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Full Cost Accounting:  
An Economic Evaluation Framework For Decision-Making  
In Everglades Restoration Efforts

By

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**ABSTRACT**

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Full Cost Accounting: An Economic Evaluation Framework  
for Decision-Making in Everglades Restoration Efforts

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Everglades ecosystem restoration will require more than twenty years of commitment and will likely cost several billion dollars. The United States Army Corps of Engineers, a federal agency, and the South Florida Water Management District, a state agency, are the two primary parties responsible for its success. As the two agencies design and construct restoration projects, both attempt to adequately reflect in their decision process the benefits and costs derived from the implementation of their respective policies. However, many environmental and social benefits and costs are overlooked or not adequately addressed in their decision-making processes. Full cost accounting is an economic evaluation approach which attempts to identify, quantify, and, where possible, monetize these overlooked benefits and costs. The implementation of full cost accounting by both these agencies would enhance the amount of information available to them for policy decisions and would likely result in more informed and better quality decisions and policy for Everglades restoration.

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## INTRODUCTION

Everglades restoration is the largest ecosystem restoration ever attempted, and commands the attention of not only the United States, but the entire world. Accordingly, vast sums of money are being channeled toward restoration projects, from federal agencies to local and state agencies alike. Numerous non-governmental organizations (NGOs), such as the National Audubon Society and The Nature Conservancy, and local community organizations have also dedicated their time and money to help facilitate the successful completion of the effort. Current predictions imply that restoration of the ecosystem will require more than twenty years of commitment by all parties involved and will likely cost several billion dollars. Massive losses of wetlands and flora and fauna, notably wading birds and the Florida Panther, the sea grass dieoffs in Florida Bay, and the endangerment of Everglades ecosystem keystone species (organisms whose own health and population numbers mirror the health of the ecosystem in which they inhabit), including the Snail Kite, have spurred this display of dedication and financial commitment.<sup>1</sup>

The United States Army Corps of Engineers (Corps), a federal agency, and the South Florida Water Management District (SFWMD), a state agency, are the two primary parties responsible for Everglades restoration. As of November 1996, Congress dedicated fifty percent federal matching funds to a local state sponsor, the District and/or others, for restoration projects. The Water Resources Development Act (WRDA) also contained a stipend of seventy five-million dollars to be used within three years for "Critical Projects" vital to effectuate Everglades restoration.<sup>2</sup> As the two agencies design and construct restoration projects, by law, both must attempt to adequately reflect in the decision-making process the benefits and costs derived from their respective policies.<sup>3</sup> The purpose for performing these evaluations is simple: to prevent the implementation of projects that result in greater social and environmental harms than the projects attempt to correct. For example, as part of the Central and Southern Florida (C&SF) Project, the Corps spent millions of dollars to straighten the Kissimmee River in an effort to alleviate flooding; however, it neglected to fully consider the environmental and social consequences associated with such an undertaking. Upon completion, the environmental side effects

immediately appeared, prompting the Corps years afterwards to question its own project.<sup>4</sup> Today, it plans to spend approximately 500 million more over the next ten years to restore the Kissimmee River to its historical meandering path.<sup>5</sup>

Everglades restoration remains an extremely complicated and expensive proposition. However, the need to identify and quantify social and environmental benefits and costs is essential, even if the effort requires additional funding and complicates the decision-making process. Arguably, if such evaluations were performed and incorporated into decisions during the development of the C&SF Project, it might not have ever been undertaken. This practice of identifying and quantifying social and environmental benefits and costs is commonly referred to as full cost accounting.<sup>6</sup> Most agencies, including the Corps and the SFWMD, do not use full cost accounting. The difficulties in identifying the vast range of potential unexpected benefits and costs from a particular decision, as well as the challenges in accurately assessing them, deter the widespread use of full cost accounting by governmental agencies and private industry.

This paper distinguishes the various interpretations of full cost accounting, identifies the economic and environmental assessments performed by the Corps and the SFWMD for environmental restoration projects, and explores the feasibility and impacts of the adoption of full cost accounting for decision-making by these two entities. If the agencies embrace full cost accounting, the practice should further inform decisions for Everglades restoration by promoting a better understanding of the true costs and benefits attributable to policy decisions.

## **BACKGROUND**

Prior to the 20th Century, the Everglades ecosystem encompassed more than four million acres of wetlands and supported rich and abundant populations of flora and fauna. Vital to the sustained health of this entire ecosystem was the "lifblood" of the Everglades - water. Beginning in the Kissimmee Chain of Lakes, water flowed into Lake Okeechobee, where it collected and subsequently dispersed into a sheetflow over the "River of Grass." These headwaters also nourished several highly biologically productive estuaries, including the Caloosahatchee and the St. Lucie. Water distributions continued to flow in the Everglades through sloughs, notably Shark River and Taylor sloughs, and eventually filtered into Florida

Bay. The Everglades ecosystem began in the Kissimmee River Basin and extended through the Florida Keys.

Perhaps the most important aspects of the original system before human intervention were the natural timings, distributions, qualities, and volumes of fresh water nourishing the Everglades ecosystem. In the wet seasons, the system could successfully store the excess water in its wetlands and redistribute it for future use during the natural droughts in the dry seasons. Further, the water entering the ecosystem from Lake Okeechobee, rainfall, and other sources contained relatively minute amounts of nutrients, primarily low levels of phosphorous. The vast expanses of wetlands and the clockwork distributions of freshwater during the wet and dry seasons accommodated a unique combination of wildlife and habitats found nowhere else on Earth.

The geography of South Florida defined the path of sheetflow dispersions descending from Lake Okeechobee, and ultimately the boundaries of the Everglades ecosystem. While most of the internal lands in South Florida are relatively low lying areas, not more than a few feet above sea level, a coastal ridge exists on the eastern fringes of the Florida peninsula that lies ten to sixteen feet above sea level. Moreover, the lands bordering the western boundary of the Everglades lie several feet higher than the lands to the east. As a result, water flowed between both the coastal ridge and the higher elevated lands in the west, now known as Big Cypress National Preserve, and funneled into the Everglades.<sup>7</sup>

## **DEVELOPMENT OF SOUTH FLORIDA**

Most initial human habitation and development were confined to the coastal ridge in the east to avoid the seasonal flooding of the region. Migration to the area blossomed with the completion of Henry Flagler's railroad on the eastern ridge. Areas that once remained relatively inaccessible became open for habitation and development. These early pioneers touted the region and ecosystem as a paradise for sportsman and vacationers. By the 1940's, South Florida housed a thriving human population supported to a large extent by tourism and agriculture.

With the arrival of several hurricanes in the 1920s and 1930s, and the subsequent flooding of the region, Floridians called for Congress to protect them from the seasonal water fluctuations. In response, Congress authorized the Corps to construct the Central and Southern

Florida Project, a series of levees, dikes, and canals. In essence, the Corps received the authority to drain significant amounts of wetlands in the Everglades to provide flood protection and water supply to the growing human populations on the east coast. Beginning in 1948, the Corps dredged and filled hundreds of miles of wetlands and successfully implemented the C&SF Project. With guaranteed flood protection and water supply provided by the federal government, and with the desiccation of thousands of acres of pristine wetlands, development in South Florida exploded. For the inhabitants of the region and the land speculators, the draining of the seemingly worthless swamp was a boon. Native Americans, including the Miccosukee and Seminole Indians, and the flora and fauna of the Everglades necessarily yielded to the development pressures resulting from the rush of immigrants from the northern states and Latin America.

Today, over half of the original Everglades, about two million acres, has been drained and/or developed. Moreover, water flows into the Everglades have shifted dramatically from the traditional sheetflow to a regulated one. Perhaps the most significant consequence of the water management system has been the alteration of the natural distribution, quality, timing, and volume of freshwater entering the Everglades, Florida Bay, and the estuaries on the east and west coasts.<sup>8</sup> Oftentimes, the water management system keeps lands within the Everglades too inundated during the wet seasons and too dry in the dry season. Further, many scientists contend that shortages of fresh water flows into Florida Bay increase its salinity and contribute to its overall decline in health and vitality.<sup>9</sup> Finally, the Caloosahatchee and St. Lucie estuaries receive tremendous amounts of fresh water from the water management system, altering the salinity composition of their waters and adversely affecting their health and productivity.

Of more immediate concern to most humans in South Florida is the availability of an adequate water supply for agricultural and urban uses. A majority of South Florida's water supply comes from aquifers beneath parts of South Florida. After rain events, water filters through the ground and collects within the porous limestone that comprises the aquifers. It then percolates through the limestone and journeys south to Biscayne Bay and Florida Bay. Water levels in the aquifers fluctuate in response to the amount of recharge rain events and the amounts withdrawn for human use. The ecosystem loses its ability to recharge the aquifers with land development and wetland destruction. As less water enters the aquifers and exits into the salt

water bays, the greater the occurrence and depth of salt water intrusion into well fields for drinking water.

In 1991, Congress, recognizing the economic and environmental severity of the problems affecting the natural systems, mandated the Corps to "restudy" the C&SF Project and take appropriate measures to correct the environmental damage. This subsequent replumbing of the C&SF Project follows the addition of ecosystem restoration as one of the Corps' congressional mandates along with flood control, drainage, and water supply.

Despite the environmental harms attributable to human habitation, South Florida boasts some of the most productive agricultural lands in the nation and remains an extremely popular tourist destination. Currently, South Florida, sustains over six million people, with expectations of its inhabitants increasing to more than fifteen million by 2050.<sup>10</sup>

#### **THE GOVERNOR'S COMMISSION FOR A SUSTAINABLE SOUTH FLORIDA**

Governor Lawton Chiles created the Governor's Commission for a Sustainable South Florida (GCSSF) in March 1994 with Executive Order 94-54 (Appendix 1), charged it to determine South Florida's sustainability and, if necessary, make recommendations which will ensure that the region becomes sustainable. The Commission determined that South Florida, on its present course, is not sustainable. Through an unprecedented bipartisan consensus approach, its members, consisting of federal, state, county and local government, business, environmental and Native American representatives, developed recommendations for achieving a healthy balance between the environment, the economy, and society. These recommendations, contained in its *Initial Report*, tackled many issues including Everglades restoration, water supply, education, employment, economic development, liveable communities, agriculture, and transportation. Currently, the Commission is monitoring the implementation of its initial recommendations and continues to refine and develop further strategies to ensure the health of the Everglades ecosystem. The Commission defines the Everglades ecosystem as both the natural and built environments.<sup>11</sup>

In its *Initial Report*, the Commission recognized the need for better evaluations and monetary estimates of environmental and social benefits and costs resulting from policy decisions. Specifically, it called for "land use and water management decisions" to be "evaluated using full cost accounting principles,"<sup>12</sup> and ecosystem "restoration plans (to) incorporate

principles of . . . full cost accounting."<sup>13</sup> At the time, however, the Commission failed to identify these "principles" of full cost accounting. In September 1996, a special topic committee of the Governor's Commission was appointed to formulate principles of full cost accounting for review and adoption by the full Commission. This Full Cost Accounting Committee has since met monthly and responded to its charge by providing principles at the Governor's Commission meeting on September 3-4, 1997. In turn, the Commission will vote to adopt them during its January 1998 meeting.

## **FULL COST ACCOUNTING**

Full cost accounting is one of many economic evaluation tools used to generate information regarding a particular management and/or policy decision and can be implemented within three evaluation frameworks: social accounting, corporate internal accounting, and benefit/cost analysis.

Social accounting attempts to incorporate measures of natural, human, and social capital and their subsequent depreciation in both regional and national products accounts, i.e. the Gross National Product (GNP). This process reflects the "greening" of products accounts. Oftentimes, environmental and social values are not reflected and, accordingly, accounts paint a less-than-accurate portrayal of a region's or nation's welfare. The inclusion of these measures would better indicate the social welfare of the region and would serve as a guide for achieving sustainability.<sup>14</sup>

Internal corporate accounting concentrates the scope of concern to business decision-making. In this use, full cost accounting identifies and measures all of the private and social costs associated with an investment's or product's life cycle, including raw material acquisition and product disposal. This type of accounting (sometimes called life cycle analysis) can lead to a better understanding of the environmental consequences of various production practices within a business. If this concept were extended to product pricing, it would provide a more complete signal to consumers regarding the effects that specific products and their production may have on the environment. In practice, businesses have applied full cost accounting to their internal decision-making processes in order to control production costs and limit liability for environmental damages.<sup>15</sup> In this sense, corporations generally only consider environmental

costs that are "internal" to the firm, e.g. abatement and control costs. Even within this scope, the adoption of full cost accounting at the corporate level might generate both private and social benefits by helping firms to make better product mix decisions, better manufacturing input decisions, better evaluations of waste management options, and ultimately greater investments toward cleaner technologies.<sup>16</sup>

While each framework addresses a different and specific decision process, cost/benefit analysis remains the one most suitable for public policy decisions. It attempts to identify and value all environmental and social benefits and costs that may arise from a particular policy or decision. Theoretically, the employment of a cost/benefit analysis will yield a monetized spectrum of the consequences, beneficial and harmful, resulting from a particular decision.<sup>17</sup> The successful implementation of a cost/benefit analysis, however, hinges on the dismantling of several formidable obstacles and the resolution of a myriad of questions. How does one ensure that all benefits and costs have been identified? How does one assign a defensible dollar value to them? How long into the future should one estimate benefits and costs? What dollar value does one assess them? Finally, should the analysis include "non-use values" (the value one places on knowing that a resource exists, even if the individual has never, and may never, personally experience it), and if so, what dollar amounts should they be given?

After several months of deliberations, the committee determined that the traditional benefit/cost analysis failed to consider the entirety of its concerns. For example, many policy decisions have economic consequences for both individuals and specific communities that are not addressed in a cost/benefit analysis. Instead, a fiscal impact analysis or an economic assessment analysis would be completed to ascertain this data. In fact, there are a variety of different economic tools available to help collect and disseminate information. Therefore, the best policy decision will result from utilizing most, if not all, of these various instruments. The full cost accounting committee acknowledged the need for a broader base of information for decision-making and concluded full cost accounting implied more than simply a cost/benefit analysis. Currently, the committee has coined the phrase "Fuller Cost Accounting" to reflect their improvisation and expansion of the traditional scope of full cost accounting. Thus, in the Committee's eye, it means the use of cost/benefit, fiscal impact, economic assessment, and other analysis tools.

Following this conclusion, the Committee developed principles of full cost accounting. They are intended to provide a framework from which an individual or an organization can better understand the scope and essential components of full cost accounting. When employing a full cost accounting approach, one needs to incorporate all the "principles" to ensure the application is thorough and complete. A large variance from the basic framework may threaten the analysis with an incomplete picture and may prevent vital information from "coming to light." The following list reflects the principles of full cost accounting adopted by the Committee:

1. Full cost accounting is a set of analytical techniques for better informed decision-making in order to encourage efficiency, innovation, and economic, environmental, and social enhancement.
2. Full cost accounting approaches should be flexible, practical, and adaptable as new information and valuation techniques arise.
3. Full cost accounting approaches should be tailored to the issue under consideration, to the decision-making entity (private industry vs. governmental agency) and to the geographical scope of the decision (local vs. regional vs. global).
4. Full cost accounting should incorporate the benefits and costs for present and future generations.
5. Full cost accounting should identify and quantify all private, social, and environmental benefits and costs.
6. Efforts should be made to estimate and assign a specific monetary value to all benefits and costs, but if this valuation is not possible, they should be qualitatively incorporated into the decision-making process.
7. Full cost accounting by all government agencies should seek public input regarding private, social, and environmental benefits and costs.<sup>18</sup>

## **THE ARMY CORPS OF ENGINEERS**

The Corps is the federal agency responsible for the implementation of Everglades restoration. Its C&SF Project Restudy, when completed, will produce a framework for the

replumbing of the water management system and will eventually restore more natural water flows to the ecosystem. Ecosystem restoration, however, remains a relatively new enterprise for this agency, especially a restoration project as large and complex as the Everglades effort.

Prior to the adoption of the National Environmental Protection Act of 1969 (NEPA), the Corps placed less emphasis on the environmental and social benefits and costs resulting from their policy decisions. This position, however, mirrored the degree of concern reflected in public sentiment, and in turn, Congress during that time. To a large degree, the Corps was typically authorized to provide flood control, water supply, and drainage in its water management projects, and it subsequently limited its concerns to project construction costs and project benefits to the nation. In order to determine if a particular project was worthy of implementation, the Corps performed a benefit/cost analysis to illustrate the project's net effects on the national economy. If the cost/benefit analysis indicated a ratio of benefits to costs for the nation to be greater than one (positive benefits), the project was justified." In its assessment of the project benefits, the Corps did identify and account for some social benefits and costs where applicable. Typical benefits included the creation of jobs, a social benefit, and recreational benefits (the analysis for the initial Kissimmee River project in the 1950s accounted for the recreational benefits gained and lost from the straightening of the river).<sup>20</sup> A more in-depth review of consequential environmental and social impacts was not addressed, however.

With regard to the C&SF Project, the Corps fulfilled its mandate to rescue South Floridians from the seasonal flooding and constructed one of the most successful water management systems to date. Obviously, the emphasis placed on the project centered around flood control, water supply, and drainage, the congressionally authorized purposes of the project. Environmental concerns were primarily limited to the speed at which the swamp could be drained and made available for agriculture and development. Again, at the time, this approach bore testimony to the attitudes and values of the past. Since then, the Corps and the public have recognized the value of considering the social and environmental costs and benefits resulting from policy actions and decisions.

The advent of NEPA illustrates this turning point for federal agency responsibility to environmental concerns, and like other federal entities, the Corps was required to consider environmental and social impacts in its economic assessments. Over the years, it has attempted to do so but with varying degrees of success. In the 1970s, the Corps received guidance in its policy

decision-making through the Principles and Standards (P&S), and again through the Principles and Guidelines (P&G), promulgated in 1983. The benefit/cost ratio analysis to illustrate a project's net effect on the national economy subsequently evolved into one of the four "accounts" outlined in the P&G.<sup>21</sup> Specifically, the P&G attempts to "facilitate evaluation and display of the effects of alternative plans" for the Corps' decision-makers.<sup>22</sup>

The Principles and Guidelines require the Corps to assess at least two of four accounts: national economic development (NED), environmental quality (EQ), regional economic development (RED), and other social effects (OSE). The NED account illustrates a project's net effect on the national economy, requires the monetization of all costs and benefits addressed, and necessitates completion before any project can be justified. The EQ account exhibits the "effects on ecological, cultural, and aesthetic attributes of significant natural and cultural resources that cannot be measured in monetary terms," and represents the other account that the P&G requires the Corps to complete. The RED account shows "the regional incidence of NED effects, income transfers, and employment effects." Finally, the OSE account displays "urban and community impacts and effects on life, health, and safety."<sup>23</sup>

Since environmental benefits and costs can be difficult to identify and because the EQ account does not require their monetization, certain projects, primarily those that involve environmental restoration, can fail the "greater than one requirement" of the NED account (benefit/cost analysis). To counteract this selection criteria, the Assistant Secretary of the Army for Civil Works can dismiss the requirement to perform a traditional benefit/cost analysis and, instead, require an analysis that addresses both monetary and non-monetary benefits and costs. exceeding costs still applies. The C&SF Project Restudy did not require the traditional benefit/cost analysis for the NED account.<sup>24</sup>

When the plan selection for environmental restoration projects is not based on the NED selection criteria ("positive benefits"), the Corps employs a cost-effectiveness and incremental-cost analysis. Typically, there will have been a number of alternatives which the Corps would originally consider. After some initial screening and discarding of original alternatives, the Corps begins its evaluation of the "final" alternatives (various combinations of management measures and scales) with a cost-effectiveness analysis to "identify that subset which produces either the same output at less cost or more output at the same or lower cost."<sup>25</sup>

Following the cost-effectiveness analysis, the Corps employs an incremental-cost analysis to determine "the additional cost per unit associated with increasing levels of output" for the various alternatives.<sup>26</sup> Incremental-cost is used because "restoration measures must be justified through [the] determination that the benefits or losses restored or prevented justifies the combined monetary and non-monetary cost, including NED benefits foregone, of the last added increment of the ecosystem restoration measure."<sup>27</sup> Once the "final" alternatives have been analyzed through these economic analyses, the Corps determines its selection of the final plan based upon this (incremental costs and outputs) and "other " information.

The amount of "other" information used in the decision-making process, stemming from data gathered in the other two accounts of the P&G, depends on the scope of work outlined in the Project Study Plan (PSP). Both the Corps and the local sponsor of the project determine which of the other Both the Corps and the local sponsor of the project determine which of the other three accounts merit investigation and inclusion in the PSP. In an attempt to provide flexibility for the analysis, the PSP is designed as a "living" plan that may be modified at the request of either party, pending the other's consent<sup>28</sup> The original PSP for the C&SF project spanned a six-year time frame and included all four accounts. The WRDA, passed in fall 1996, specified that the Restudy be completed by July 1999, three years earlier than its original deadline. Since February 1997, the Corps and the District have been revising the PSP to reflect the accelerated schedule. Final adoption of the new PSP occurred in July 1997. While the C&SF Comprehensive Plan is due by July 1999, the Corps will submit a "draft" in October 1998. In order to accommodate such a short deadline, the new PSP language and scope of work differs significantly from the six-year plan. According to the Corps, the plan will require a "gross-level" review of the different proposed components of the Restudy; however, it will still require the completion of a cost-effectiveness and an incremental cost analysis.<sup>29</sup>

Two important issues have arisen as a result of this new timetable. First, the Corps has stated that a robust data collection would likely require the six years originally allocated for the effort. Accordingly, it will not have compiled and disseminated all the information necessary to fully evaluate all the alternatives by 1999. Therefore, its selection of the alternative will be supported by a percentage of the information it normally commands for such a determination. Nevertheless, the Corps believes that it will have enough data to choose the most appropriate alternative.<sup>30</sup> Second, the social account, if used, acts as a vehicle to incorporate in the selection

process any costs and benefits not identified in the cost-effectiveness analysis, the EQ, and the RED. With the inclusion of the OSE account in a PSP, the Corps studies the final alternatives to determine the "other social effects" from their implementation. In light of the accelerated time schedule, it will not have the opportunity to gather and evaluate this detailed data prior to its selection. Only after the selection of an alternative will the Corps actively investigate the OSE account.<sup>31</sup> Currently, the Corps has begun to identify "types of OSE impacts . . . as well as potential data and analytical tools that may be needed to measure them."<sup>32</sup>

When compiling information to include in its economic assessments, the Corps does not include non-use values. A non-use value is the value one holds on knowing that a resource exists, even if the individual has never, and may never, personally experience it. Non-use values can be derived from various evaluation techniques. A contingent valuation study (CV) represents one of the most identifiable techniques used to gather non-use values. This method asks interviewees, for example, to assign a dollar amount that they would be willing to pay for knowing Snail Kites have the habitat they need to survive in perpetuity.

The Corps avoids non-use values for several reasons. First, the absence of non-use values helps ensure their project estimations can withstand detailed and rigorous scrutiny. Allowing the inclusion of dollar estimations from CV studies and other evaluation techniques might open the Corps to legal disputes.<sup>33</sup> Second, the significance of the non-use values, as they pertain to a particular project, might not warrant the resources necessary to garner the information.<sup>34</sup> Third, in particular studies such as the Restudy, the Corps believes the information adds little information to their selection process. What effects, if any, would result from the Corps' adoption of non-use values in its accounts? How would the expanded effort to identify, quantify, or qualitatively incorporate all environmental and social costs and benefits from a policy decision affect the Corps' internal operations? Would these actions necessarily promote better policy decisions?

The successful incorporation of non-use values in its economic assessments would be a lengthy and costly initiative if undertaken by the Corps. Such efforts, if undertaken, would increase the total expenditures for the particular project. Moreover, as with any new technique, the monetization and/or qualitative incorporation of non-use values in its economic assessments would likely occur years after an initial trial period.<sup>35</sup> As the Corps is a federal agency,

Congress would ultimately decide whether to include and/or monetize non-use values in the economic assessments.

## **THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT**

The Florida Legislature created the five water management districts in 1972 with the Florida Water Resources Act and replaced former water management agencies with similar charges. In particular, the SFWMD oversees water management within its geographic boundary which includes all or parts of sixteen South Florida counties. Its operational boundaries parallel the hydrology of the Everglades ecosystem, beginning in the Kissimmee Chain of Lakes and ending in the Florida Keys. The daily maintenance and operation of the C&SF Project are administered by the District. The District and the Corps are the co-sponsors of the C&SF Project Restudy.

None of the Water Management Districts incorporated guidelines for conducting economic assessments in their water management plans until the early 1990s. In conjunction with the Florida Department of Environmental Regulation, the Districts did develop a "convention" for economic assessments in 1991. The purpose of the economic convention was "to outline a set of sound and consistent economic principles to be followed when analyzing solutions to critical water resource problems." The convention covers the use of cost-effectiveness analysis, cost/benefit analysis, economic impact analysis, and fiscal impact analysis. The guidelines recognize the difficulty in monetizing all costs and benefits, and that final decisions need to include other evaluations in addition to the economic assessments. For the most part, the District has not regularly used the convention in completing water management planning evaluations.<sup>36</sup>

Prior to the adoption of the new economic convention, the Districts developed analysis procedures to "fit specific needs such as the analysis of wastewater reuse feasibility and water conservation." In addition, the Districts looked to the procedures outlined in two federal documents, Economic Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council), and Guidelines for Performing Regulatory Impact Analysis (the U. S. Environmental Protection Agency).<sup>37</sup>

In its recent Lower East Coast planning effort, the District analyzed projects by determining physically based performance measures. Instead of identifying and quantifying all the possible benefits that may be derived from the implementation of a project, the District evaluated the benefits using "performance measure graphics that show differences in modeled physical and operational characteristics such as hydroperiods, water levels, and flows and frequencies. If, for example, a more natural hydroperiod for a region is reestablished, an improved natural system functioning is expected to result.<sup>38</sup>

As a partner in the C&SF Project Restudy, the District has expanded its typical economic evaluations to include cost-effectiveness analyses and incremental cost analyses. Many of the modeling data the Corps uses to generate the various components of its Restudy alternatives originate from the District. Accordingly, the District will continue to aid the Corps for the next two years to determine a selected alternative through the use of the two economic analyses.

There does not appear to be any movement toward the District's adoption of monetizing and identifying all environmental and social costs and benefits for policy decisions. Its Governing Board and Advisory Committee share in the responsibility to effectuate such a determination.

## **CONCLUSION**

Full cost accounting is a tool that can help policy makers and managers gather greater degrees of information for better informed decisions. It does not, however, necessarily prompt the wisest decision. Even today, many agencies and businesses rely on information and evaluation techniques which do not adequately categorize or provide for the entire "picture." Full cost accounting is a powerful set of evaluation tools that can overcome these information shortfalls and illuminate many of the overlooked environmental and social benefits and costs associated with policy decisions. However, estimating some of these values remains the greatest obstacle to the widespread employment of full cost accounting.

Many agencies and businesses do attempt to garner enough information to aid in their respective decision-making processes. However, most, if not all, do not truly practice full cost accounting. With regard to the agencies involved with the C&SF Project Restudy and

Everglades restoration, both the SFWMD and the Corps do not employ full cost accounting. Through its Principles and Guidelines, however, the Corps' approach reflects the closest embodiment of full cost accounting of the two agencies, and perhaps many agencies around the nation. Full cost specifically tries to identify and quantify many of the environmental and social costs and benefits which the Corps does not address routinely (non-use values). Again, full cost accounting does not necessitate the monetization of all costs and benefits, but rather their incorporation, quantitatively or qualitatively, into the decision-making process. If the Corps were to expand its scope of concern to reflect non-use values of resources, then, arguably, it would take tremendous strides toward the realization of a full cost accounting approach.

One of the foremost reasons for the exclusion of non-use values in its economic assessments is the reliability and defensibility of the data. The weakness of CV studies, among other things, can stem from the actual translation of money promised and money put forth for a particular issue. This discrepancy prevents some contingent valuation studies from establishing defensible, and in many cases, accurate monetary estimations.<sup>39</sup> On the other hand, it does reflect a real value many people place on "non-uses."<sup>40</sup> Nevertheless, CV methodologies continue to improve as economists strive to capture the real worth of non-use values. Moreover, the judicial system has increasingly been favorable to well designed and implemented studies.<sup>41</sup> The adoption of non-use values by the Corps would provide it with a better understanding of the issues involved in a particular decision, and would likely pave the way for additional agencies, state and federal, to enhance their evaluation frameworks.

The SFWMD, on the other hand, also has many of the tools required for a full cost accounting exercise in its economic convention. However, it does not regularly employ many of the economic assessments outlined in the convention. In some instances, the District did, after the fact, contract consultants to employ some of the economic assessments typical of a full cost accounting approach for particular policy decisions, such as the Dairy Industry Buyout above Lake Okeechobee.<sup>42</sup>

The implementation of a full cost accounting approach by these agencies would enhance the amount of information available to them for policy decisions and would likely result in better quality decisions and policies. Everglades restoration would also benefit from the application of full cost accounting as many of the overlooked environmental and social values, costs, and benefits find their way into the decision-making processes.

## ENDNOTES

1. Davis, S. M. and Ogden, J. C. (Eds.), *The Ecosystem and its Restoration*. St. Lucie Press, Delray Beach, Fla., p. 3.
2. *Water Resources and Development Act (WRDA)*, 1996.
3. Benefit/cost analysis has an extensive history and statutory basis in natural resources management. See "Handbook for Coastal Resource Managers," National Oceanic and Atmospheric Administration (NOAA), 1995.
4. Bill Hanson, Economist, United States Army Corps of Engineers (USACE), speech on April 4, 1997.
5. Mike Ornella, Project Manager for the C&SF Project, USACE, phone conversation on October 8, 1997.
6. Economics literature commonly uses the terms "full cost accounting" and "benefit/cost" interchangeably. See *Full Cost Accounting Narrative*, Governor's Commission for a Sustainable South Florida. September 1997, p. 2.
7. Richard A. Pettigrew, Chairman of the Governor's Commission for a Sustainable South Florida, October 1995, p. 43.
8. Davis, S. M. and Ogden, J. C. (Eds.), *The Ecosystem and its Restoration*. St. Lucie Press, Delray Beach, Fla., p. 761.
9. *Ibid*, p. 117.
10. *Supra*, note 7.
11. *Ibid*.
12. *The Initial Report of the Governor's Commission for a Sustainable South Florida*, October 1995, p. 43.
13. *Ibid*, p..5.
14. *Full Cost Accounting Narrative*. September 1997, p. 2.
15. *Ibid*. p. 2.
16. *Ibid*, p. 2.
17. *Ibid*, p. 1.
18. *Full Cost Accounting Committee*, June 2, 1997.
19. Brad Fowler. Economist. USACE, speech on April 4, 1997.
20. Eric Raasch, Chief Economist, USACE, August 25, 1997, personal correspondence
21. *Ibid*.
21. Eric Raasch, May 14, 1997, phone conversation.
23. *Principles and Guidelines*, USACE, December 28, 1990, pp. 5/15 - 5/24.
24. *Supra*, note 21.
25. *Ibid*.

26. *Ibid.*
27. *Ibid.*
28. Supra, note 23.
29. Stuart Applebaum, Director of Environmental Restoration, Jacksonville District, USACE, phone conversation on May 22, 1997.
30. Supra, note 21.
31. *Ibid.*
32. *Ibid.*
33. Eric Raasch, phone conversation on August 28, 1997.
34. *Ibid.*
35. Supra, note 21.
36. Carl Woehlcke, Lead Economist, South Florida Water Management District, personal correspondence on August 23, 1997.
37. *Ibid.*
38. *Ibid.*
39. Grace Johns, Senior Economist, Hazen & Sawyer, speech on July 22, 1997.
40. *Ibid.*
41. *Ibid.*
42. Nancy Roen, former Governing Board member of the South Florida Water Management District, telephone conversation on May 20, 1997.

## APPENDIX I

# State of Florida

## OFFICE OF THE GOVERNOR

EXECUTIVE ORDER, NUMBER 94-54

Governor's Commission for a sustainable  
South Florida

WHEREAS, South Florida, including the Everglades Ecosystem, densely populated coastal areas and fertile agricultural lands, is widely recognized as a unique area of state, national and international importance, and

WHEREAS, the Everglades Ecosystem, including the Kissimmee River Basin, Lake Okeechobee, the Everglades, Big Cypress Swamp, Florida Bay, and the Ten Thousand Islands, is a major water resource for South Florida, and the major source of fresh water for the citizens of the most populous region of the State, and

WHEREAS, the Everglades Ecosystem is home to a significant number of threatened and endangered wildlife species, the most significant breeding ground for birds in North America, and a principal nursery area for commercial and sports fisheries, and

WHEREAS, South Florida has the only living coral reef in the continental United States and the third largest reef community in the world, and

WHEREAS, South Florida is an international commercial, agricultural, and tourist center, with a diverse population that reflects varied ethnic, economic and social values, and

WHEREAS, the by-products of rapid population growth in South Florida, including land development, water management activities,

and land conversion, have had a negative impact on the Everglades Ecosystem, and

WHEREAS, the population in South Florida is expected to triple in the next half-century, and

WHEREAS, the Florida Legislature has found that the water quality of many of the surface waters of the state is degraded, or is in danger of being degraded; and that associated natural systems have been altered and no longer perform the important functions they once performed, and

WHEREAS, surface water problems can be corrected and prevented through effective surface water improvement and management plans and programs, and

WHEREAS, numerous organizations and persons are working to understand and enhance the performance of the Everglades Ecosystem, and the Department of Environmental Protection has been directed by the Florida Legislature to protect the functions of entire ecosystems, and

WHEREAS, it is vital to all residents and visitors to this State that the use of our land, water, and other resources within South Florida assure a healthy Everglades Ecosystem and sustainable economy for future Floridians.

NOW, THEREFORE, I, LAWTON CHILES, Governor of the State of Florida, pursuant to the Constitution and Laws of the State of Florida, do hereby promulgate the following executive order, effective immediately:

Section 1. The Governor's Commission for a Sustainable South Florida is hereby created.

Section 2. The Commission shall work to improve coordination among and within the private and public sectors regarding activities impacting the Everglades Ecosystem, examine the effects of continued development and agriculture on the natural resources within the Everglades Ecosystem, recommend actions for the restoration, management, preservation and protection of these

resources, recommend strategies for ensuring the South Florida economy is based on sustainable economic activities that can coexist with a healthy Everglades Ecosystem, and assist in promoting and monitoring the implementation of it's recommendations.

Section 3. The Commission shall carry out the following tasks:

1. Serve as a forum for coordinating information on the status of the numerous efforts under way to study, restore, manage, protect, and preserve the Everglades Ecosystem.
2. Identify opportunities for enhancing coordination in the approaches being taken. to studying, restoring, managing, preserving, and protecting the Everglades Ecosystem among those federal, state, and regional agencies, local governments, task forces, private and non-private organizations, and other parties that either have jurisdiction within or adjacent to the Everglades Ecosystem or otherwise are involved in efforts impacting or benefiting the Everglades Ecosystem.
3. Through testimony from parties listed in paragraph 2 above and other appropriate interests, assess the current status of the natural and urban environment in South Florida and rank current and future threats to the health of the Everglades Ecosystem. Special attention shall be given to coordination with the reconnaissance study being conducted by the Army Corps of Engineers.
4. Consider and evaluate current comprehensive planning and regulatory programs affecting the Everglades Ecosystem in light of the state's objective of achieving a sustainable South Florida economy and healthy Everglades Ecosystem.
5. Assess the structure and performance of the South Florida economy and identify those economic activities compatible with fostering and achieving both a sustainable economy and healthy Everglades Ecosystem.

6. Solicit and provide opportunities for public input on key issues involved in establishing and sustaining a healthy Everglades Ecosystem into the future.

7. Recommend strategies and actions for:

a. Improving coordination and eliminating duplicative efforts among governments, agencies, task -forces, and organizations;

b. Increasing understanding of the workings of the Everglades Ecosystem and its relationship to other lands in the South Florida area;

c. Restoring, managing, protecting, and preserving the natural resources comprising the Everglades Ecosystem;

d. Guiding the appropriate use of land impacting the Everglades Ecosystem;

e. Allocating natural resources to support environmental and urban systems;

f. Promoting sustainable and environmentally compatible development that boosts the regional economy and supports a healthy Everglades Ecosystem;

g. Enhancing the public's understanding of the necessity for both preserving and restoring natural resources and supporting sustainable development; and

h. Implementing additional actions as determined appropriate by the Commission.

8. Promote and monitor the implementation of its recommendations.

Section 4. The Commission shall provide quarterly status reports to the Governor and Cabinet in coordination with the quarterly "Save Our Everglades" reports. Each status report should address tasks 1, 2, 7.a, and, when applicable, task 8, in Section 3. By July 1, 1995, the Commission shall submit s written report to the Governor and Cabinet presenting the Commission's findings and recommendations pursuant to all tasks in Section 3. The report shall set forth a five-year action agenda and identify

any legislative, executive or other initiatives necessary to implement the commission's recommendations. The Commission may submit additional reports and amendments and updates to previous reports as necessary to meet its charge.

Section 5. The Commission shall have 35 voting members. The members shall consist of a citizen of the state to serve as the chair; eight representatives of the South Florida business community; eight representatives of public interest and environmental organizations; five county commissioners representing South Florida counties; three elected officials representing South Florida cities; a board member of the South Florida Water Management District; a board member of the South Florida Regional Planning Council; a board member of the Treasure Coast Regional Planning Council; the secretaries of the Florida Departments of Environmental Protection, Community Commerce, and Transportation; a commissioner from the Florida Game and Fresh Water Fish Commission; a member of the Florida House of Representatives; and a member of the Florida State Senate. In addition, a representative from each of the U.S. Army Corps of Engineers, the U. S. Department of the interior, the U.S. Environmental Protection Agency, and the National Oceanic and Atmospheric Administration are requested to participate as non-voting members.

The members of the Commission shall be appointed by the Governor and serve two year terms. The chair shall be appointed by the Governor, and the Commission shall meet upon the call of the chair. A member may be re-appointed to serve subsequent terms of office. If a member has been appointed to serve as a representative of an entity named in this order, failure to maintain that employment or membership shall constitute cause for removal by the Governor. If a member is absent from more than three consecutive meetings of the Commission without showing good cause, such absences shall constitute cause for removal by the Governor. The Secretary of the Department of Environmental Protection shall serve as the permanent vice-chair of the

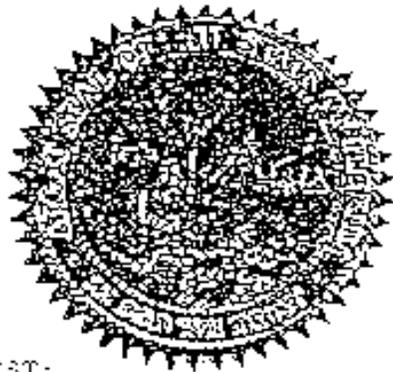
Commission.

Section 6. The Commission may establish one or more technical resource committees to assist the Commission in assimilating the technical information provided by federal, state and regional agencies, local governments, private and non-profit organizations, and other parties that either have jurisdiction within or adjacent to the Everglades Ecosystem or otherwise are actively involved in efforts impacting the Everglades Ecosystem. The Commission also may establish one or more citizen advisory committees.

Section 7. Commission members, and the members of any technical resource committees or citizen advisory committees which may be appointed, shall not receive remuneration for their services. Commission members shall be reimbursed for travel and expenses in accordance with Chapter 112, Florida Statutes, to the extent funds are available for this purpose. Public officers and employees shall be reimbursed by their respective agencies in accordance with Chapter 112, Florida Statutes.

Section 8. Administrative, research and staff support to the Commission shall be provided by the Department of Environmental Protection in close coordination with the Executive Office of the Governor, Department of Community Affairs, Department of Commerce, South Florida Water Management District, Florida Institute of Government, South Florida Regional Planning Council, Treasure Coast Regional Planning Council, and the Florida Coastal Zone Management Program. All agencies under the control of the Governor are directed, and all other agencies are requested, to cooperate with and render assistance to the Commission.

Section 9. This executive order shall remain in effect until repealed.



IN TESTIMONY WHEREOF, I have hereunto set my hand and have caused the Great Seal of the State of Florida to be affixed at Tallahassee, the Capitol, this 2<sup>nd</sup> day of March 1994.

  
GOVERNOR

ATTEST:

  
SECRETARY OF STATE

## APPENDIX II

# State of Florida

## OFFICE OF THE GOVERNOR

EXECUTIVE ORDER, NUMBER 94-270

Governor's Commission for a Sustainable  
South Florida

WHEREAS, by Executive Order 94-54 the Governor created The Governor's Commission for a Sustainable South Florida, and

WHEREAS the Commission was charged with the duty to improve coordination among and within the private and public sectors regarding activities impacting the Everglades Ecosystem, to examine the effects of continued development and agriculture on the natural resources within the Everglades Ecosystem, to recommend actions for the restoration, management, preservation, and protection of these resources, to recommend strategies for ensuring the South Florida economy is based on sustainable economic activities that can coexist with a healthy Everglades Ecosystem, and to assist in promoting and monitoring the implementation of its recommendations, and

WHEREAS, it is appropriate to amend that previous Executive Order to add a representative of the Miccosukee tribe and a member of the agriculture community as members of the Commission. NOW, THEREFORE, I, LAWTON CHILES, Governor of the State of Florida, pursuant to the Constitution and Laws of the State of Florida, do hereby promulgate the following executive order, effective immediately:

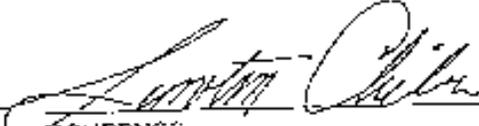
Section 1. The membership of the Commission is hereby increased to 37 voting members. The Governor shall appoint a

representative of the Miccosukee tribe and a member of the agriculture community as members of the Commission.

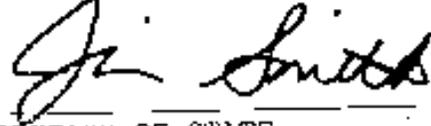
Section 2. Except as amended hereby, Executive Order 94-54 is hereby ratified and reaffirmed.



IN TESTIMONY WHEREOF, I have hereunto set my hand and have caused the Great Seal of the State of Florida to be affixed at Tallahassee, the Capitol, this 27 day of September, 1994.

  
GOVERNOR

ATTEST:

  
SECRETARY OF STATE

## APPENDIX III

# State of Florida

## OFFICE OF THE GOVERNOR

EXECUTIVE ORDER, NUMBER 97-201

### GOVERNOR'S COMMISSION FOR A SUSTAINABLE SOUTH FLORIDA

WHEREAS, by Executive orders 94-54, 94-270, 95-464, and 96137, the Governor created the Governor's Commission for a Sustainable South Florida, and

WHEREAS, the Commission was charged with the duty to improve coordination among and within the private and public sectors regarding activities impacting the Everglades Ecosystem, to examine the effects of continued development and agriculture on the natural resources within the Everglades Ecosystem, to recommend actions for the restoration, management, preservation, and protection of these resources, to recommend strategies for ensuring the South Florida economy is based on sustainable economic activities that can co-exist with a healthy Everglades Ecosystem, and to assist in promoting and monitoring the implementation of its recommendations, and

WHEREAS, by Executive Order 96-137, the Governor's Commission on a Sustainable South Florida expired on June 30, 1997.

NOW, THEREFORE, I, LAWTON CHILES, Governor of the State of Florida, pursuant to the Constitution and the Laws of the State of Florida, do hereby promulgate the following executive order, effective immediately:

Section 1. Executive order 96-137 is hereby amended to extend the expiration date of the Governor's Commission for a Sustainable South Florida to June 30, 1999. This Executive order

is effective nunc pro tunc June 30, 1997.

Section 2. Except as amended herein, Executive Order 96 137 is hereby ratified and reaffirmed.

**GCSSF's Conceptual Plan Schematic**

**Kissimmee River Basin**



IN TESTIMONY WHEREOF, I have hereunto set my hand and have caused the Great Seal of the State of Florida to be affixed at Tallahassee, the Capitol, this 21 day of July, 1997.

*Lawton Chiles*  
GOVERNOR

ATTEST:

*Sandra Northam*  
SECRETARY OF STATE



Concepts Not Shown

- Lake Okeechobee Operational Plan
- Aquifer Storage and Recovery
- Invasive Plant Control
- Conservation of Soil
- Protect and Restore Coastal Estuarine & Marine Ecosystems
- Increase Spatial Extent and Quality of Wetlands
- Operate, Manage and Implement C&SF Project Modifications

**APPENDIX V****ACRONYMS**

<b>C&amp;SF</b>	Central & Southern Florida
<b>Corps</b>	U. S. Army Corps of Engineers
<b>CV</b>	Contingent Valuation
<b>EQ</b>	Environmental Quality Account
<b>GCSSF</b>	Governor's Commission for a Sustainable South Florida
<b>GNP</b>	Gross National Product
<b>NED</b>	National Economic Development Account
<b>NEPA</b>	National Environmental Protection Act
<b>NGO</b>	Non-Governmental Organization
<b>OSE</b>	Other Social Effects
<b>P&amp;G</b>	Principles and Guidelines
<b>P&amp;S</b>	Principles and Standards
<b>PSP</b>	Project Study Plan
<b>RED</b>	Regional Economic Development Account
<b>SFWMD</b>	South Florida Water Management District
<b>WRDA</b>	Water Resources Development Act 1996