LAURA OGDEN

The Everglades Ecosystem and the Politics of Nature

ABSTRACT In this article, I offer an institutional history of the ecosystem concept, tracing shifts in its meaning and application as it has become the key organizing principle for the Everglades restoration program in Florida. Two institutional forms are analyzed here: (1) *quasi-governmental organizations*, a term I use to describe interagency science collaboratives and community stakeholder organizations, and (2) *government bureaucracies*, which are the administrative agencies tasked with Everglades restoration planning and implementation. In analyzing these knowledge trajectories, I both document the complex networks of relations that facilitate the ecosystem's emergence as an object of knowledge and examine the bureaucratic claims to authority that circumscribe the ecosystem's transformation into policy. [Keywords: ecosystems, Florida Everglades, bureaucracy, environmental policy]

OVER A CENTURY ago, John Wesley Powell, writing in the *American Anthropologist*, grappled with defining an *institution*. Powell asserted, rather tautologically, that although we often use the term to describe organizations and even buildings, an institution is actually "the rules of conduct instituted by men for the regulation of society" (1899:475–476). Building on the work of James March and John Olsen, archaeologist Adam Smith made a similar distinction by suggesting that institutions are less formal structures "than a set of enduring procedures, routines, and values that establish the frameworks within which social and political relationships proceed" (Smith 2003:235). Seen in this light, institutions are knowledge figurations that are embodied in collectives of individuals, their practices, and various materialities. We are used to the idea that institutions have their own common sense; terms like *institutional memory, institutional culture*, and *institutional knowledge* reflect this popular wisdom. We also have some understanding of how the process of knowledge production occurs within specific institutions. Donna Haraway, for instance, investigated the ways that ideologies of race, sex, and class are situated and displayed at the American Museum of Natural History (Haraway 2004). Other scholars have examined the forms of expertise and knowledge privileged in a variety of institutional contexts, including the United Nations (Barnett 1997; Riles 1998), medical schools and hospitals (Posner et al. 1995), state welfare bureaucracies (Graham 2003), development agencies (Ferguson 1994), and academic and research organizations (Brenneis 1994; Wiegman 2001).

In this article, I aim to contribute to this literature by offering an institutional history of a scientific object of knowledge, the "ecosystem," specifically showing how this object of knowledge takes shape within environmental science and policy institutions dedicated to restoration efforts in the Florida Everglades. I trace shifts in the ecosystem concept's meaning and application as it becomes absorbed into a variety of institutional and bureaucratic contexts. In analyzing these knowledge trajectories, I show how knowledge production—in this case, environmental science—is embedded within the interests and expertise of these institutions (what we might consider larger knowledge frameworks). Two institutional forms are analyzed here: (1) *quasi-governmental organizations*, a term I use to describe interagency science collaboratives and community stakeholder organizations, and (2) *government bureaucracies*, administrative agencies tasked with Everglades restoration planning and implementation. I build on previous research on institutional knowledge production by analyzing the political interests and networks that foster and circumscribe the transfer and transformation of knowledge within and between these institutional forms. In doing so, I show how the political capital of specific institutions, particularly bureaucratic agencies of the state, ultimately determines which forms of knowledge become national policy and practice.

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There is a vast literature detailing the Everglades' environmental problems and the need for restorative interventions (for overviews, see Davis and Ogden 1994; Grunwald 2006). Changes to the Everglades landscape, which led to these environmental problems, are bound up in the nation's larger political and economic history and the state's territorial claims. When Florida gained statehood in 1845, much the southern portion of the state was underwater for periods of the year and, according to federal law, these wetlands remained under the control of the U.S. government. At that time, wetlands were considered impediments to the developmental interests of the nation, with agricultural production considered a national security interest (Vileisis 1997). The federal Swamp and Overflowed Land Act of 1850 provided a mechanism for transferring wetlands to states with the contingency that these lands be "reclaimed" for agricultural production. Drainage schemes sputtered along until 1881, at which time Florida Governor William Bloxham sold Philadelphia millionaire Hamilton Disston four million acres of Everglades land. As part of this deal, and subsequent deals with other investors, Disston was granted ownership of half of any lands his company successfully drained. Disston's efforts were fairly successful; in little over a decade he drained over 50,000 acres of land and created the first major drainage canals in the region. Needless to say, other entrepreneurs quickly followed his lead.

Without reclamation, the Everglades was considered miasmic and dangerous, uncivilized, and certainly worthless. Unleashing the value of this "derelict landscape," as David McCally has termed it (1999), required a new vision of the landscape, one we might understand as "opportunistic." Although the economic value of the Everglades lay in its productive potential, it is clear that this new vision resonated with less tangible promises, such as the possibility of a "fresh start" within an exotic landscape. In a sales brochure published in 1914 by the Okeechobee Fruit and Lands Company, we witness the emergence of this new vision:

> If you are not making a financial success in your present environment; if your health requires a perfect climate; or if you are sick of the drudgery of a futureless career at an office desk, come to this *land of opportunity* and settle on America's richest soil. . . . Among those people who have never visited this region there prevails an erroneous conception of its character. It is pictured as a wild, almost impenetrable swamp hidden beneath vine-laden trees—the haunt of snakes, alligators and other reptiles. Instead of these forbidding conditions, the visitor is surprised to see, extending from Lake Okeechobee to Biscayne Bay, a great, almost unbroken stretch of land, in appearance similar to the great plains of the Middle West. [1914:2–3, emphasis added]

Realizing the potential of this opportune land entailed mammoth efforts at reengineering the landscape, instigated by both the giants of capitalism, such as Henry Flagler who built the first railroads into southern Florida, and thousands of struggling settlers who quickly found that the land's productive potential was not so easily claimed (McCally 1999).

The Okeechobee Fruit and Lands Company's explicit boosterism was merely a single note in the cacophony that led thousands to buy Florida swampland sight unseen. Specially charted buses and trains brought Northeastern investors into the Miami area; on arrival, they were immediately bombarded by real estate agents seeking prospective clients (George 1986:35). By 1924, both the price of land and number of building permits issued in Miami skyrocketed, ranking it well above other southern cities in real estate development (George 1986:30). This real estate boom brought about rapid transformations of the landscape, with hundreds of acres of mangrove forests, scrubby pinelands, and inland hammocks cleared for development. Ultimately, an estimated two-thirds of the historic Everglades landscape became air-conditioned strip malls, sugar cane fields, and endless expanses of housing developments.

Early drainage efforts pale in comparison to the water management practices of the mid–20th century. In 1948, after two decades marked by disastrous hurricanes and floods, the federal government authorized an ambitious flood control and water management project known as the Central and Southern Florida Project (C and SF Project).[1] Constructed by the U.S. Army Corps of Engineers (hereafter, "the Corps"), implementation of the C and SF Project continues today and includes 1,000 miles of levees and canals, 15 square miles of interconnected water reservoirs, 150 water control structures, and 16 major pumping stations. To provide adequate flood control for the region, each day water managers divert an average of 1.7 billion gallons of freshwater to the oceans and bays, causing repeated water shortages and saltwater intrusion to the aquifer.

In response to the ecological problems caused by this reengineering, the U.S. Congress authorized the Comprehensive Everglades Restoration Plan (CERP) in 2000. Guided by the principles of ecosystem management, the restoration effort reflects the popularity of ecosystem approaches within U.S. environmental mitigation and conservation efforts, as well as academic ecology. Spanning 18,000 square miles, with costs estimated to rise beyond current projections of $19.7 billion, the Everglades restoration program is certainly one of the most comprehensive in both scale and scope (U.S. Government Accountability Office [USGAO] 2007).

The term *ecosystem* commonly is used as a heuristic device to think through the relationships between habitats and organisms, often sharing a number of implicit theoretical assumptions. The first of these assumptions is that the natural world contains identifiable ecological boundaries—albeit permeable ones—where systemic interactions between the physical environment and local biota take place. Second, these interactions produce an entity (the "ecosystem") whose overall properties are different than the assemblage of its parts. Scientists tend to conceptualize ecosystems not as static functionalist machines but, rather, as adaptable, resilient systems that gravitate toward states of internal homeostasis (Golley 1993; Jørgensen

and Muller 2000; Moran 1990). Management efforts based on the ecosystem framework generally recognize that environments are driven by complex human and nonhuman associations, and therefore they should be treated as "socioecological" systems (Berkes and Folke 1998; Redman et al. 2004).

The ecosystem's "exact moment of birth" occurred in 1935 when Sir Arthur Tansley proffered the concept in a paper entitled "The Use and Abuse of Vegetational Concepts and Terms" (Golley 1993:1–8). Tansley's "ecosystem" was thoroughly modernist, conferring a mechanistic essentialism to the study of nature, where geology, hydrology, nutrients, and organism interact systematically, like "machine theory applied to nature" (Golley 1993:2). This systemic approach excommunicated ecology's lingering romantic humanism, as Tansley saw it, which relied on anthropomorphic metaphors, such as "community," and the sense that society and nature functioned according to parallel processes (Worster 1977:301). Tellingly, Tansley's retreat from ecology in the early 1920s, when he studied psychoanalysis under Freud in Vienna, reflected a similar modernist sensibility: in other words, a yearning to translate life's mysterious magic into a knowable and predictable system.

In this article, I am not focusing on the appropriateness of the "ecosystem" as a metaphor for the articulations of human and nonhuman natures. Instead, I explore how a particular scientific object of knowledge (the ecosystem) takes shape and then in turn shapes state institutional interventions, practices, and policy in the Florida Everglades. At the same time, ecosystems are specific ways of ordering knowledge about the world, with intellectual traditions that collude with the work of managing nature. Therefore, with this article, I also explore how the conceptual boundaries of the ecosystem itself overlay with the politics of Everglades restoration. In doing so, I hope to contribute to broader theoretical investigations into the "politics of nature" by documenting the process by which a particular discourse of nature—the ecosystem—becomes redefined through its incorporation into the machinery of state and nonstate institutions. Rather than focusing on the formal politics of Everglades restoration science, as Gail Hollander (2005) and Michael Grunwald (2006) have done, I investigate the internal institutional politics of state administrative agencies and, perhaps more importantly, the discursive power of bureaucratized ideas of nature to shape the character of environmental policy.

Research for this article included participant-observation, semistructured interviews, and document analysis. I began participating in restoration planning meetings in 1997 as a staff anthropologist for the Governor's Commission for a Sustainable South Florida (hereafter, "Commission"), an organization described below. I attended meetings of the Commission from 1997 to 1999 as well as other interagency restoration planning forums, including meetings of the South Florida Ecosystem Restoration Working Group and the Science Coordination Team, a subcommittee of the working group. These organizations served as primary sites for restoration policy formation and program coordination during the late 1990s.

My understanding of Everglades ecosystem ecology is both personal and professional. My father, John Ogden, has spent his career as an Everglades ornithologist and ecologist, working most recently as a Senior Scientist for the South Florida Water Management District (hereafter, "District"). At the District, my father's role has been to coordinate restoration science and develop conceptual models for that effort. My background has granted me rather personalized insight into Everglades ecology and the science that supports restoration activities. In addition, I have participated in several efforts to incorporate social science research into Everglades ecological science, most recently as the leader of the "Human Dimensions of the Everglades" research group for the Florida Coastal Everglades Long Term Ecological Research Program (LTER), supported by the National Science Foundation. My collaboration with LTER scientists has been incredibly rewarding. At the same time, I remain unsure of how well the ecosystem works as a metaphor to guide this collaboration. The research for this article reflects my continued questioning of approaches borrowed from the natural sciences.

To reconstruct the processes by which the ecosystem takes shape as the guiding metaphor for Everglades restoration, I built on the participant-observation work summarized above by conducting 15 ethnographic interviews with biophysical scientists and policymakers involved in the restoration process. These interviews took the form of oral histories of the restoration program, with a particular focus on how scientific ideas about the Everglades changed over time. Because interview participants are all still involved in restoration planning, I have done everything possible to protect their identities in this article. Finally, I have analyzed the proliferation of official documents that articulate state agency goals, missions, and funding for Everglades restoration programs. This data includes policy papers, legislation, and formal restoration planning reports developed by the District, the Commission, and the Corps.

The rest of this article is divided into five sections. I begin with an overview of pre-ecosystem science in the Everglades. Subsequent sections chart the paradigm shifts of the Everglades as ecosystem, specifically linking changes in knowledge regimes to the institutional contexts in which they are deployed. These transformations include the ecosystem as a purely ecological concept, an ecosystem that incorporates social and economic concerns, and, finally, a bureaucratized ecosystem that essentially is a water management plan. I conclude this article by elucidating the specific cultural barriers produced by the state bureaucracies in question, which prevent certain forms of knowledge from altering institutional practice and policy.

THE PRE-ECOSYSTEM EVERGLADES

As a material landscape, the Everglades embodies thousands of years of reshaping, brought about by Ice Age

shifts, rising and falling water levels, warming temperatures, and, more recently, dredging machines, plows, and water-pumping stations. Yet its emergence as an object of scientific inquiry has a much shorter history. Scientists first began conducting fieldwork in the region in the mid-1800s, and as befitting the era's natural history paradigm, their work was focused on cataloguing and understanding the landscape's plants, animals, and geomorphology. Eminent naturalists visited the region in this early period, including Nathan Lord Britton, director-in-chief of the New York Botanical Garden; Roland Harper, one of ecology's early pioneers; and the ornithologist Frank Chapman, who was curator of ornithology at the American Museum of Natural History. Their research and subsequent publications were geared toward describing and categorizing the unique properties of the Everglades, a landscape that they considered a rare exemplar of the tropics within the continental United States. This early research was supported through various universities, private philanthropists, and natural history museums.

By the mid–20th century, Everglades research was thoroughly institutionalized into the practices of resource management agencies. The reinvention of the Everglades as a landscape of resources requiring management corresponded to the increased transformation of the landscape by other government agencies. For instance, President Truman dedicated Everglades National Park in 1947, the year before the C and SF Project was authorized. These resource agencies, such as the National Park Service and the U.S. Fish and Wildlife Service, had their own research programs, funding, and science planning efforts linked to agency missions and areas of expertise. Even so, surveys and research of Everglades biota continued to follow disciplinary traditions, with ornithologists producing studies of the region's bird life and botanists producing descriptive taxonomies of plant species.

By the 1960s, researchers at Everglades National Park, while continuing in-depth studies of specific species, began to expand their focus to consider the interrelationships among plants, animals, and biophysical space. So, for example, scientists documented the habitat-scale ecology of alligator holes, the importance of fire to Everglades wildlife and plant ecology, and the impact of environmental toxins, such as DDT, on nest productivity of ospreys. This shift in emphasis toward an understanding of relationships within biotic communities followed the gradual institutionalization of ecosystem ecology within academics and the growing concern over environmental contaminants after Rachael Carson published *Silent Spring* in 1962.

Yet at the same time, much of this Everglades community- and habitat-scale fieldwork was conducted by agency scientists whose research was bounded by agency mandates. In an interview, a biologist described research in the Everglades during this time as being narrowly constrained by the "authorities and legal and policy responsibilities" of these agencies. He went on to say that "certainly, in the [Everglades National] Park, there didn't seem to be a lot of thought of what was happening outside the Park. So the [ecological] problems were being documented in the Park, but there wasn't the sense that you could solve those problems on much larger scales, or that *you had to* on much larger scales" (interview, November 2005). This meant that if an agency scientist was conducting research on a particular species, such as the roseate spoonbill, surveying and monitoring of spoonbill would not have extended beyond the boundaries of the park. Moreover, agency administrators discouraged their scientists (by controlling research funds and use of equipment such as boats or airplanes) from conducting research outside the geographic boundaries of their institutionally defined territories. These organizational barriers certainly made it more difficult for scientists to develop a broader understanding of the Everglades as a larger watershed and, importantly, as a landscape produced by nearly a century of drainage and flood control measures.

THE EVERGLADES AS ECOLOGICAL ECOSYSTEM

In the mid-1980s, environmental organizations concerned with the seemingly catastrophic losses of Everglades habitat, water quality, and biota began to demand a shift in the way natural resource agencies approached Everglades management and research. As one agency scientist described it, "environmental organizations really provided the leadership in the 1980s to bring about this sort of system-wide perspective. And they are the ones who went to Washington and lobbied . . . in a very qualitative sense, [environmental organizations] understood that the Everglades was deteriorating" (interview, November 2005). Although a detailed history of this environmental activism (and related litigation) is beyond the scope of this article, these environmental organizations—such as the Audubon Society, the Friends of the Everglades, and the Everglades Coalition—drew on their political connections to influence state-supported research in the Everglades.[2] They did so by calling on powerful bipartisan allies to lobby cabinet and upper-division agency policymakers to push for larger-scale science and management strategies for the Everglades.

Environmentalists' efforts would not have been successful without their ability to use decades of field research and monitoring to justify their claims that a new approach to managing the Everglades was necessary. Ironically, most of this data were collected by scientists working for state and federal resource and land management agencies. As one agency scientist recalled, "The translation of what the scientists were doing and what they were beginning to document in terms of ongoing and accelerated degradation of the system . . . wasn't direct from the agency scientists to the agency managers" (interview, November 2005). Instead, environmental NGOs such as the Everglades Coalition acted as conduits between the science community and senior administrators working within natural resource agencies. This political pressure helped transform the culture of applied Everglades science and management, allowing for interagency collaboration and planning.

Academic ecosystem ecology thus entered the discourse of Everglades science through actors external to the state—environmental NGOs. However, the resulting shift in agency science policy facilitated the redrawing of conceptual boundaries for Everglades science, and thus the conceptual boundaries of the landscape itself, as well as the collaboration of agency scientists with academic scientists. In October 1989, 300 scientists attended a weeklong Everglades science meeting in Key Largo, Florida. The meeting was supported by the National Park Service and the District, reflecting resource agencies' new commitment to interagency cooperation. C. S. "Buzz" Holling, one of the leading proponents of ecosystem ecology, at the time at the University of British Columbia, provided intellectual focus to the meeting, insisting that participants consider the dynamics of Everglades ecology at various spatial and temporal scales. For many in the Everglades science community, this Everglades conference represented a "turning point" in the history of their research. Prior to this event, there had been very little formal interaction among scientists conducting Everglades research. By spending a week together, scientists were able to synthesize their knowledge, much of it unpublished. As one participant described it, "We began to realize what we did know collectively about the Everglades for the first time. And when we thought about it in terms of spatial and temporal scales . . . it all started coming together" (interview, November 2005). The Key Largo conference and subsequent interagency science meetings represent the very early stages of institutionalizing the "ecosystem" as an organizing principle for Everglades ecological research and management directives. Subsequent publications reflected an ecosystem perspective, detailing landscape-scale phenomenon such as the relationship between climate change and sea-level rise, fire patterns, and total-system hydrologic models (Davis and Ogden 1994; Porter and Porter 2001).

Despite this broadened perspective, the ecosystem that emerged from these early interagency planning efforts reflected the natural resource mandates of the participating agencies. This Everglades ecosystem did not synthesize human and biophysical variables into conceptual models or research agendas. Instead, humans figured into the ecosystem as "stressors" or "drivers of change" to the natural system, with humans treated as abstract agents external to the ecological world. As an example, "agricultural practices" were conceptualized as drivers that stressed the nonhuman environment by increasing phosphorous loads in a previously nutrient-poor landscape. This stress, in turn, led to the spread of phosphorous-loving cattails and subsequent displacement of endemic vegetation and animal habitats. Missing from this vision of the Everglades ecosystem was the recognition that human communities have different histories and varying access to resources and power and that they, therefore, may be differentially affected by environmental transformations, including restoration activities. To follow through on the previous example, why and to what extent phosphorous loads become a part of the Everglades landscape is a very different story if "agricultural practices" indicates a family-owned tomato farm or industrial-scale sugarcane production. The disembodied "drivers" of phosphorous loads include agricultural extension agents, white-collar farm managers, migrant workers with varying degrees of legal autonomy, folks who own a John Deere tractor and a barely serviceable pickup truck, fertilizer salesmen, and so forth. These agriculturalists are differentially embedded in global and national commodities markets (and related trade agreements, restrictions, and discourses of national security) and certainly differ in their capacities to alter production practices and in their vulnerabilities to change.

THE SOCIOECOLOGICAL ECOSYSTEM

The ecocentric focus that characterized this emergent Everglades ecosystem did not reflect the interdisciplinary emphasis found within ecosystem studies at that time. National and international organizations concerned with environmental sustainability were shifting the ecosystems discussion to highlight the interconnections (and disconnections) between human and nonhuman landscapes. For example, the National Research Council and the White House Task Force on Ecosystem Management, under the William Jefferson Clinton administration, were not only stressing issues of local biophysical ecology but also calling for management approaches that addressed societal concerns (Peine 1999). This "socioecological" ecosystem included consideration of economic development, social and environmental equity, "green" technologies, and environmental education and literacy at the community level. In effect, these conceptualizations of the ecosystem mirrored the discourse of sustainability and sustainable development (Cortner and Moote 1999; Dower et al. 1997).

It took several years, though, for the socioecological ecosystem to influence Everglades research and restoration planning. A closer examination of how this paradigm shift occurred grants us greater insight into how scientific ideas and applied policy frameworks spread across various institutional boundaries. As I demonstrate in this section, innovations to the ecological ecosystem were facilitated by the participation of "quasi-governmental" organizations in the planning process. These new knowledge collectives included a variety of nonstate actors, while at the same time retaining critical linkages to state authorities. Quasi-governmental organizations produced a new vision of the ecosystem, one that superimposed social and economic concerns on the ecological landscape.

The U.S. Man and the Biosphere Program (USMAB) exemplified the trend of closely aligning "ecosystem management" with the concepts of sustainability and sustainable development (McCormick 1998). In the early 1990s, the Human-Dominated Systems Directorate of USMAB chose the Everglades as a case study for developing "real world" ecosystem management principles. From June 5 to June 16, 1994, USMAB organized a collaborative workshop, held in Isle au Haut, Maine, to develop recommendations for Everglades ecosystem restoration. Approximately 100

Everglades experts attended this meeting, including biophysical and social scientists, resource managers, legal and policy specialists, and representatives from Florida agricultural interests. At this meeting, participants seriously considered the Everglades as a landscape with human attributes that were conceptualized beyond their role as stressors to the natural system (USMAB 1994b). Moreover, participants concluded that ecological restoration could and should be compatible with regional agricultural and urban interests (USMAB 1994a). The resulting recommendations link the recovery of Everglades biological diversity and ecological function to a planning process promoting a "shared vision of desired human/environmental conditions" (USMAB 1994b:6). The report is strongly worded, arguing that restoration would fail without a serious consideration of quality-of-life and economic-sustainability issues.

In an attempt to apply a "shared vision" to regional environmental planning, former Governor of Florida Lawton Chiles established the Governor's Commission for a Sustainable South Florida. The Commission did not emerge in response to USMAB recommendations but instead reflected the pervasiveness of the sustainability discourse within U.S. environmental policy circles. From 1997 to 1999, I served on the Commission staff as a consulting anthropologist, where I helped to develop a social science research agenda for Everglades restoration planning.[3]

The Commission was a formal advisory board whose members included elected city mayors, county commissioners, board members from two regional planning councils and the District, representatives from the Florida Senate and House, economic concerns (such as agriculture and real estate), and civic and environmental organizations. Appointees were all fairly visible representatives of their interest group or organization, such as the secretary of Florida's Department of Community Affairs and the senior vice president of the U.S. Sugar Corporation. Members also represented a multitude of seemingly intractable positions. For example, the commercial agricultural community was exceedingly concerned that restoration-related changes in water allocation would put them out of business, whereas environmentalists had publicly lambasted agriculture, particularly sugar cane growers, as unmitigated despoilers.

The charge of the Commission was to make recommendations for "regaining a healthy Everglades ecosystem with a sustainable economy and quality communities" (GCSSF 1995). Reaching consensus on a set of guidelines to realize this charge, outlined in its *Initial Report* (GCSSF 1995), took 17 months of intensive diplomacy and reflected the members' commitment to the organization and process (Ogden 2006). The resulting vision for sustainability was integrative and holistic, reflecting the conflation of the sustainability rhetoric with ecosystem studies. This said, the Commission approach to conceptualizing its integrated vision, and subsequent processes for developing policy recommendations, served to disentangle the *socio* from the *ecological*. The Commission illustrated its sustainability vision using an icon of three overlapping circles representing the domains of the economy, society, and the environment, with the understanding that "sustainability" required the vitality of all three domains. The Commission subcommittees, where the actual work of policy formation took place, mirrored this trifurcation. For instance, the "Quality Communities Committee" seemed to address everything that was not specific to natural system restoration or water management protocols (issues taken up by other committees). A committee member's stream-of-consciousness remarks during an August 1998 meeting reflected the grand scope of the Committee's concerns:

> It's about quality day care, health care, and education training and whether they are available and affordable . . . what about conception? This includes in-utero [fertilization] which is a big thing for me, because health care should meet the needs of all ages. Kids are ready to learn and they have to be encouraged when they start school. Remember that the two top priorities for educational success are the child's socioeconomic level and the mother's ability to read. . . . Mass transit should be readily available and affordable to get people from home to school to work to play and to decrease sprawling. [Oyola-Yemaiel 1999:225–226]

Even so, the committee developed thoughtful and politically charged recommendations, including the creation of urban development boundaries (GCSSF 1995), the implementation of "full-cost accounting" for restoration projects (GCSSF 1998), and a report on sustainable energy policy (GCSSF 1997).

Conversely, other committees were particularly focused on natural system restoration and water resources issues, working in parallel with other restoration initiatives. In 1992, the U.S. Congress directed the Corps to develop a plan to address the ecological problems caused by the C and SF Project. In response, the Corps led the effort, referred to as the "Restudy," to develop a "comprehensive plan" for modifying the C and SF Project. The Commission was critical to the eight-year Restudy process, as the Commission served as the primary vehicle for including nonagency perspectives (the "public") into the plan. In this role, the Commission developed a conceptual plan for the Restudy that included ten specific "concepts" that it felt should guide the Corps plan for modifying the C and SF Project (GCSSF 1996). These concepts ranged from increasing the spatial extent and quality of existing wetlands to controlling invasive species, developing water supply and flood control measures for urban and agricultural areas, and creating particular recommendations for increasing water storage throughout southern Florida. Emphasized throughout the conceptual plan is the idea that these environmental and water management issues are "inseparable" from a "sustainable economy and quality communities" (GCSSF 1996:13). President Clinton signed a bill that directed the Corps to use the conceptual plan of the Commission as a blueprint for restoration (GCSSF 1996; Grunwald 2006).[4] The Corps and District's final report to Congress on the Restudy's findings specifically reference the socioecological vision of restoration articulated by the Commission (USACE 1999). The idea that the

built and nonbuilt environments are "inextricably linked," and thus mutually interdependent, is repeated throughout subsequent government-planning and strategy documents that outline restoration principles (South Florida Ecosystem Restoration Task Force [SFERTF] 2002; USACE 1999).

Much of the institutional context for the emergence of the socioecological Everglades ecosystem is situated in what we might consider quasi-governmental organizations—such as the Commission, the USMAB program, or various interagency science planning efforts. They are "quasi" in that although their directives mirrored that of state administrative agencies—such as the welfare of the environment and the region's citizens—these organizations were not actually state agencies with the power to act on recommendations. Quasi-governmental organizations look like government. They perform many rituals of modern state power, including the evocation of endless acronyms, a strict reliance on technoexpertise, and, in the case of the Commission, deference to men in uniform. Yet, although government agencies dedicated hundreds of thousands of dollars to support these planning efforts, none of this funding, or related staffing, was directed toward restoration implementation. This fiscal deficit and limitation of authority ultimately meant that the ecosystem, as an object of institutional knowledge, would become further transformed when embedded within the knowledge frameworks of government agencies charged with restoration implementation, as I discuss in the next section.

THE ECOSYSTEM AS WATER MANAGEMENT PLAN

The U.S. Congress authorized the Comprehensive Everglades Restoration Plan (CERP) in 2000.[5] Reflecting the history of using bureaucratic boundaries to define "natural" borders, the law defined the spatial extent of the Everglades ecosystem as all the lands and water within the jurisdiction of the District, the administrative agency in charge of the daily management of the C and SF Project. The District's jurisdiction spans most of southern Florida—from its wetlands and agricultural fields to its rural towns and metropolitan Miami. This spatial extent encompasses a striking array of human and nonhuman geographies (see Figure 1). Mirroring this broad understanding of the ecosystem's attributes, the law specifically requires CERP to be implemented so that benefits incur for both the "natural system" and "human environment."

This seems to be a story of scientific consensus emerging from disparate institutional domains to inform the direction of U.S. natural resource policy. Yet the research, institutional commitment, and funding necessary to implement a "shared vision" of human–environmental sustainability has been "watered down" at best since CERP was authorized. Instead of addressing the social and economic concerns articulated in previous visions of the ecosystem, CERP's primary focus is reengineering the existing regional water management system. There are over 60 components of CERP, each of which is a large-scale water storage, water treatment, or water delivery project. For instance, a key component of the plan calls for building 300 wells designed to store water in the upper Floridan aquifer. Although this well system, called Aquifer Storage and Recovery, is a fairly controversial aspect of the plan (National Research Council, Committee on Restoration of the Greater Everglades Ecosystem 2002), supporters contend that it will allow 1.6 billion gallons of water a day to be pumped and stored underground.

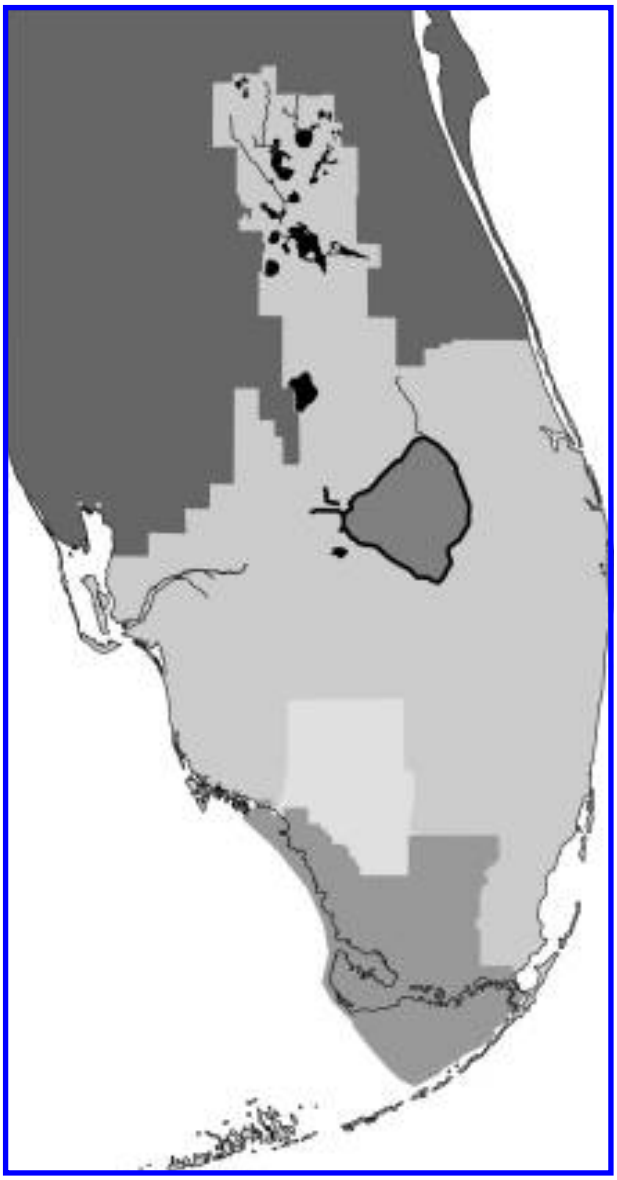

FIGURE 1. Lighter shaded areas represent the spatial extent of the Everglades Restoration Program. Lake Okeechobee is in the center of the map; the Big Cypress National Preserve and Everglades National Park are highlighted to the south. (Map courtesy of the South Florida Water Management District)

The enabling legislation set the course for this transformation by granting oversight of CERP to specific agencies, with the Corps and the District designated as co-lead agencies. Although the Corps and the District receive the majority of restoration funds, agencies within the Department

of the Interior—in particular, the National Park Service and the Fish and Wildlife Service—have a considerable stake in restoration funding (Sheikh and Carter 2006). In 2005, federal restoration–related budgets totaled $270 million, with approximately $125 million allocated to the Corps and $106 million to agencies within the Department of the Interior (SFERTF 2005). With these appropriations, the ecosystem became institutionalized into these agencies' rules of process, legally defined missions, and areas of expertise. As I demonstrate in this section, bureaucratizing the ecosystem produced a conflict between one kind of institutional knowledge (the ecosystem) and another kind of institutional knowledge (the expertise and specialized administrative functions of these agencies). This conflict resulted in a highly circumscribed version of the Everglades as ecosystem and reveals much about the barriers to integrating science-driven policy into governmental practice.

The rationale for allocating restoration responsibility to these agencies deserves further inquiry. First, allocating oversight to these agencies was based on their considerable experience with the Everglades, a form of institutional knowledge and political capital. The literature on U.S. natural resource agencies suggests that, like most bureaucracies, the most successful agencies (defined in terms of budgets, staffing, and public support) are those that are able to stake out specific terrains of expertise and defend them (Clarke and McCool 1996). Historically, drained and developed portions of the Everglades were managed to meet the region's increasing water demand and flood control needs, with lesser developed areas treated as discrete entities managed to protect native habitat and species. Moreover, specific federal and state agencies were assigned administrative oversight over these different Everglades, with the Corps tasked with the construction of the C and SF Project, the District granted oversight over the C and SF Project's operations, and agencies from the Department of the Interior authorized to manage lands considered "natural." Although these agencies appear to have failed in their environmental stewardship roles, ironically this long-term association has granted them a sort of historically determined expertise to speak for the landscape.

Second, restoration funders, such as the U.S. Congress, perceive the Corps and the District to have the technical expertise to "fix" the problems in the Everglades, although environmentalists and other critics of the Corps certainly do not share this confidence. Timothy Mitchell reminds us that the politics of technoexpertise demands that technical failures, such as the intertwined environmental and public health crises brought about by the building of the Aswan Dam, be characterized as "minor issues of the improper implementation of the plans, unexpected complications, bureaucratic delays" and the like (2002:42). Foundational to the discourse of Everglades restoration is the lament that no one could have predicted the C and SF Project's "unintended impacts" to the natural system (USACE 1999:iii), ample evidence of decades of public concern notwithstanding. This same narrative of technopolitics lays to rest any doubts regarding the agencies' failure of perspective by historicizing the C and SF Project's goal, which was to control hydrologic conditions that were "hampering economic development," and by emphasizing the project's success at meeting these goals (USACE 1999:iii).

James Ferguson makes a similar point in his ethnography of development in Lesotho, where development agencies propose to tackle "problems" that mirror the largely technical "solutions" that development agencies are able to provide (1994:70). In this vein, the previous record of the Corps success grants them the expertise to recommence another equally large-scale reengineering of the Everglades. Underlying this approach is the certainty that problems can be solved by controlling their underlying processes, even when these processes are poorly understood, hard to predict, nonlinear, and complex in nature (Holling and Meffe 1996:329).[6] In the case of the Everglades, what can be controlled with the least uncertainty is regional water supply and delivery. Envisioning the Everglades as a water management system is one way of collapsing the messiness of regional environmental and social relationships into a set of technological problems that have imagined solutions. Moreover, the ecosystem as water management system dovetails with the landscape's reigning technopolitics and the concomitant solutions that the Corps and the District are able to provide.

The paradigm shift that marks the transformation of the Everglades socioecological ecosystem into a water management plan arose as the ecosystem moved from the purview of quasi-governmental to bureaucratic agencies of the state. The role of experts in this metamorphosis was critical. The Commission relied extensively on technical experts to help shape members' understanding of particular social, ecological, and water management concerns. As the Commission working committees separated the ecosystem into specific domains of inquiry ("Livable Communities" for instance), the experts they called on came from very difficult institutional contexts. In general, the experts advising the Commission on the *socio* aspects of their charge were social scientists not associated with agencies involved in Everglades restoration planning. For instance, Robert Bullard, then-director of the Environmental Justice Resource Center at Clark Atlanta University, made a presentation to the quality communities committee on environmental equity and strategies for including minorities in environmental planning on October 15, 1998. Numerous academic economists from the University of Miami and University of Florida, as well as economists employed by local and national consulting firms, helped the Commission prepare the *Report on Full Cost Accounting* (GCSSF 1998).

However, the experts guiding the Commission recommendations for natural system restoration and reengineering the C and SF Project were decidedly insiders, technicians and biophysical scientists engaged in parallel restoration planning efforts such as the Restudy. For example, hydrologists from the District made presentations on hydrologic modeling, national park biologists discussed

phosphorous-induced changes in vegetation and problems with exotic species, and the Corps provided briefings on the Restudy and other projects. One agency ecologist described the Everglades science community's interactions with the Commission as a "slew of science meetings . . . over a period of a year or so. The scientists would sit down with commission members to work through what *is the science* involved here [in the Everglades]" (interview, October 2005).

Less formally, dozens of agency experts were also available at each meeting in case Commission members required clarification on a technical or scientific issue. Each of these technical experts was engaged in other planning efforts, such as Restudy teams or the South Florida Ecosystem Restoration Working Group and its multiple subcommittees. Mary Dengler, in her recent examination of the Restudy's collaborative governance process (2007), documents the overlapping memberships of participants in these various planning and science forums. Of 40 participants Dengler interviewed, 16 individuals belonged to three or more different restoration planning committees (2007:432–433). The intersections of these individual experts created a network of relations among discrete institutional knowledge sites. These relations facilitated the incorporation of applied Everglades ecological frameworks into the emerging vision and definition of the ecosystem of the Commission, as well as integrating the Corps and other resource agencies' rationale into the Commission's own restoration recommendations. The extent of agency participation in the decision-making process of the Commission is reflected in the conceptual plan's acknowledgments (GCSSF 1996). Of the 54 individuals cited, all but 16 were employed by state or federal administrative agencies (GCSSF 1996).

Conversely, the experts the Commission relied on to make its social and economic policy recommendations were not integrated into this broad network of relations. These experts did not attend the multiple and overlapping committees that set restoration policy, nor was their particular expertise reflected in the organizational structure and missions of participating agencies. Their expertise lay outside the boundaries of the technopolitics of restoration and therefore had little chance of transforming the institutional knowledge of the restoration effort. To some degree the socioecological paradigm of the Commission amounted to the addition of social and economic concerns to an existing conception of an ecological ecosystem, a bifurcation of the world common to many socioecological ecosystem efforts.[7] The restoration program's network of relations, and the barriers of entry to this network, facilitated the subtraction of the *socio* from the *ecological*.

Science often seems to take on a life of its own as it becomes institutionalized, making it a particular species of capital, as Nathan Sayre demonstrates in his environmental history of ranching and land management at the Buenos Aires National Wildlife Preserve (2002). In his study, Sayre shows how the science that supports management paradigms (such as "carrying capacity") is selectively evoked and applied to meet the bureaucratic mandates of land management agencies. This process requires the bureaucratization of these ideas into a set of procedures and practices that structure the ways in which the world is acted on and apprehended (Sayre 2002:xxiv). In the case of the Everglades, the ecosystem of quasi-governmental organizations remained imaginary, a heuristic to think through an imagined future of South Florida environmental and social sustainability. With its bureaucratization, the ecosystem became circumscribed into a set of technical practices that could be implemented, mirroring the expertise of the agencies in charge.

DISCUSSION AND CONCLUSION

Hugh Raffles, in his evocative *In Amazonia* (2002), recalls his surprise at discovering the extent to which the streams and tributaries of Igarapé Guariba had been transformed by region's inhabitants. Instead of the pristine Amazonia of popular and scientific accounts, Raffles discovers a landscape of coproduction, a nature constituted through the agencies of humans and nonhumans. In contrast, although real estate developers advertise homes along drainage canals and retention ponds as "waterfront property," the transformations of the South Florida environment are hardly subtle. Yet the restoration program's institutional boundaries and related claims to expertise create a monocular vision of the landscape not dissimilar from the Amazon as pure nature. In this case, the Everglades is imagined as an ecological landscape overlaid with a water management system, disarticulated from the social and natural processes that continue to reshape it.

The ecosystem's circumscription speaks to the mechanisms of boundary keeping practiced by "modern officialdom," as Max Weber called state bureaucracies. Weber characterized bureaucratic authority as claims over "fixed and official jurisdictional areas" of expertise (1982:327). Michael Barnett's thoughtful portrayal (1997) of his experiences as a political officer for the U.S. Mission to the United Nations during the Rwandan genocide furthers our understanding of what jurisdictional boundary keeping entails. As Barnett found, bureaucracies privilege forms of knowledge that dovetail with the "facts" of the bureaucracy and subsequently ignore forms of knowledge that jeopardize the bureaucracy's self-interest. Barnett tells us that his stature as an "expert on Rwanda" was granted through his knowledge of the "culture of the policy-making process in the U.S. government and the U.N." rather than the "particulars about Rwanda" (1997:554). In other words, new figurations of knowledge that do not mesh with the bureaucracy's existing knowledge frameworks and self-interest were less likely to alter these organizations' ways of knowing and acting in the world.

Since the authorization of CERP, the Commission has been disbanded and its members have returned to their respective "home" institutions. At the same time, new quasi-governmental organizations have emerged, including novel variants of interagency science planning organizations. It is too soon to evaluate their potential impact on restoration

implementation, particularly because the State of Florida has grown increasingly dissatisfied with the federal government's pace at implementing restoration projects. This emerging schism will certainly shape future ideas about the boundaries and characteristics of the Florida Everglades and the practice of restoration.

Anthropologists and others within science and technology studies have long critiqued the universalizing truth-making claims of scientific practices and epistemologies, many emphasizing the imbrications of scientific knowledge and modern state power. Science becomes, in many of these examples, a sort of handmaiden of the state: fostering and legitimizing state attempts to order, classify, and control resources and people. Certainly, one of the ways states exercise power is by setting bureaucratic and legal boundaries on various ways of thinking about and acting on nature, often calling on scientific or technical knowledge to defend these claims (Fairhead and Leach 1996; Guha 1989; Neumann 1998, 2004; Peluso 1992, 2003). But states, like the cultures and places they seek to engineer, are hardly monolithic entities (Abrams 1988; Li 2005; Moore 2005). Instead, modern states control resources and peoples through a profoundly complex architecture of administrative agencies, quasi-governmental organizations, and a variety of nested and overlapping private–public "partnerships." These institutional contexts are sites of political contest, having their own cultures, histories, and terrains of expertise to defend and stake out. This example suggests that an anthropology that seeks to understand the relationship of science to state claims of authority needs to attend to not only the formal politics of scientific production but also the power relations within and among state and quasi-state institutional assemblages.

Laura Ogden Department of Sociology and Anthropology, University Park Campus, Florida International University, Miami, FL 33199

NOTES

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1. In 1926, a hurricane destroyed 13,000 homes and farms along Lake Okeechobee's eastern edge, leaving over 400 dead. Two years later, another hurricane struck the region causing the earthen dike around the lake to fail. In an hour's time, over 2,000 people drowned, many of them African American farm workers.

2. Both the Everglades Coalition and the Friends of the Everglades were established in the late 1960s in efforts to halt the construction of a jetport within the Big Cypress Swamp. Majory Stoneman Douglas founded the grassroots Friends of the Everglades in 1969; today the organization has approximately 4,000 members. The Everglades Coalition is an alliance composed of 45 state, local, and national environmental and conservation organizations.

3. I would like to acknowledge and thank Dr. Barbara Johnston for her mentorship during my time on the Commission staff. My appointment was funded through a joint Society for Applied Anthropology and U.S. Environmental Protection Agency program, which Johnston initiated and directed.

4. Congress, through the Water Resources and Development Act (WRDA) of 1992, directed the Corps to conduct a comprehensive review of the C and SF Project. WRDA 1996 authorized the Corps to develop a comprehensive plan for Everglades restoration and included a process for interagency governance and decision making with the recommendation that the Corps "consider" the conceptual framework of the Commission.

5. The Comprehensive Everglades Restoration Plan was authorized through WRDA 2000.

6. An anonymous reviewer of a previous article (Ogden 2006) suggested the relevancy of the Holling and Meffe (1996) to me, for which I am grateful.

7. Contemporary ecosystem studies tend to conceptualize humans as being both of ecosystems and outside ecosystems. This curious positioning arises with the claim that humans, geology, animals, plants, nutrients, and so forth are all integral components of ecosystems, while at the same time, humans receive critical "services" from ecosystems (such as fresh water and clean air) and human behavior alters ecosystems ("feedbacks" to the ecosystem).

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