as a mature part of their agency, embedded in their soul, that's not how they would perceive environmental issues—as the counterweight to what they want to do.
>
> —Thomas Van Lent (Environmental Organization, Everglades Foundation)

> I would say, it's still perceived within EPA, my agency, that the Corps is most comfortable with structural solutions to water resource problems...It seems from

> our perspective that it's been hard to get the Corps as an institution...to understand the tradeoffs that sometimes are involved and that the optimal location from purely an engineering perspective for a flood wall or for a levy may cause a significant amount of ecological damage and that perhaps a slightly suboptimal location for that flood wall or levy can produce so much less environmental damage that the net result is a better project. And it just seems like it's hard to get the Corps project managers to see things in that light. And I think that's, in my mind, it's that kind of observation that leads to the conclusion that it's been a struggle for them as an organization to embrace environmental protection as a coequal mission with their structural engineering mission.
>
> —David Evans (Federal, EPA Office of Water)

The interviewees who were engineers expressed a sense of pride in projects done well and largely supported the contractor-client relationship metaphor of the Army Corps of Engineers to Congress and the natural resource agencies, as was described in the preceding section.

4.2.4 Information

Several interviewees described optimism at the 2009 appointment of Terrence "Rock" Salt as Principal Deputy Assistant Secretary of the Army for Civil Works. Prior to this Presidential appointment, Salt worked for 17 years as a leader in various aspects of Everglades restoration, both for the Department of the Interior as special Everglades advisor and for the Corps as Jacksonville District commander (USACE, 2009a). Strong leadership, as is represented by Salt, is key both to driving institutional change (if so oriented) and to maintaining the status quo that has been successful at maintaining power and control (Clarke & McCool, 1985).

> It's occurred to some of us that in some sense, aquatic ecosystem restoration is—you can talk about natural flood management (in a stream) as an ecosystem service, or as a natural function of the stream. The Corps has seen this [natural flood management] as a cheaper way to do flood control for a while. People are now starting to say, what's the difference between ecosystem restoration and natural, non-structural flood control systems? I would say there is 75% overlap...
>
> There has to be a better way to integrate facilities for better flood protection and water supplies—not just for farmers but also for endangered ecosystems. If we could integrate and optimize our systems, we would be able to provide a lot more restoration benefits...
>
> We don't have any detailed guidelines on restoration, on ecosystem services—only on flood protection and dredging...
>
> —Terrence "Rock" Salt (Corps, Office of ASA Civil Works)

In late 2009 the White House Council on Environmental Quality (CEQ) released new proposed guidance for water resource implementation studies (known informally as "the P&G"

for "principles and guidelines") that included a policy-level directive to "account for ecosystem services," especially *changes* in ecosystem services as a result of the proposed intervention (CEQ, 2009). The use of such a metric in federal cost-benefit analyses could dramatically change the context of CERP implementation, allowing the Corps to count gains or losses ecosystem services such as natural flood control and estuarine water quality as monetized costs and benefits when proposing individual projects to Congress for funding. Reactions within the Corps to such a high-level policy directive were mixed:

> That will help in the long run, but HQ doesn't understand ecosystem services and they're not gonna know what to do with the new P&G. Just because we've got new words on new pages doesn't mean people are all of a sudden gonna do business differently. It's going to take a long time for us to figure out what that really means...I'd like to say I'm excited about it [the P&G], but I'm not. It's just new words on new pages...Now I know [the staff in HQ] will be told to implement the new P&G and they'll come up with some good ways to do that, but it's gonna be years before we have implementing guidance. So we won't have big change any time soon. —Eric Bush (Corps, JAX)

As such a large organization, it takes a long time to disseminate new information throughout the Corps. Enormous amounts of data are produced and published by different branches of the Corps, and despite the availability of online information clearinghouses, monthly publications and status reports, external reviews, and workshops and conferences, there are barriers preventing the spread of information learned in one arena to others within the Corps.

The agency's conservative interpretation of FACA limits its engagement with external information, and attempting to sort through the massive quantities of available data regarding Everglades restoration was an experience that I found to be akin to trying to drink from a waterfall with a straw. Several Corps interviewees reported that their colleagues from other districts seek them out at conferences and regional meetings to ask about Everglades restoration, indicative of a broad interest in the topic but also evidence that it may be difficult to find such information in a more structured, formal way. Several members of state or other federal agencies reported a sense of insularity within the Corps, in one case somewhat offended that they and their expertise were not included in decision-making by the Corps nor called when relevant issues arose. These and other structural and cultural barriers were generally acknowledged as presenting difficulties to sharing important information, and in some cases were described as explicitly impeding institutional learning.

4.2.5 Strategy

The official strategy of the Corps in pursuing Everglades restoration is laid out in the multi-volume Comprehensive Everglades Restoration Plan, referred to familiarly as the "Yellow

Book" for the color it imparts to sagging bookshelves. However, in the more than ten years since passage of CERP, new developments have inevitably shaped the options available to the Corps and the strategies it has pursued. I assessed the scope of recent past strategy choices by asking interviewees about successes and challenges the Corps had encountered in restoration. Successes and challenges provide the feedback that a learning organization needs to grow and change, to reinforce or rethink its strategy. As the work of the Corps in restoration is so dependent upon support from partners (who if unhappy with the process have few recourses besides filing lawsuits, which bring work to a halt), it is essential not that the Corps enjoy unmitigated successes but that they and their partners take similar lessons from the process. The successes and challenges of Everglades restoration are particularly relevant for the Corps as a whole, as the agency has opportunities across other districts and restoration programs to allow the lessons learned in Florida to shape strategies from the beginnings of new programs.

4.2.5.1 Successes

When answering the two separate questions about successes and challenges/failures, many respondents included examples of both outcomes in their responses to both questions. The answers generally presented a mixed picture of successes intertwining with frustrations, with a large institution gradually learning to solve unprecedented problems but repeatedly experiencing setbacks that originated both inside and outside the agency. Ecologically, respondents pointed over and over to the story of the Kissimmee River restoration as inspiration but also occasionally to caution against hubris[3]:

> Kissimmee—you need to fly over it in the wet season to comprehend how successful that's been. I think that's part of the problem...the fix was so simple, the Corps thinks it's going to be that successful everywhere. I could be wrong...but I see such a successful project being tooted as the proof that people are assuming it's going to be as simple as just shoving dirt back into a hole.
>
> —Joseph Walsh (State, FL FWC)

Figure 4.3 shows the responses of those in the Corps and non-Corps groups to the question "What are some examples of successes the Corps has achieved in restoration so far?" There are clear disparities in what topics the two groups discussed in relation to the term "success." Partners and outsiders discussed the Picayune restoration, construction of other projects, and concerns related to water quality overwhelmingly more than did Corps members. Non-Corps respondents also focused on community decision-making, describing a push-and-pull process of the Corps gradually becoming better at including partners in the decision-making process

[3]Numerous actors and restoration professionals made a similar point in 2002, saying that "the Kissimmee's success has been achieved despite the Corps" (Grunwald, 2002)

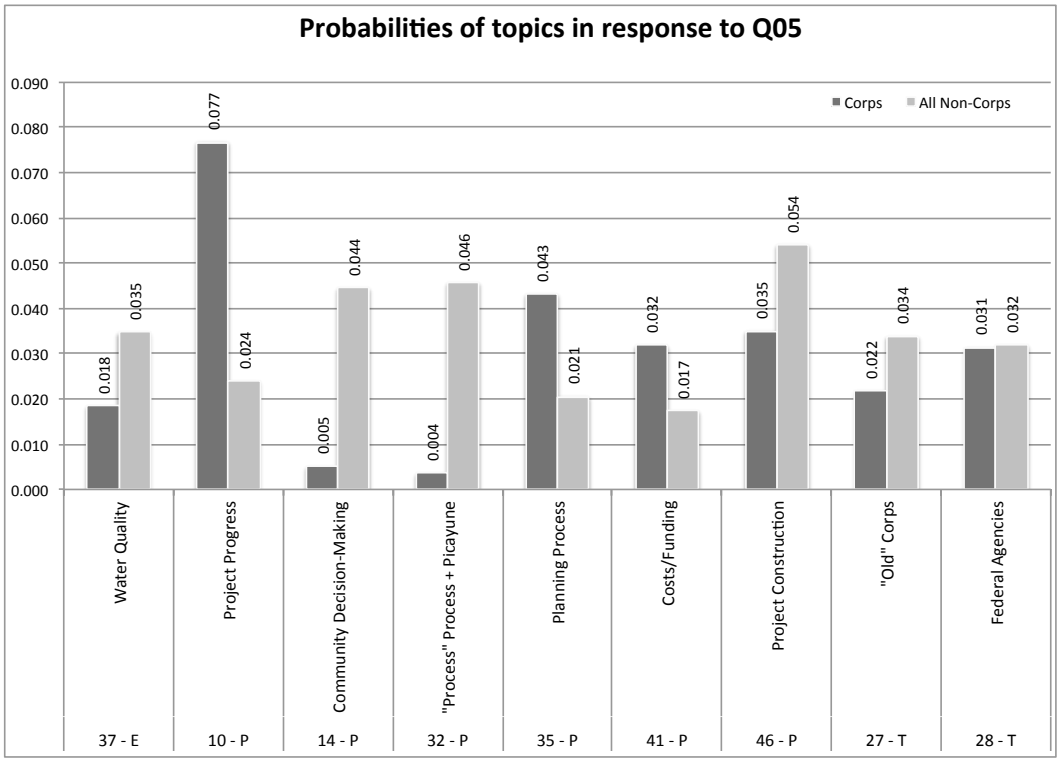

Figure 4.3: Probabilities of topics in response to question 5, "What are some examples of successes the Corps has achieved in restoration so far?" The 9 topics shown account for 26.7% of all words in response to question 5 for the Corps group, and 30.6% for the non-Corps group. Several uninterpretable topics (1, 4, 17, 24, 42, and 43) with probabilities within the 3-4% range were omitted for clarity. See caption in figure 4.1 for a full description.

but also hampered by a lack of flexibility ("the federal parties are a gigantic oil barge that we're steering" —Malcolm "Bubba" Wade (Agriculture, US Sugar Corp.)).

> I think [that] in [the] Everglades that interagency interaction, the Corps on an ongoing basis is sitting down and working together with agencies that have environmental protection as their central mission—I think that has helped, to bring the Corps along to understand how to incorporate environmental protection into the broader structural engineering projects that they have.
>
> —David Evans (Federal, EPA Office of Water)

Those within the Corps focus much more on the progress of projects, on the planning process, and on working out cost-share and funding details when asked to discuss successes (see figure 4.3). As Eric Bush, assistant chief of the Everglades Division, put it,

> In hindsight, the planning was the easy part. Implementation mode is what's really hard...There were a number [of planning-period success] which people

> wouldn't get too excited about—like finalizing programmatic regulations and coming up with guidance memoranda on how to do...really complicated stuff like how do you manage water for the natural system or how do you meet the requirements of the WRDA 2000 savings clause...Getting things authorized is really hard too, you're asking for tens or hundreds of millions of taxpayer dollars and the forces are arrayed in plenty of checks and balances. That's professionally frustrating, but we've succeeded, got through all that, and now we're doing real construction work. —Eric Bush (Corps, JAX)

4.2.5.2 Challenges, Failures, and Setbacks

As with opinions on successes, respondents often couched their discussion of failures and challenges with caveats related to more positive outcomes. Interviewees generally praised the Corps for its structure and planning process while simultaneously identifying flaws within those very processes. Figure 4.4 shows the topics discussed by the two groups in response to the question "What are some examples of challenges or failures the Corps has encountered in restoration?" Here, as in figure 4.3, most of the top ten topics discussed are process-related, which reflects the fact that ecological progress on the ground has been slow. However, the questions were open-ended and designed to elicit responses related to either ecological or process-related successes and failures, at the interviewees' discretion.

The specific challenges most commonly addressed were related to a few major issues, including the availability or lack of funding and the difficulty the Corps has had in catalyzing cultural change towards ecosystem management. Numerous interviewees explicitly contrasted the mindset and values required for ecosystem management with those inherent in traditional structural and civil engineering, as discussed above. Some examples of these values-related challenges include partnering and collaborating with local sponsors, developing flexibility in the planning process, and defining a common vision for restoration. These challenges extended across scales, from local implementation and managing interactions with the public on a particular project (for example) to one interviewee's description of Corps leadership rejecting district-originated plans for an integrative national center on ecosystem restoration.

While they emphasized different aspects of the planning and implementation processes, interviewees from within the Corps had perspectives similar to outsiders on what their agency's challenges are. Corps members often discussed the ways in which the planning and project development process hindered the flexibility they needed to work on restoration, and also identified difficulties with working collaboratively with partners. Both groups focused on the complexity and bureaucracy of the planning process, in which the new strategies and collaborative methods pioneered by the Everglades Division do not exempt them from following other, pre-existing Corps regulations and guidelines:

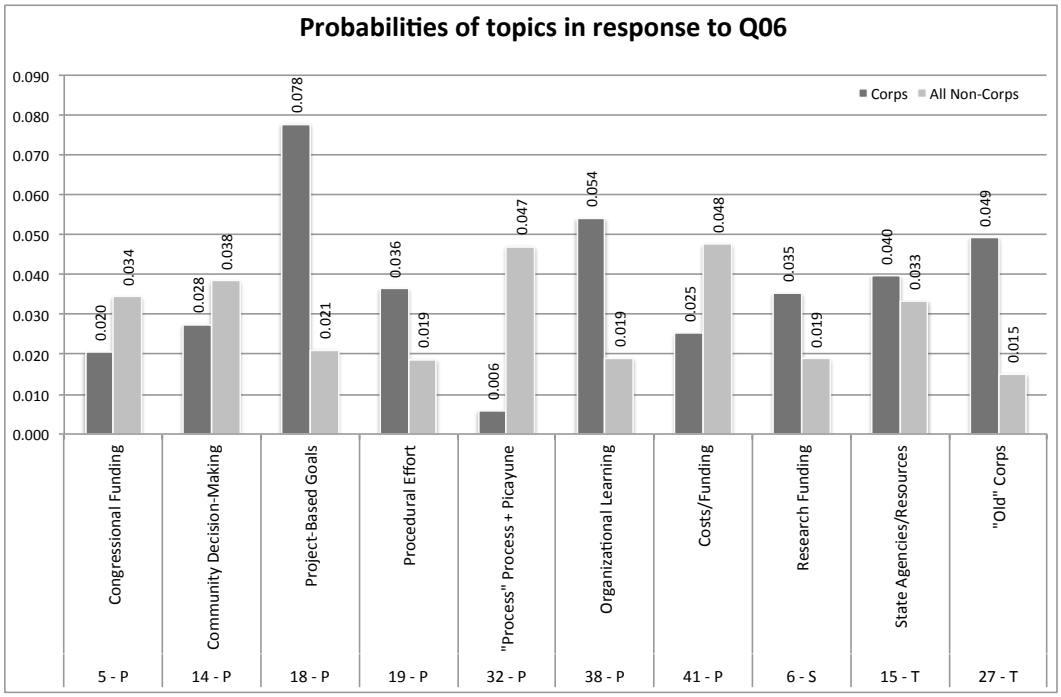

Figure 4.4: Probabilities of topics in response to question 6, "What are some examples of challenges or failures the Corps has encountered?" The 10 topics shown account for 37.2% of all words in response to question 6 for the Corps group, and 29.4% for the non-Corps group. Uninterpretable topic 42 (Corps probability = 3.5%) was omitted for clarity. See caption in figure 4.1 for a full description.

> The most overwhelming [challenge] is the procedural thicket, and it's one of the things emphasized in the NRC 2nd biennial report. The fact that you have this whole new set of planning and procedural requirements that have been created for CERP, that have been layered on top of the requirements already in existence in the Corps and SFWMD, is extremely cumbersome.
>
> —Katrina Schwartz (Academia, University of Florida)

4.2.6 Leadership

Within the Corps, many respondents included some description of project-based goals in their vision of success. This vision is influenced by leadership from above, as Stu Appelbaum, Deputy District Engineer for Everglades Restoration in Jacksonville, envisions that

> In 20 years...we'll be well on the road to building the projects and retooling the C&SF project so that the system looks much better. *I hope that we'll have a number of projects and completed enough successes so that people see we're on the road and give us support for working more.* I hope that the system itself will

> be well on the way to returning to health, although it will never be the same. [emphasis added] —Stuart Appelbaum (Corps, JAX)

Appelbaum has been at the Jacksonville district since 1988, and has long been a leader on Everglades restoration. He commands loyalty and hard work from his staff, and through his leadership has shaped the vision of Corps employees in the district regarding restoration. Says one mid-level manager, "People like me, we stay and we work on this program regardless of how difficult it is, because [Appelbaum] believes...in the program" (Pauline Acosta, Corps, JAX).

Conversely, some smaller partners are concerned about the politicization of the leadership structure and the restoration process, as was discussed above in section 4.2.1. The Miccosukee Tribe in particular has taken issue with numerous implementation decisions and have filed several important lawsuits, although they were engaged as partners in the development of CERP. The leader of a small environmental organization also has reservations about the leadership of the Corps in terms of Everglades restoration:

> There's been talk about having an Everglades Czar, but the truth is we've had people in positions of authority and they too have come under sway by special interests.
>
> —Alan Farago (Environmental Organization, Friends of the Everglades)

Aside from Farago, many interviewees, both inside and outside of the Corps, expressed their hope that the current leadership arrangement would be positive for Everglades restoration. However, this leadership structure, which directly influences restoration policy at state and national levels, may not represent the full relationship of the Corps towards restoration programs. This is evidenced by the failure of the Corps to enact a national center on ecosystem restoration to explicitly demonstrate the importance of lessons learned in ecological management and restoration.

* * * * * * * * * *

Framing the quantitative and qualitative results of 50 interviews with the institutional culture and policy learning theories of Tierney and Sabatier has produced an outline of an agency in varying states of flux depending on the scale of concern. I discuss cultural change as it relates to these various scales in the next chapter, Discussion.

5

Discussion

Throughout this thesis I have defined culture as "the deeply embedded patterns of organizational behavior and the shared values, assumptions, beliefs, or ideologies that members have about their organization or its work" (Peterson & Spencer (1990), as quoted in Kezar & Eckel, 2002, 437). My results show an agency culture distinguished by a split between the Jacksonville district and other districts and levels, with respondents acknowledging that the restoration focus of Jacksonville is unique throughout the Corps. The "greening of the Corps," however, cannot ride upon the restoration program of one district alone. If the Corps is re-orienting itself towards a new mission of environmental protection, that shift in culture would be manifest across districts and levels of the hierarchy and would affect all aspects of the work that the Corps undertakes. A greener Corps would ask tougher questions of CWA §404 permit requests, would make recommendations to Congress that it *not* intervene to improve navigation in particularly sensitive aquatic environments, and would be able to manage adaptively and flexibly in response to changing environmental conditions. Many of these changes are antithetical to the ethos of an organization that is oriented around building structures and whose mottos and history stress dominion over nature. While it is laudable that the Jacksonville district is breaking new ground on developing plans and processes for large-scale ecosystem restoration, a conclusion supported by the National Academy of Sciences (NAS) in its third biennial review of progress towards restoring the Everglades (NRC, 2010), the Corps cannot rest upon its laurels as a greener organization until the lessons learned from the Everglades Division travel to other program areas (including within JAX) and around the country.

5.1 Institutional Learning in the Advocacy Coalition Framework

Having described the ways that Corps employees and members of partner or observer organizations see the components of the agency's culture in the previous section, I now turn to the ways that the culture may be shifting as the institution learns. I chose the Everglades restoration policy subsystem as a case study with the idea that "if it can happen here, it can happen anywhere"—Everglades restoration benefits from a history of political will, funding prioritization, and a jurisdiction wholly within one state. What I found was a subsystem that was not easy to define as separate from other subsystems, since the actors and coalition members work at a wide variety of spatial scales. Some district Corps members work exclusively on one local project, while others develop region-wide planning materials, and others interface regularly with other districts and higher levels. Very few members of the Everglades Division seem to interact with the work of the Regulatory Division, but non-Corps members very much perceive those other divisions and missions as being faces of the larger "Corps" with which they work on restoration. Furthermore, the NAS found that there are enormous trade-offs throughout the process of Everglades restoration, where the project required to restore one area to health may come at the explicit expense of another (NRC, 2010, 28-29). Such tradeoffs muddy the simplicity of the restoration story and make it harder to unify the actors around one vision of restoration (Stone, 2002), an outcome consistent with my results.

Without the ability to coalesce around a consistent vision of restoration, the system has been too slow to realign its secondary and policy core beliefs. A policy space enveloped in controversy and politicization leads to a hardening of attitudes by the actors involved, and makes it ever-more difficult to arrive at the compromises that predicate realignment of beliefs. It is this very realignment of beliefs and deep values that comprise the process of institutional learning (Sabatier, 1988; Sabatier & Brasher, 1999), and it has been slow to arrive in the Jacksonville District but does seem to gradually be taking hold. As a case study of how the Corps has been changing in response to the pressure to shift its mission to be more protective of the environment, Jacksonville shows a route of slow but steady progress in one mission area, with a great deal of work still to go. Preliminary evidence from this study shows that other districts and mission areas of the Corps can draw some lessons from the work of the Jacksonville district but will likely need to embark upon their own long and difficult processes of institutional change.

5.2 Jacksonville district

I find strong evidence that the restoration program of the Jacksonville district of the Army Corps of Engineers does indeed appear to be breaking new ground in terms of setting an

example for others to follow—but with caveats that limit its effectiveness in on-the-ground ecological outcomes. While hindered by a rigid military leadership structure and both cultural and Congressional constraints on flexibility, the district has pioneered policy advancements such as developing partnership agreements with a co-equal major state partner, improving the process of outreach and teamwork with minor partners, and guiding the federal half of the CERP process while faced with changing state priorities. The program managers, mid- and top-level leadership, and engineers and planners evinced strong support for the restoration goals of CERP. The district has also led the nation in terms of implementation of adaptive management, which while not the focus of this study does represent the best-understood (if easily misused by falling back on traditional positivist scientific management (Clark, 2011; Mattson, 2009)) way to implement a flexible institutional culture into the process of ecosystem management.

The most important factor in assessing the progress of institutional learning/cultural change within the Jacksonville district may be the level of environmental commitment felt by the employees with whom I spoke—their shared values, assumptions, beliefs, and ideologies (Peterson & Spencer, 1990). Every restoration staff person within the Everglades Division, regardless of disciplinary background, spoke repeatedly and consistently of concern for the environment and described a vision of restoration that included a functioning natural system. Engineers in other program areas, such as the rehabilitation of the Lake Okeechobee flood control dike, sea-level rise planning, and infrastructure operation (all but the latter of these program areas fall within the Everglades Division) also reflected an orientation towards environmental protection, but to a lesser degree. These non-restoration professionals were for the most part mission- and project-driven, speaking of the need to protect public safety as the highest priority (in the case of flood control) or to respond to the needs and demands of Congress. I did not speak with any individuals in the regulatory division, but all those respondents whom I was able to ask about the relationship between restoration and §404 permitting described a lack of communication and coordination between the two.

The restoration work of the Everglades Division represents a large and growing share of the budget for the Jacksonville district. Given this fact, it can be said that the culture of the Everglades Division is driving the larger evolving culture of the district, but in a limited way. Just as the "reset" was important in reorganizing the Everglades Division into one cohesive unit, the other divisions and programs of the district are now more separated from their restoration colleagues. This may shift over time, as restoration priorities shift from construction and planning to longer-term operations and maintenance and more program areas acquire jurisdiction over CERP projects. Though the hiring decisions and evolving institutional culture of the Everglades Division are an example of internal policy-oriented learning in an advocacy coalition framework (Sabatier & Brasher, 1999), they have not yet

affected the work of other divisions within the district, as highlighted by the disjuncture between restoration planning and the regulatory division.

While in the Introduction I defined a policy subsystem as Everglades restoration under the Corps of Engineers, this subsystem might be more accurately (ecologically speaking) defined as *Everglades management*. The Everglades subsystem comprises a diverse array of participants, organized into coalitions that pursue policies across diverse realms such as restoration, environmental protection, land and habitat conservation, and development and agriculture (Clark, 2002; Sabatier, 1988; Sabatier & Brasher, 1999). Since policy-oriented learning rarely alters the deep-core beliefs (that which can be said to comprise culture in the ACF) of a policy subsystem, as long as this institutional learning remains concentrated within one actor in the subsystem it will not filter out across coalitions and transform policy goals.

The conception of Everglades *management* (as opposed to restoration) as the primary operative subsystem reflects interview responses regarding the actors' visions of restoration. Many interviewees included descriptions of ecosystem function, clean water, and human population support within their definitions of a restored Everglades. However, the primary goals of CERP adhere largely to only the first of those attributes, indicating that water quality and ecosystem services are not a part of *restoration* per se, but rather of overall Everglades management. This is consistent with the relationship between the goals of CERP and the broader goals of the South Florida Ecosystem Restoration Task Force (NRC, 2010, 27-28). Participants in Florida's Everglades policy arena are encountering significant challenges in determining jurisdiction, responsibility, and funding sources for resolving issues related to these two latter envisioned areas. Given the outsized part played by the Corps via its role in CERP, enlarging the scope of Everglades management away from restoration towards a more holistic view of the system may allow actors to think outside the box and find alternate solutions to these problems.

5.3 National Corps and other districts

It can be assumed that many of the local- and state-based non-Corps respondents referred to the Jacksonville district when they discussed the Corps. Hence, most of my results pertain to the Jacksonville district, except when I interviewed those in leadership or headquarters-based positions. Even within Florida, however, many of my respondents had worked with other districts or had contact with the leadership chain above them and thus were aware of directives and guidance pertaining to their environmental work that emanated from above. Additionally, many regional non-Corps interviewees had contact with different branches of the Jacksonville district, both the Everglades Division and other program areas, such as the Regulatory Division.

Tierney's cultural model of environment, mission, socialization, information, strategy, and leadership provide a useful frame for examining the context of cultural change across the Corps (1988). While the mission of the Corps has changed to include ecosystem restoration and environmental management, and the top-level ASA leadership rotates in response to Presidential administrations, the other four components of this framework have not shifted significantly over the last decade. Interview respondents indicated that environmental information-sharing across the Corps is largely confined to restoration professionals, and that the socialization process and hiring decisions largely reflect a career path open to traditional engineers except in specifically restoration-focused programs. The long-term strategy of the Corps may change once it develops guidelines in response to the new Principles and Guidelines on water resources management (CEQ, 2009), but it is not yet clear in what ways that strategy might shift. Finally and most significantly, Congress has not changed or reformed in the environment in which the Corps operates (Carter et al., 2005). The Corps continues to receive funding in a decentralized fashion through Water Resources Development Acts loaded with individual Senators' and Representatives' requests and through congressional earmarks, which largely bypass the policy authority of the civilian ASA for Public Works' office (Grunwald, 2010).

Given its close historical relationship with development advocates via its work on behalf of economic development and its regulatory §404 program, the Corps in many locations remains surrounded by entrenched interests who are likely to work against changing the status quo (Clark, 2002). The exceptions to this relationship have been in policy arenas with overwhelming support for change (e.g. Florida in the 1980s during the push for Kissimmee restoration). Besides external pressures to maintain existing structures, the Corps itself is

> subject to a large body of legislation, administration guidance, and congressional committee language. As additional laws and authorizations have been passed over the years, the consistency of existing and new obligations has not been carefully evaluated. In this setting, the Corps at times appears reluctant to move away from pre-existing authorized purposes, even when it may have the legal authority to do so. (NRC, 2004, 9)

It may be the case that the Corps of Engineers is reform-proof, as Grunwald essentially accused it of being it in his 2000 *Washington Post* series. It is certainly not "greening" as fast as some critics and supporters would desire (e.g., Water Protection Network, n.d.), although conversely it is leading the way in ecosystem restoration in the Jacksonville district. The Corps seems to be faced with two options, reflective of two visions of how the agency can face the challenges of the future (Carter et al., 2005; USACE, 2003): aggressively disseminate the procedural and ecological lessons learned in the Jacksonville district's Everglades Division throughout the other districts and business lines, or spin off comprehensive ecosystem management into some other, more integrative problem-solving mission. Without pursuing one

of these two options, the Corps risks allowing the very expensive, complex, and pathbreaking work of Everglades restoration to perish in the Jacksonville district.

6

Conclusion

6.1 Implications for environmental protection

It has long been acknowledged that ecosystem management is more than scientific management and requires the incorporation of uncertainty, flexibility, and adaptiveness (Brunner & Steelman, 2005). Willingly or not, the Army Corps of Engineers has been thrust into the role of ecosystem manager by virtue both of its legacy infrastructure and its ongoing missions in the realms of navigation, flood control, ecosystem restoration, and so on. Ecosystem management always involves humans and our interactions with the system, no matter the management context—restoration is not the only arena for this more adaptive vision of management and governance (Clark & Cherney, 2011; Clark, 2002; Gross, 2003). While the Corps is a strong partner in Everglades restoration by virtue of its leadership role in CERP and its employees' commitment to the goal of ecosystem restoration, the Corps cannot be said to have "greened" until the lessons learned from this policy subsystem are transferred across all geographic areas and business lines (not just restoration) of the agency.

The Everglades is the first and most extensive large-scale ecosystem restoration project undertaken by the Corps of Engineers and its local partners, but it will not be the only one. Potential Clean Water Act criminal penalties related to the Deepwater Horizon oil spill in the Gulf of Mexico in April 2010 may make billions of dollars available for previously underfunded general restoration on the northern Gulf coast, and the restoration process of that spill's Natural Resource Damage Assessment may also contribute to the large-scale restoration getting underway in the area (Tripp, 2010). Additionally, the Corps is engaged in significant watershed level ecosystem restoration efforts in the California Bay Delta, the Great Lakes, and Chesapeake Bay, among other watersheds, which have begun to make inroads into the Everglades' outsized claim on the Corps' restoration budget requests[1]

[1]The high-water mark was 65% of the requested Corps FY2009 restoration budget directed towards the Everglades. For 2012, the figure is down to 32%. Since FY2007, spending requests for restoration have

While there is no integrative national center for ecosystem restoration, there are numerous conferences and publications available for restoration professionals to exchange information, both within and outside of the Corps. However, interviewees struggled to describe opportunities for interaction and learning across mission areas, even when involved in different missions within the same Everglades ecosystem. These barriers between mission areas are reflective of the "schizophrenia" that scholars and observers have seen in the Corps for some time, and have not been resolved by adding the Environment business line onto the existing agency structure (Houck, 2006). Several interviewees pointed out that despite the nearly indescribable complexity of Everglades restoration, it actually enjoys one extraordinary simplifying trait that many other major Corps projects do not: it is completely encompassed within one state. With Everglades restoration years behind schedule and subject to the political whims of federal and state financing, the fact that the region also has not been able to engage the other business lines of the Corps in ecosystem-oriented thinking does not bode well for adoption of "greener" ideas throughout the institution.

6.2 Recommendations

> Ecosystem management must be an evolutionary process because ecosystem contexts are far too diverse, complex, and dynamic for anyone to understand completely, completely objectively, or once and for all. In this evolutionary process progress in sustaining the integrity of ecosystems can be delayed by taking clearer goals or a better scientific foundation as a priority or a prerequisite. Such improvements are neither necessary nor sufficient for management decisions; and, in any case, management decisions often cannot wait for them. (Brunner & Clark, 1997, 49)

The long delay so far between authorization of CERP in 2000 and project groundbreaking ten years later is evidence of the truth of the statement above. Funding limitations have contributed to the delay, but so has a case of paralysis by analysis whereby extensive scientific modeling, indicator development, and other forms of data-gathering have occupied managerial attention at the expense of clarifying a vision of restoration and management. Some of the well-known flaws in CERP stem from the centralization of its design (Light, 2005), while others result from the slowness of the Corps in reorienting itself to face the challenges of restoration and environmental management, as described in this thesis.

It is too late to retrieve the ten years of planning, frustration, and delay that have so far elapsed, nor is it likely that CERP could be reauthorized in the current national budget climate. Instead, the Corps can take a hard look at the constitutive barriers that have stood

climbed from 7% to 12% in the FY2012 budget, categorized under the "Environment" business line since 2007 (USACE, 2006, 2007a, 2008, 2009b, 2010, 2011a).

in the way of fully engaging with partners and learning from successes and failures. They (and the nation) must choose one of two options to truly push the agency's capabilities forward towards ecosystem management and restoration:

Option #1: Aggressively and explicitly pursue institutional learning. This bottom-up approach would require managers to examine their own and their agencies' values and expectations and actively look for (and be rewarded for) collaboration both within and outside of their home districts or agencies. Managers, engineers, and scientists must be willing to make the best decisions possible with the information at hand and then be ready to listen to constructive criticism and adapt the very constitutive structure of their decision making process itself for the next time. Within restoration programs such as the Everglades, the agency's interpretation of several federal laws (i.e., their responsibilities under FACA and CWA) is overly restrictive and fundamentally bars information-sharing and governing adaptively with partners. Practitioners must remember that the bureaucracy that governs the process was put in place in order to codify the needs of the public, and if that very bureaucracy is not allowing those needs to be met it may be acceptable to stretch interpretations and practice to allow for greater flexibility and adaptiveness.

Option #2: Separate integrative, comprehensive ecosystem management for areas under the Corps' jurisdiction into a new mission or sub-agency. At the more ambitious scale, despite the commitment and good-faith efforts of the members of the Jacksonville district, the Corps of Engineers may not be the right agency to take on environmental restoration as it is currently structured. Its cultural biases towards action, construction, exploration, and centralized planning run deep, and previous mission realignments have not fundamentally altered them so far. The deep wells of engineering expertise held within the agency will continue to be essential to restoration work, but it may be more appropriate to have the Corps truly fill the role of consultant to client natural resource agencies (as numerous interviewees described the Corps' current conception of itself as being). This top-down approach would involve reorganizing the structures for large-scale ecosystem restoration, and vesting leadership, power, and funding for such activities either in a different agency (for example, the EPA or FWS) or in a hybrid agency bringing together disciplinary experts and interdisciplinary leaders to manage all components of the ecology and human geography of a place. There would be immense logistical and budgetary challenges to such a hybrid (state/federal, engineers/ecologists, §404 regulators/restoration staff, flood managers/endangered species managers, etc.) entity, but there is precedent for such a dynamic, problem-solving body. That precedent comes from within the Corps of Engineers itself, during the two-year collaborative process of producing the Restudy of the C&SF: the document that became CERP.

6.3 What the future brings

"These are tough times," Shannon Estenoz of the DOI said in May 2011 (Stapleton, 2011). As of this writing, recently-elected Governor Rick Scott has proposed a 66% cut in state funding for Everglades restoration and a 25% cut in the property tax collection rate that funds the work of the SFWMD. Stu Appelbaum reassured the public that since the state has contributed most of the funding for land acquisition and other early-stage restoration projects, the Corps can take the lead now and continue to push restoration forward–but environmental groups are unhappy and fear significant delays or even whole-scale de-authorization of the restoration project. (ibid.). If Scott's budget cuts go through this spring, it will mean that the Corps, previously in a supporting and planning role alongside the state of Florida, will take the lead on the entire restoration project. Their ability to work with others in the common interest and find success in restoration will be greatly tested in this time of reduced political will.

The Corps would do well to reflect, at this moment of transition, on its progress at effecting constitutive cultural change thus far. They have laid the groundwork within the Everglades restoration program for real leadership in commitment to adaptive ecosystem management. With more work, they can accelerate a transition to adaptive governance that will build upon their and their partners' strengths to continue to drive restoration forward.

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