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THE ECOLOGICAL AND ECONOMIC FAILURES OF FLORIDA'S MANGROVE REGULATORY SCHEME

*Ericson P. Kimbel**

I. INTRODUCTION

The mangrove ecosystem¹ is "one of the most productive and biologically diverse wetlands on Earth," providing habitats worldwide for thousands of species, including both threatened and endangered species.²

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1. The common characteristics of mangrove plants (approximately 80 species worldwide) are the abilities to tolerate high levels of salinity, tidal forces and "poorly drained and frequently anaerobic substrate." PAUL ADAM, *SALT MARSH ECOLOGY* 70 (1990). Mangroves are capable of growing from the mean water line to the upper reaches of the equinoctial tide flood zone. Because of the varying salinities in the intertidal zone, mangrove ecosystems often form with pronounced zonation of plant type by species' salt tolerance levels. See P.B. TOMLINSON, *THE BOTANY OF MANGROVES* 16-19 (1986) [hereinafter TOMLINSON]. The three major species of mangrove trees occurring in Florida are, in order of high to low salinity tolerance, *Avicennia germinans*, black mangrove, *Rhizophora mangle*, red mangrove, and *Laguncularia racemosa*, white mangrove. These are also the only three species protected by the Mangrove Trimming and Preservation Act. See FLA. STAT. ANN. §§ 403.9321-9333 (West 1998). See *infra* text at note 72 and following for discussion of this Act.

Mangrove forests are distributed along coastlines, along tidally influenced rivers and bays and other areas where fresh and saltwater meet. The unique ability to thrive in this dynamic ecotone where land and freshwater meet the sea allows the ecosystem to dominate the intertidal zone. However, the ecosystem occurs only in intertidal zones between the latitudes of 25 degrees North and 25 degrees South. Ambient air temperature is the most limiting factor of distribution because the ecosystem requires air temperatures above 20 degrees Celsius with fluctuations of less than 5 degrees and no occurrence of temperatures below -4 degrees Celsius. See MICHAEL J. KENNISH, *2 ECOLOGY OF ESTUARIES: BIOLOGICAL ASPECTS* 202-04 (1986) [hereinafter 2 KENNISH]. Hence, South Florida is one of the primary locations for mangrove ecosystems in the United States.

2. Don Hinrichsen, *Coasts in Crisis*, 12 *ISSUES IN SCIENCE & TECHNOLOGY* 39, 40 (1996) [hereinafter Hinrichsen]. See also TOMLINSON, *supra* note 1, at 10.

In Florida Department of Environmental Protection (DEP) adjudications, the most common endangered species linked to the mangrove ecosystem, because of its ability to enhance and sustain the growth of seagrasses, is the manatee, which grazes on the seagrass.

Although the mangroves of Florida are concurrently governed by federal,³ state and, often, local regulations, they are still subject to depletion⁴ through dredging and filling, and are sacrificed for private riparian rights of view.⁵

See generally Flynn v. DEP, Department of Administrative Hearing (“DOAH”) No. 96-4737, 1998 WL 67336 (Fla. DEP Feb. 13, 1998); Alden Pond, Inc. v. DEP, DOAH No. 93-6982, 1994 WL 738020 (Fla. DEP Oct. 10, 1994) (using the impact on seagrasses as one factor to deny a dredge and fill permit).

3. See United States v. Holland, 373 F. Supp. 665, 676 (M.D. Fla. 1974) (holding that filling of artificial mosquito canals and mangroves was within Army Corps of Engineers jurisdiction based on geographical, biological and hydrological factors as defined in the Federal Water Pollution Control Act of 1972 (FWPCA), and, thus, these areas were subject to federal dredge and fill permitting); see also P.F.Z. Properties, Inc. v. Train, 393 F. Supp. 1370, 1380 (D.C. Cir. 1975) (holding that mangroves were ‘navigable waters’ under the meaning of the FWPCA).

4. See Charles H. Ratner, *Should Preservation be Used as Mitigation in Wetland Mitigation Banking Programs?: A Florida Perspective*, 48 U. MIAMI L. REV. 1133, 1141 (1994) (stating that 40% of mangroves in the Tampa Bay area were lost in the early 1990’s along with 80% of the seagrasses, and that, in 1992, Florida lost 23,000 acres of all types of wetlands with “the largest [contiguous] loss of 1,599 acres coming from South Florida.”) [hereinafter Ratner]; see also T.E. DAHL, U.S. DEP’T OF THE INTERIOR, WETLAND LOSSES IN THE UNITED STATES 1780’S TO 1980’S (1990) (reporting that from 1780–1980 Florida lost forty-six percent of its total wetlands); Jeffrey S. Solocheck, *Volunteers Help Restore Estuary: More Help is Needed to Restore Plants and the Ecosystem in Sarasota Bay*, SARASOTA HERALD-TRIB., Aug. 21, 1999, at B1 (stating that Sarasota Bay has “lost about 40% of its tidal wetlands since 1950.”); Komarek v. DEP (Swart), DOAH Case No. 95-1983, 1995 WL 738987 (Fla. DEP Nov. 8, 1995) (permitting an 8 slip boat dock, with a pier of 237 feet); but see McGinnis v. DEP, DOAH No. 97-1894, 1998 WL 295409 (Fla. DEP June 1, 1998) (denying a dredge and fill permit for a project which would have filled approximately 1.39 acres of wetlands, mostly mangroves, on the edge of Miguel Bay — an Outstanding Florida Water as defined in FL. ADMIN. CODE r. 62-302.200(17) and protected under FLA. ADMIN. CODE r. 62-302.700. Although the decision in *McGinnis* prevented the loss of mangroves, the designation of Miguel Bay as an Outstanding Florida Water was the determinative factor in denying the permit. See *id.* at 8.).

5. Though this discussion is limited to mangrove regulation under dredge and fill permitting and the Mangrove Trimming and Preservation Act, it is important to note that the statutory valuation for pollution of a mangrove wetland is only “\$1 per square foot of mangrove or seagrass impacted,” under FLA. STAT. ANN. § 376.121(5)(a)(4)(b) (West 1997), while FLA. STAT. ANN. § 376.121(5)(a)(4)(a) (West 1997) provides the rate of “\$10 per square foot of coral reef impacted.”

The difference in value between the mangroves and seagrasses, and the coral reefs impacted is somewhat unexplainable. Coral reefs are directly dependent on the export of organic materials, fry and larvae, and the control of turbidity provided by mangroves and seagrasses. It would seem that these liability standards were decided without regard to the connections between the three ecosystems. A polluter could damage a mangrove paying \$1 per square foot, when in fact that square foot of mangrove damage will cause additional degradation of the proximate seagrass and coral reef for a possible total of \$12 per square foot in actual damage (using the statutory rates for calculation). See Commonwealth of P.R. v. SS Zoe Colocotroni, 628 F.2d 652, 678 (1st Cir. 1980) (remanding for a proper determination

At the foundation⁶ of mangrove depletion is the failure of the Florida Legislature and the Florida Department of Environmental Protection (DEP) to fully account for the values served by the mangrove ecosystem in dredge and fill permitting and under the Mangrove Trimming and Preservation Act ("Mangrove Act"). This article will briefly identify the use and nonuse values served by the mangrove ecosystem, examine the real societal cost of dredging or trimming a mangrove under the current legal structure in Florida, and propose adjustments to account for the loss incurred by society when a mangrove is dredged or trimmed.

II. VALUES SERVED BY THE MANGROVE ECOSYSTEM

The mangrove ecosystem provides both use and nonuse values to society. However, few of these goods and services have been monetized, and the value of the ecosystem is not fully recognized in either the DEP dredge and fill permitting standards, or under the Mangrove Act.⁷ The use

of liability damages). The court held that the district court had erred in awarding \$6,164,192 for 20 acres of mangrove damage in Puerto Rico. The district court had determined that \$5,526,583 should be awarded for replacement costs of the organisms lost since most of the organisms were available through biological suppliers. The First Circuit held that replacement cost was "grossly disproportionate," and that it would be unreasonable to undertake such a remedy. *See id.* at 675. Though the court is correct in its second determination (the facts indicated that actual restoration of the affected area would not be effective), its first determination fails to use the best indicator of economic valuation — the market. It also fails account for the full loss of the biological elements of an intact mangrove. However, the court wished to prevent a "windfall" to the public treasury (despite the fact that the public had actually been injured in the market value amount by the loss of the biological elements used in the calculation) and directed the district court to find the cost "reasonably incurred by the sovereign or its designated agency to restore or rehabilitate the environment . . . without grossly disproportionate expenditures." *Id.* at 675); *see* Charles B. Anderson, *Damage to Natural Resources and the Costs of Restoration*, 72 TUL. L. REV. 417, 435-37 (1997) (discussing the *Colocotroni* decision).

6. Treatment of regulatory takings and mangrove wetlands is beyond the scope of this discussion. However, it bears mentioning that in 1995 the Florida Legislature passed the Private Property Rights Protection Act, 1995, Fla. Laws ch. 95-181 (codified at FLA. STAT. ANN. § 70.00 (West 1987 & Supp. 1999)). Section six of the Act awards "compensation for any loss in the fair market value of the property once a court determines that a regulation 'inordinately burdens' the property." *Id.* *See* Tirso M. Carreja, *Adding a Statutory Stick to the Bundle of Rights: Florida's Ability to Regulate Wetlands under Current Takings Jurisprudence and Under the Private Property Rights Protection Act of 1995*, 11 J. LAND USE & ENVTL. L. 423, 446 (1996) [hereinafter Carreja]. Carreja predicts a decrease in either wetland regulations or an increase in regulations designed with mitigation measures so the government will not have to pay a "premium for the 'inordinately burdened' land" under the 1995 Act. *Id.* at 453.

7. *See infra* note 72 and following for a discussion of the Mangrove Act.

values of mangroves can be categorized into income generation, cost-savings and beneficial use, while nonuse values can be categorized as existence, option and unknown values.⁸

A. Use Values of Mangroves

Income generation is the most easily quantifiable and readily monetized value served by mangroves. The ecosystem is directly linked with the productivity of coastal shelf and deepwater fisheries because it provides food for commercially valuable species through export of nutrients and smaller species.⁹ The mangroves also provide habitat for the young of many species and provide nursery and spawning grounds¹⁰ for many coastal and deepwater

8. Though unknown values could be categorized as an existence value in some contexts, unknown values cannot be discovered without the existing ecosystem. For purposes of this discussion, existence value is limited to the desire of society to preserve the ecosystem, while unknown values are the undiscovered goods and services which may be provided by an ecosystem in the future.

9. An estimated seventy-five percent, \$175 million, of the commercially-caught species in the Queensland, Australia fisheries area “depend directly on mangrove[s] at some time in their lives or feed on food chains leading back there.” Environmental Protection Agency, State of Queensland, Australia, *Mangroves — More Than Mud and Mozzies* (last modified Mar., 1999) <<http://www.env.qld.gov.au/environment/coast/habitats/m.html>> [hereinafter Queensland EPA]; Department of Primary Industries, State of Queensland, Australia, *Queensland's Fisheries Resources: Conditions and Trends 1988–95* (last modified Aug. 6 1998) <<http://www.dpi.qld.gov.au/fishweb/about/newtrends.html>>. See also Hinrichsen, *supra* note 2, at 42 (estimating “that one hectare of mangrove forest in the Philippines, if properly managed, could produce an annual yield of 100 kg of fish, 25 kg of shrimp, 15 kg of crabmeat, 200 kg of molluscs, and 40 kg of sea cucumber. In addition, the same area could simultaneously supply an indirect harvest of up to 400 kg of fish and 75 kg of shrimp that mature elsewhere.”).

10. The mangrove has a unique and extremely productive detrital food chain. The detritus produced by mangrove plant growth is significant with the most constant supply coming from the year-round production and loss of foliage. See Jin-Eong Ong, et al., *Structure and Productivity of a 20-year-old Stand of Rhizophora apiculata Bl. Mangrove Forest*, 22 J. BIOGEOGRAPHY 417, 422 (1995) (estimating biomass distribution for the species *apiculata* at 10.6% leaves and canopy, 74% trunk, 10% stilt roots and 5.1% subterranean roots, with 40% of the annual biomass increment coming from leaf litter production).

The detritus is first decomposed by fungi, bacteria and protozoa present in the soil and water of the mangrove root zone. This stage can increase the amount of protein in leaf litter up to 400%. See Queensland EPA, *supra* note 9. After this step, tidal and permanent algal and planktonic communities of the mangrove feed on the decomposed detritus and protozoa. See 2 KENNISH, *supra* note 1, at 208; DANIEL M. ALONGI, COASTAL ECOSYSTEM PROCESSES 63–64 (1998); MICHAEL J. KENNISH, I ECOLOGY OF ESTUARIES: PHYSICAL AND CHEMICAL ASPECTS 160–62 (1986). The plankton and algae are then consumed by a multitude of young larvae and other microscopic herbivores, which in turn feed shrimp, worms, mysids and

species.¹¹

Cost savings through reduction of storm damage is, arguably, one of the most valuable services provided by the mangroves of Florida because of the concentration of coastal and near-coast development.¹² The ecosystem has been found to provide a twenty percent reduction in storm wave height, and also protects by reducing storm windspeed.¹³ Much like an insurance policy against storms, or constructing buildings to withstand gale-force winds, the mangrove protects coastal investments to the benefit of both private and public interests.¹⁴ Additionally, mangroves also control turbidity in the sedimentary zone during storm and non-storm periods, which reduces coastal erosion.¹⁵

nematodes. 2 KENNISH, *supra* note 1, at 206. At this step, small carnivorous fish or shellfish such as minnows and grass shrimp consume the smaller shrimp, worms, and mysids. *Id.* The small carnivores feed the largest and most economically valuable carnivores in the food web such as salmon and prawns. *Id.* The wastes produced by these large consumers, "along with the smallest mangrove debris, is taken up by molluscs and small crustaceans. Even dissolved substances are used by plankton or, if they land on the mud surface, are browsed by animals such as crab and mud whelks." Queensland EPA, *supra* note 9.

11. See *Flynn v. DEP, DOAH*, Case No. 96-4737, 1998 WL 67336 at 13 (Fla. DEP Feb. 13, 1998) (recognizing the value of the mangrove as a habitat for manatee and the valuable food chain in its denial of a permit for a single family boatdock. However, the application was denied primarily on the basis that the dock would moor a 171 foot vessel which, when docked, would extend across one-third of the Intercoastal Waterway's width at that point.).

12. See George A. Maul, *State of Disaster*, TAMPA TRIB., August 29, 1999, at A6 (discussing how the reduction of tidal wetlands has increased the level of destruction from hurricanes and other natural phenomena in Florida, and suggesting greater protection of environmental resources "that mitigate damage, such as mangrove stands, wetlands, coastal vegetation and sand dunes.") [hereinafter Maul].

13. See Yoshihiro Mazda et al., *Mangroves as a Coastal Protection from Waves in the Tong King Delta, Vietnam*, 1 MANGROVES AND SALT MARSHES 127 (1997) (finding a 20% reduction of wave height when mangroves are present along coastlines during seasonal tide levels and citing an estimate that mangroves in Malaysia provide a cost-savings of at least \$300,000 per kilometer on the draconian calculation of "the cost of rock walls that are needed to replace them [to control erosion] when they are cut down.").

14. See *id.*

15. Mangrove litter causes faster sedimentation of particulates immediately offshore through increased formation of flocs which "shelters the waters further offshore from high sedimentation and excessive turbidity," where many seagrass meadows and/or coral reefs occur. Eric Wolanski, et al., *The Importance of Mangrove Flocs in Sheltering Seagrass in Turbid Coastal Waters*, Abstract, (1998) (visited Sept. 22, 1999) <<http://Ibm590.aims.gov.au/reports/mangfloc.html>>; see also Chris Bright, *The Nemesis Effect*, WORLD WATCH 12:3 (May 1, 1999) (discussing the sediment-filtering characteristics of mangroves and concluding that the declining health of coral reefs is due, in part, to the depletion of coastal mangroves. Bright also reports that Southeast Asia has lost half of its mangroves over the last 50 years and that one-third of the mangrove cover has been lost from Indonesia coasts, while three-quarters has been lost from the coasts of the Phillipines during that same time).

The mangrove ecosystem also provides cost-savings through its filtration processes, and, like a freshwater wetland, functions as a nutrient sink whereby pollutants, certain pathogens and particulates are trapped in the root system and substrate.¹⁶ Furthermore, because of the mixing of saline and fresh water, and the extensive food web and the benthic communities within mangroves, these filtration processes are accelerated.¹⁷

Beneficial uses include recreation and aesthetic enjoyment and are the least quantifiable of use values.¹⁸ However, estimations based on willingness to travel for tourism purposes and the decrease of real estate prices near mangrove depletion indicate that this beneficial use may be quantified, and is a tangible value of the ecosystem.¹⁹

B. Nonuse Values

In addition to use values, the mangrove also provides existence, option and unknown values which have present economic worth to society. Existence value is best characterized as the worth one places on the ecosystem for the knowledge that it is intact, despite any possible use or nonuse values that person may receive from the ecosystem.²⁰ Option value, however, is directly related to future use of the ecosystem, and is best characterized as preservation for possible future use.²¹ Both of these values are difficult to quantify, but do exist as society's desire to preserve ecosystems for their own existence and future optional use is the basis for many preservation, conservation and management systems.

Unknown values are, of course, not quantifiable at present due to lack of knowledge of the undiscovered benefits of the mangrove.²² However, a recently discovered cancer treatment found in oysters which naturally occur

16. Though not a valuation of only the mangrove ecosystem, swamps and wetlands are valued at approximately \$3,024 per hectare annually for these filtration functions. Charles Petit, *Natural Environment Gets a Price Tag — \$33 Trillion*, S. F. CHRON., May 15, 1997 available in WESTLAW Library, ENVNEWS file.

17. *See id.*

18. *See generally* TOM TIETENBERG, ENVIRONMENTAL ECONOMICS AND POLICY 59-70 (1998).

19. *See id.*

20. *See id.*

21. *See id.*

22. This does not mean, however, that they are valueless. In fact, some present unknown values may actually be more beneficial than present known values, but they have yet to be discovered and monetized.

only in Floridian mangroves provides a weighty argument to include the unknown values when considering whether to dredge or trim a mangrove.²³

III. DREDGING AND FILLING OF MANGROVES THROUGH DEP PERMITTING

Since passage of the Florida Environmental Reorganization Act in 1993 (FERA),²⁴ mangrove dredge and fill permits are issued pursuant only to the same standards²⁵ for issuance of a non-mangrove wetland dredge and fill permit, despite the highly valuable ecological functions discussed above.²⁶

23. In March of 1998, an oyster which only grows on the prop roots of Floridian mangroves was found to have significant cancer prevention and treatment capabilities. This oyster is now being cultivated in laboratories (on artificially grown mangroves) and tested for future FDA approval. See *Discovery News* (ABC television broadcast, Friday April 10, 1998 (unpublished transcript)). This oyster proves that the mangrove ecosystem can be highly valuable for its unknown goods and/or services. These goods and services are destroyed or degraded by dredging and trimming as currently allowed under Florida's regulatory scheme.

24. FERA's "Declaration of Policy," states at subsection (c) that one of FERA's purposes is "to protect the functions of entire ecological systems through enhanced coordination of public land acquisition, regulatory, and planning programs." 1993 Fla. Laws ch. 93-213 (available as historical note at FLA. STAT. ANN. § 20.255 (West 1998) (emphasis added)).

25. FERA eliminated the prior "regulatory minefield" caused by the layering of state, local, and federal permitting requirements and the approval of the Internal Improvement Trust Fund Board of Trustees. See Bruce Wiener & David Dagon, *Wetlands Regulation and Mitigation After the Florida Environmental Reorganization Act of 1993*, 8 J. LAND USE & ENVTL. L. 521, 553-54 (1993). However, the applicant must still comply with any water management district or local regulations stricter than those set forth in FERA, but the water management district and/or local agency concurrently reviews a single Environmental Resource Permit application. See *id.* (explaining that prior to FERA, an applicant was required to apply for at least three separate types of permit: dredge and fill, alteration of mangroves, and storage of surface waters. The applicant would also then have to apply to the regional water management district and any local agencies which had authority under the Coastal Zone Management Act, or had been delegated authority by the Department of Environmental Resources [later consolidated with the Department of Natural Resources and renamed the Department of Environmental Protection].).

26. FLA. ADMIN. CODE ANN. r. 62-340.300 (1999), provides "five mutually exclusive methodologies or 'tests' that agencies are permitted to utilize when asserting wetland jurisdiction." John J. Fumero, *Environmental Law: 1994 Survey of Florida Law — at a Crossroads in Natural Resource Protection and Management in Florida*, 19 NOVA L. REV. 77, 99 (1994) [hereinafter Fumero].

The first test is visible delineation of the wetland by plant type using the extensive list of 330 wetland plant species in FLA. ADMIN. CODE ANN. r. 62-301.200(1)(c) (1999), which includes all eleven Atlantic American Mangrove species, not only the three listed in the Mangrove Act. The second and third tests define the wetland through percentage of cover type. See *DEP v. Mertens*, DOAH Case No. 93-3897, 1996 WL 77741 (Fla. DEP Jan. 8, 1996) (finding jurisdiction on the basis of expert witness testimony of vegetative and

The procedure and requirements for a dredge²⁷ and fill permit are codified in Florida Administrative Code (“Code”), rule 62-312.²⁸ Rule 62-312.010 makes clear the primary requirement of water quality.²⁹ The standards to issue a dredge and fill permit under this section are “in addition to and not in lieu of the water quality standards which are required by other provisions of these rules.”³⁰

Code rule 62-312.080(1) also mandates that, “no permit shall be issued unless the applicant has provided the Department with reasonable assurance based on plans, test results or other information that the proposed dredging or filling will not violate water quality standards.”³¹ The “reasonable

hydrological factors and holding that respondent had filled the “landward extent of the waters of the state” without a permit). The fourth test uses substrates that are “undrained hydric soils with characteristics listed under rule 62-340.300(c)” for delineation. Carreja, *supra* note 6, at 428. The fifth test is satisfied if “(1) the area contains ‘one or more of the hydrological indicators listed in rule 62-340.500;’ (2) the area’s soil is hydric; and (3) ‘reasonable scientific judgment indicates that the inundation or saturation is present sufficient to meet’ the statutory definitions of wetlands.” *Id.* at 428–29 (quoting from FLA. ADMIN. CODE ANN. r. 62-340.300(2)(d)). The mangrove ecosystem is easily classifiable as a wetland under this hierarchy of tests, and, as such, is subject to the same standards as other Floridian wetlands for a dredge and fill permit.

27. FLA. ADMIN. CODE ANN. r. 62-312.020 (1999), defines dredging as, “excavation, by any means, in waters of the state. It is also the excavation (or creation) of a water body which is, or is to be, connected to any of the waters listed in section 62-312.30(2), F.A.C., directly or via an excavated water body or series of excavated water bodies.”

FLA. ADMIN. CODE ANN. r. 62-312.060(1) (1999) describes the activities, non-exhaustively, which require a dredge and fill permit:

Unless specifically exempt, permits shall be required for dredging or filling, including but not limited to construction of: artificial reefs, groins, jetties, breakwaters, riprap or seawalls, revetments and similar type structures; marinas, docks, wharfs, piers, marine railroads, walkways, mooring pilings, dolphins and similar structures; boat ramps, lifts or similar launching facilities; ski ramps or other similar structures; utility installations, navigational aids, commercial signs or similar obstructions; canals, canal locks, bridges or similar crossing structures; as well as dredging or excavating by any means and filling or placing of material in, on or over waters of the state listed in Rule 62-312.030, F.A.C.

28. Additional dredge and fill jurisdictional statements providing DEP, the water management districts and duly delegated local agencies with permitting jurisdiction are codified in FLA. ADMIN. CODE ANN. r. 62-312.030–045 (1999).

29. *See* FLA. ADMIN. CODE ANN. r. 62-312.010 (1999).

30. *Id.* Hence, all dredge and fill permits must simultaneously qualify under the water quality standards, codified at 62-302.500 & 62-302.530, to be approved by the DEP.

31. FLA. ADMIN. CODE ANN. r. 62-312.080(1) (1999). FLA. STAT. ANN. § 373.414 (West 1997), “Additional Criteria for Activities in Surface Waters and Wetlands,” [a portion of the Water Quality Standards] provides in relevant part:

[T]he governing board or the department shall require the applicant to provide reasonable assurance that state water quality standards applicable to waters as defined

assurance" necessary may consist of documentary and testimonial evidence which proves that the water quality standards will not be degraded.³² Though it provides flexibility, which may or may not be beneficial depending on the circumstances, the reasonable assurance standard is quite low considering the value of the mangrove ecosystem.

*A. Economic Values Exchanged Under
Current Regulation of Florida's Mangroves*

By applying such a low standard of assurance in this and other dredge and fill provisions, the DEP does not require a significant guarantee that any measure regarding the permit will succeed as designed by the applicant. A simple economic expression explains how the reasonable assurance requirement does not protect the public interest in an economically efficient fashion because the reasonable assurance standard allows exchange of unequal values.

The value of an acre of mangrove in its current natural state is set at A , while the value of that same acre after being dredged and filled is set at B . If $A = B$, then an economically efficient allocation of society's resources would occur when A and B are exchanged on the same terms. That is, the public would not incur an overall loss as the value to society of A is equal to B and the public only experiences a change in use.³³

in s. 403.031(13) will not be violated and reasonable assurance that such activity in, on, or over surface waters or wetlands, as delineated in s. 373.421(1), is not contrary to the public interest. However, if such an activity significantly degrades or is within an Outstanding Florida Water, as provided by department rule, the applicant must provide reasonable assurance that the proposed activity will be clearly in the public interest.

Under the Surface Water Management and Storage Act, 'activity' is defined to include dredging. The contrary to public interest test referred to in this section is codified at FLA. STAT. ANN. § 373.414(1)(a) (West 1997) and is applied to dredge and fill permitting by FLA. ADMIN. CODE ANN. r. 62-312.080(1)-(2). See *infra* text at note 38 for the language of the contrary to public interest test.

32. FLA. ADMIN. CODE ANN. r. 62-312.080 (1999); *McGinnis v. DEP*, DOAH No. 97-1894, 1998 WL 295409, at 6-7 (Fla. DEP June 1, 1998) (denying a permit for a dredge and fill project on the coast of an Outstanding Florida Water in part because the applicant could not provide reasonable assurances that the project would not degrade proximate water quality).

33. For purposes of this hypothetical only. A change in the use of the mangrove has additional, far-reaching ecological and economic effects which should be accounted for in the permitting decision. The change in use destroys the first step in the complex food web comprised of mangroves, seagrasses and coral reefs. See *supra* notes 5, 10, 15 and accompanying text. By destroying the mangrove, the change in use decreases the amounts of fry, nutrients and turbidity-controlling detritus transported from the mangrove to the seagrasses and coral reefs offshore. See *supra* notes 5, 10, 15 and accompanying text. This

However, under Code rule 62-312.080, and others which use the reasonable assurance standard as a guarantee of efficacy in permitting, society's value of B is diminished and an unequal trade occurs.³⁴ A is traded at full value and without unknown factors which would make it less valuable to society. At the point when A is permitted to be dredged and filled it's full value is converted to usage B . However, B is traded with only a *reasonable assurance* that its value as traded can be achieved. Thus, a more exact equation for this exchange would be $A > B - C$, where C is the non-assured portion of B . The variable C must be included in the equation because *the assurance only has to be reasonable, not definite nor guaranteed*. Additionally, it must be negative because it decreases the actual value of B as traded for A .

Furthermore, the mangrove is traded at full-known value and also includes additional, unknown positive values which are traded without compensation.³⁵ These unknown positive values make the equation even more disproportionate, yielding a representation of $A + D > B - C$, where D represents the unknown positive value of the acre.

To compensate the negative value of C , the DEP could require a bond from the applicant in assurance that the project will not violate water quality standards, or cause other environmental degradation.³⁶ The bond would serve at least two purposes in the dredge and fill process. First, the applicant will be certain that the project will not violate water quality standards as proposed, and will maintain this quality until the cost of maintaining the water quality exceeds the cost of the bond. Second, with a bond payable upon violation of the water quality standards, the DEP will have an immediate source of funds to mitigate the damage if the project violates water quality standards in the future.

alteration of the food web has a direct effect on the productivity of near-coast fisheries. See *supra* note 9 and accompanying text; see *infra* note 43 and accompanying text for discussion of the effect of mangrove alteration on surrounding fisheries. Of course, the corollary is that the B usage may also require adjustment in value because of its purpose and economic benefit to society, and could, arguably, be a more beneficial use to society than the natural state of A .

34. See generally FLA. ADMIN. CODE ANN. r. 62-25-042 (1999), "Permit Requirements for Wetland Stormwater Discharge Facilities;" 62-312.080 (1999), "Standards for Issuance or Denial of a Permit;" 62-312.340 (1999), "Evaluation of Mitigation Proposal,;" 62-312.370 (1999), "Restrictions on Property Use;" 62-341.475 (1999), "General Permit for Minor Activities."

35. See *supra* notes 22, 23 and accompanying text.

36. The bond would operate similar to a contract performance bond and would require that the applicant achieve the standards set forth in the permit.

Unfortunately, there is no simple way to remedy the loss of unknown value represented as D in the equation. The permit could require an additional payment into trust for future values lost, but this is probably not politically feasible. Alternatively, representative sections of the various mangroves around the state could be conserved. This second alternative is being partially implemented under other conservation efforts, but these efforts do not have preservation of mangrove diversity as a primary goal.

B. Contrary to the Public Interest

The contrary to public interest test appears in Florida Statute section 373.414, which is applied to dredging and filling by Code rule 62-312.080(2).³⁷ This test is the second standard for issuance of a dredge and fill permit and is the primary tool for recognition of mangroves' value in Florida's current regulatory scheme. The provision directs the "governing board or department [to] consider and balance" the following seven criteria in determining if the dredge and fill application is contrary to the public interest:

- A. Whether the activity will adversely affect the public health, safety, or welfare or the property of others;
- B. Whether the activity will adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats;
- C. Whether the activity will adversely affect navigation or the flow of water or cause harmful erosion or shoaling;
- D. Whether the activity will adversely affect the fishing or recreational values or marine productivity in the vicinity of the activity;
- E. Whether the activity will be of a temporary or permanent nature;
- F. Whether the activity will adversely affect or will enhance significant historical and archaeological resources under the provisions of s. 267.061; and

37. See FLA. ADMIN. CODE r. 62-312.080(2) (1999) (providing that, "no permit shall be issued unless the applicant provides the Department with reasonable assurance based on plans, test results or other information that the project is not contrary to the public interest in accordance with section 403.918(2), F.S. [now codified at FLA. STAT. ANN. § 373.414 (West 1997 & Supp. 1999)]."). The bond alternative could work in conjunction with this provision to guarantee that the project is not and will not become contrary to the public interest.

G. The current condition and relative value of functions being performed by areas affected by the proposed activity.³⁸

For purposes of this discussion, it will be assumed that the permit is for dredging and filling of a permanent nature under subsection five, and no historical or archaeological resources are involved under subsection six.³⁹

This test uses the operative phrase "adversely affect" as a standard in subsections one through four.⁴⁰ Though virtually all DEP decisions regarding the dredging of a mangrove recognize that dredging has some negative ecological effect, many hold that this effect is not contrary to the public interest because it is not sufficiently adverse. The nature of the effect varies depending on the size of each proposed dredge and fill project, and the current condition and relative productivity of the ecosystem under subsection seven.⁴¹ However, it is arguable that even small projects are contrary to the public interest and are of sufficient adverse effect to deny permitting.⁴²

In the Philippines, for example, when one hectare of mangrove is dredged for conversion to other uses, the fish and shrimp harvest in proximate coastal waters is reduced by 0.8 to 1.4 tons annually.⁴³ This type of loss should meet the "adversely affect" standard in subsection four,⁴⁴ but many of the decisions do not consider economic data in their determinations and rely on the vagueness of the "adversely affect" standard to allow dredging and filling of mangroves.⁴⁵

38. See FLA. STAT. ANN. § 373.414(1)(a) (West 1997).

39. *Id.* § 373.414(1)(a)(5),(6).

40. *Id.* § 373.414(1)(a)(1)-(4).

41. *Id.* § 373.414(1)(a)(7).

42. Consider the high public value produced by one acre of mangrove, *see supra* notes 9-23 and accompanying text, in contrast to the focused value of one acre of developed private land. It appears that virtually any project converting a portion of a mangrove would be contrary to the public interest because of the destruction of the numerous ecological benefits produced by the mangrove ecosystem. Of course, this must be weighed against the benefits of economic development and the private ownership of the mangrove. However, it appears that the scale is currently tilted heavily in favor of economic development at the expense of mangroves and the public benefits they provide.

43. See Artemio F. Cusi, III, *Economic Indicator: Mangrove Areas Shrinking at Steady Rate: FMB Data*, BUSINESSWORLD MANILLA, February 12, 1997, available in WESTLAW Library, ENVNEWS file (citing Dr. John McManus of the International Center for Living Aquatic Resources Management for the correlation ratio. The variation in the reduction is determined by the condition of the mangrove prior to dredging.).

44. FLA. STAT. ANN. § 373.414(1)(a)(4) (West 1997 & Supp. 1999).

45. The use and nonuse values served by the mangrove ecosystem are correlated with subsections one through four of the public interest test. Subsection one's health, safety, welfare and property concerns are served by the filtration, coastal protection and cost-savings functions of the ecosystem, and the public welfare is additionally served by the beneficial

A change in the language of the public interest test would allow for more exact calculation of the values sacrificed when a mangrove, or any other wetland, is dredged and filled. First, the "adversely affect" standard is vague, too demanding and subject to inconsistent decisions. A lower and more definite standard would better protect the public interest in the ecological functions of mangroves, while still allowing for dredging under certain circumstances.⁴⁶

Second, the Legislature should require the DEP to quantify and monetize, to the extent possible, the economic value lost when a permit to dredge and fill a mangrove is granted.⁴⁷ Though not fully known, inclusion of this data in the decision-making process will force the administrative law judge, or Board upon appeal, to acknowledge the financial losses incurred by the public when a permit is granted. Furthermore, the economic loss incurred by society would be made a part of the public record, and the public would have the information available to make itself aware of the values lost when a mangrove is dredged and converted to an alternative use.

Third, the decision should also be made with consideration of the entire ecosystem of the area where the permit is requested. Although FERA professes to account for entire ecological systems,⁴⁸ the "contrary to the public interest" test only measures the functions being performed by the discrete area affected by the proposed activity.⁴⁹ Thus, ecosystems can be divided under current regulation without fully considering the effects of the alteration on the entire ecosystem.

These three suggestions account for only a small area of the deficiencies in the current "contrary to public interest" test.⁵⁰ However, they do allow for

uses of aesthetic viewing and recreation. Subsection two's conservation and habitat functions correlate to the nonuse values of existence and biodiversity. Subsection three's navigation, flow and erosion interests are served by the coastal protection function during storm and non-storm conditions. Subsection four's interest in recreation and marine productive correlates to the ecosystem's productivity of fishery products.

46. Perhaps a standard such as *significant degradation of ecological functions* or similar language would be more accurate and allow for more exact calculation of the ecological values lost by dredging and filling a mangrove, or other wetland. Another alternative would be to consider a standard based on the economic value of the mangrove using the known economic values for calculation.

47. See Fumero, *supra* note 26, at 79 (commenting that two-thirds of the commercial fish and shellfish in Florida's marine fisheries are directly dependent on coastal wetlands and estuaries). See also *supra* note 9 explaining the high level of seafood production achievable in one hectare of mangrove.

48. See *supra* note 24.

49. See FLA. STAT. ANN. § 373.414(1)(a)(7) (West 1997 & Supp. 1999).

50. These suggestions would also apply to other forms of environmental resources which have a direct effect on water quality such as freshwater wetlands, river banks, etc.

a more equitable distribution of societal benefits because a more accurate approximation of the value of the mangrove ecosystem would be possible under the suggested alternatives. A better valuation allows for a more equal exchange to occur and the value of *A* would better approximate the value of *B* when the permit is granted and the ecosystem converted.

C. Impracticability, Mitigation and Variance in Dredge and Fill Permitting

Despite the use of the reasonable assurance standard as a basis to ensure water quality, and the use of the "adverse affect" standard in the contrary to public interest test, the rule contains further exceptions which allow degradation of the mangrove ecosystem and other wetlands.

Code rule 62-312.060(10) provides that the DEP shall "discuss with the applicant any modifications to the project that may bring the project into compliance with the permitting criteria" when a permit as submitted fails to meet the water quality criteria under Florida Statute section 373.414.⁵¹ The applicant then "responds . . . as to whether or not the identified modification to the proposed project is practicable and whether the applicant will make the identified modification."⁵²

Inclusion of the impracticable limitation on suggestions made by the DEP for a specific modification which would bring the project into compliance allows an applicant to violate the water quality standards if he, or she can make a persuasive argument that the modification is not practicable.⁵³ Since validity is presumed even without the DEP modification, the applicant may still receive approval and violate the water quality standards.⁵⁴ The text of this rule would better serve the public interest if a presumption of validity was given to the DEP suggested modification to balance against the claim

51. FLA. ADMIN. CODE ANN. r. 62-312.060(10) (1999).

52. *Id.*

53. *See* Dibbs v. DEP, DOAH Case No. 94-5409, 1995 WL 368766 (Fla. DEP Apr. 4, 1995) (approving a dredge and fill permit and finding that reduction of wetland reclamation from 2 acres to approximately 0.5–0.7 acres was impracticable where it would also reduce the number of commercial buildings in the project from four to two).

This decision clearly places more emphasis on the economic value of the proposed project and de-emphasizes the value of the wetland. It trades 1.3–1.5 acres of wetland for an additional two buildings instead of attempting to reach a middle ground which preserves the commercial viability of the project, but also accounts for the value of the wetland destroyed. This case shows how the impracticability limitation degrades the ecosystem without requiring any compensation to the public for the ecological values lost through conversion of the acreage.

54. *See id.*

of impracticability by the permit applicant.

The rule also allows "the applicant [to] propose mitigation measures" as an option to account for the degradation in water quality if the modification is impracticable.⁵⁵ The use of mitigation fails to compensate for the real cost of dredging a mangrove because mitigation most often fails to even approximate the ecological value of the ecosystem for which it is replaced,⁵⁶ despite using multiplicative factors to calculate the mitigation credits needed per project.⁵⁷ In the impracticable modification circumstance, mitigation is much more detrimental to the quality of the proximate waters than should be allowed because there is a DEP suggested modification which would bring the project within water quality standards⁵⁸ without mitigation's doubtful

55. FLA. ADMIN. CODE ANN. r. 62-312.060(10) (1999), provides in full:

During the processing of the permit application, the Department shall determine whether or not the application, as submitted, meets the criteria contained in sections 403.918(1) and (2)(a)1.-7. and 403.919, F.S. If the project, as designed, fails to meet the permitting criteria, the Department shall discuss with the applicant any modifications to the project that may bring the project into compliance with the permitting criteria. The applicant shall respond to the Department, in writing, as to whether or not the identified modification to the proposed project is practicable and whether the applicant will make the identified modification. The term "modification" shall not be construed as including the alternative of not implementing the project in some form. When the Department determines that the project, as submitted or modified, fails to meet the criteria contained in sections 403.918(1) and (2)(a)1.-7. and 403.919, F.S. [codified at FLA. STAT. ANN. § 373.414 (West 1997 & Supp. 1999)], the applicant may propose mitigation measures to the Department as provided in Chapter 62-312, Part III, F.A.C. Nothing herein shall imply that the Department may not deny an application for a permit, as submitted or modified, if it fails to meet the criteria in section 403.918(2)(a), F.S. [codified at FLA. STAT. ANN § 373.414 (West 1997 & Supp. 1999)], or that mitigation must be accepted by the Department.

56. See Ratner, *supra* note 4, at 1156, 1165; Virginia C. Veltman, *Banking on the Future of Wetlands Using Federal Law*, 89 NW. U. L. REV. 654, 669 (1995) (discussing wetland mitigation and determining that mitigation of wetlands has been a "dismal failure," (citing ENVIRONMENTAL LAW INSTITUTE, WETLAND MITIGATION BANKING 31 (1993) [hereinafter Veltman])).

57. See Ratner, *supra* note 4, at 1156, 1165; Veltman, *supra* note 56, at 669 (reporting that the success rate for creation of wetlands in Florida was 45% between 1985 and 1990, and that only four of the 63 permitted creation projects "had fully complied with the permit requirements," citing Ann Redmond, *How Successful Is Mitigation?* NAT'L WETLANDS NEWSL. (Env'tl. L. Inst., Wash., D.C.), Jan.-Feb. 1992, at 6).

58. When an applicant is allowed to first claim impracticability of the DEP suggested modification under Code chapter 62-312.060(10) and then use mitigation, the ecosystem essentially loses twice. First, the loss of wetland acreage and its ecological functions would be reduced by implementing the DEP suggested modification. Because that modification is not implemented due to the impracticability exception, the ecosystem loses the amount that would have been preserved if the modification was implemented. Second, mitigation is supposed to replace that loss and is a replacement for the suggested modification, but usually

efficacy.⁵⁹

The public interest test also contains a provision for variance relief on a case by case basis, providing at subsection 17 that “[t]he variance provisions of s. 403.201 are applicable to the provisions of this section or any rule adopted pursuant hereto. The governing boards and the department are authorized to review and take final agency action on petitions requesting such variances for those activities they regulate under this part.”⁶⁰

A section 403.201 variance may be granted based on economic hardship, and a landowner is able to dredge and fill a mangrove for economic gain, even though that activity is contrary to the public interest and/or violates water quality standards. Of course, there are circumstances where dire economic hardship would justify the dredging and filling of a mangrove. However, it seems extremely inequitable to consider the economic interests of an applicant without considering the negative economic impacts incurred through the reduction of ecological functions when the mangrove is dredged and filled.⁶¹

D. *The Failure of Mitigation Banking of Mangroves*

Though the standards for dredging and filling contain multiple excep-

does not achieve its projected goals. See Ratner, *supra* note 4, at 1156, 1165; Veltman, *supra* note 56, at 669.

For example, a developer proposes to dredge and fill a 10 acre portion of mangrove for an apartment complex. The DEP rejects the application and proposes a modification under chapter 62-312.060(10), which will reduce the acreage dredged and filled to five acres. The developer claims impracticability (similar to the applicant in *Dibbs v. DEP*, DOAH Case No. 94-5404, 1995 WL 368766 (Fla. DEP Apr. 4, 1995)) and proposes mitigation. At the outset, there were 10 acres of mangrove providing ecological benefits. Under the modification proposed by the DEP there would remain five acres and the complex could be constructed, though probably at a smaller size. Because of impracticability, these five acres, which could have been preserved under the modification, are also consumed.

In exchange for these five acres, mitigation is provided. If mitigation was normally effective, no secondary loss would occur. However, because mitigation is usually unsuccessful and does not approximate the exact conditions of the wetland lost, society loses a second time. See Ratner, *supra* note 4, at 1156, 1165; Veltman, *supra* note 56, at 669. That is, the five acres are traded for a quantity mitigated, but this quantity will not provide the ecological benefits lost because of the difficulties of mitigation. It is important to realize that these circumstances could achieve a much more balanced solution if the DEP modification was given a presumption of validity.

59. See *id.*

60. FLA. STAT. ANN. § 373.414(17) (West 1997).

61. This is similar to the imbalance discussed with regard to *Dibbs*, 1995 WL 368755. The Legislature has placed emphasis on the private individual's economic gain and de-emphasized the ecological value of the mangrove.

tions, mitigation banking is perhaps the most detrimental regulatory⁶² activity because the mangrove ecosystem requires growth conditions which are difficult, if not impossible, to reproduce.⁶³ A mangrove ecosystem can be created only at another coastal site.⁶⁴ Furthermore, mangroves can export organic matter to seagrass meadows and coral reefs (in maintenance of fishery stock and population) only from a coastal location.⁶⁵ With the current population pressures on these areas from rapid coastal development, the areas for possible reproduction of the mangrove ecosystem are extremely limited.⁶⁶

Mitigation banking for use in the public interest test is provided by Florida Statute section 373.414, which reads in relevant portion:

If the applicant is unable to otherwise meet the criteria set forth in this subsection [satisfaction of the public interest test], the governing board or the department, in deciding to grant or deny a permit, shall consider measures proposed by or acceptable to the applicant to mitigate adverse effects that may be caused by the regulated activity. Such measures may include, but are not limited to, onsite mitigation, offsite mitigation, offsite regional mitigation, and the purchase of mitigation credits from mitigation banks permitted under s. 373.4136. It shall be the responsibility of the applicant to choose the form of mitigation. The mitigation must offset the adverse effects caused by the regulated activity.

The department or water management districts may accept the donation of money as mitigation only where the donation is specified for use in a duly noticed environmental creation, preservation, enhancement, or restoration project, endorsed by the department or the governing board of the water management district, which offsets the impacts of the activity permitted under this part.⁶⁷

Though this is only one factor in the public interest balancing test, mitigation

62. See generally S. Scott Burkhalter, *Oversimplification: Value and Function: Wetland Mitigation Banking*, 2 CHAP. L. REV. 261, 305 (1999) (discussing the advantages and disadvantages of wetland mitigation banking and concluding that "ecologically comprehensive methods of valuing mitigation credits must be employed to assure . . . that similar wetland values and functions in the mitigation bank compensate for the destroyed or impacted wetland in the development project.>").

63. See *supra* text accompanying note 1.

64. See *supra* text accompanying notes 1.

65. See *supra* text accompanying notes 2, 5.

66. See Fumero, *supra* note 26, at 78 (reporting that "almost 1,000 people per day moved into [the South Florida] area [during the 1960's, 70's and 80's]."); Maul, *supra* note 12.

67. FLA. STAT. ANN. § 373.414(1)(b) (West 1997).

is a technique encouraged by FERA, and the decisions have recognized this legislative encouragement. Furthermore, with the passage of the Private Property Rights Protection Act of 1995, mitigation was further encouraged and regional mitigation banking standards were made less demanding.⁶⁸

As discussed above, the efficacy of mitigation of any wetland is doubtful.⁶⁹ Although mangroves can be grown in appropriate areas, these areas are extremely limited because of demand for coastal land.⁷⁰ Furthermore, new-growth mangroves do not function as well as natural mangroves and cannot provide the level of ecological benefits provided by natural mangroves.⁷¹ Therefore, current regulations which cause degradation of mangrove ecosystems by permitting mitigation banking should not be allowed.

IV. THE MANGROVE TRIMMING AND PRESERVATION ACT

In addition to being permitted as wetlands for dredge and fill purposes under the above procedures and the loss which occurs when a permit is granted and implemented, mangroves are also regulated under the Mangrove Trimming and Preservation Act.⁷² These provisions concern the trimming, type and amount of trimming, who may trim, what areas may be trimmed and when a permit is required for trimming.⁷³ Generally, property owners may trim, without a permit, existing mangroves on their property of 10 feet or less in height to a height of not less than six feet from the substrate in maintenance or enhancement of their riparian right of view.⁷⁴ If the land-

68. See Carreja, *supra* note 6, at 446.

69. See Ratner, *supra* note 4, at 1156, 1165; Veltman, *supra* note 56, at 669.

70. See Fumero, *supra* note 26, at 78; Maul, *supra* note 12, at A6.

71. See Veltman, *supra* note 56, at 669.

72. FLA. STAT. ANN. §§ 403.9321-.9333 (West 1998); see Kellyalexis Fisher, "Man Let 'em Grow" the State of Florida Mangrove Laws, 72 FLA. B.J. 58 (1998) for a discussion of the less restrictive 1995 version of the Mangrove Trimming and Preservation Act, the 1996 Amendments to the Act, and the motivation behind each.

73. See FLA. STAT. ANN. § 403.9326 (West 1998). "Trim" is defined as the cutting of "mangrove branches, twigs, limbs, and foliage, but does not mean to remove, defoliate, or destroy the mangroves." *Id.* § 403.9325(8).

74. See *id.* § 403.9326. If a landowner wishes to trim mangroves taller than 10 feet, he or she must hire a professional mangrove trimmer. See *id.* § 403.9329. The professional trimmer may not trim mangroves over 24 feet in height, and may trim only 25% per year of those mangroves between 10 and 24 feet. After being trimmed 25%, the mangrove will continue to grow and replace some of the limbs and foliage trimmed before another annual trimming occurs. Even assuming a replacement rate of two feet per year, a mangrove 24 feet in height could be reduced to 9.75 feet in five years (by trimming 6 feet in year one, 5 feet in year two, 4.25 feet in year three, 3.7 feet in year four and 3.25 feet in year five) for a loss of 59% of its biomass and related ecological functions.

owner trims 5% or more of the mangrove to a height of six feet or less, the landowner must mitigate under Florida Statute section 403.9332.⁷⁵ The Act does not require anything beyond the general requirements for dredging and filling as analyzed above when an applicant wishes to dredge a mangrove.⁷⁶

The intent of the Legislature for enactment of the Mangrove Act is provided in Florida Statute section 403.9323, which provides in subsection one that: "it is the intent of the Legislature to protect and preserve mangrove resources valuable to our environment and economy from unregulated removal, defoliation, and destruction."⁷⁷ However, in subsection three, the legislative intent is also:

to provide waterfront property owners their riparian right of view, and other rights of riparian property ownership as recognized by s.253.141 and any other provision of law, *by allowing mangrove trimming in riparian mangrove fringes without prior government approval when the trimming activities will not result in the removal, defoliation, or destruction of the mangroves.*⁷⁸

These contrary statements of intent could be one cause of the degradation of mangrove ecosystems through trimming. On one hand, the public and the DEP are informed of the protection provided by the Act, while, on the other, the rights of view are also defined as a primary purpose.⁷⁹ The lack of

75 See *id.* § 403.9332. The mitigation may be offsite under this section. If a landowner uses a professional trimmer to reduce a mangrove of 24 feet in height to 10 feet in height, see *id.* § 403.9329, and then trims the mangrove to six feet himself, that mangrove will have lost 75% of its biomass and related ecological functions. There would be no penalty for this behavior under the Mangrove Act if the landowner follows the statutory schedule. See *supra* note 74 and accompanying text.

76. See FLA. STAT. ANN. § 403.9323(1). This section provides in relevant portion: "the procedures for permitting under part IV of chapter 373 will control in those instances" where dredging and filling occurs in a mangrove wetland. *Id.*

77. *Id.* § 403.9323(1). This section continues to provide: "the Legislature finds that there are over 555,000 acres of mangroves now existing Florida. Of this total, over 80 percent are under some form of government or private ownership or control and are expressly set aside for preservation or conservation purposes." *Id.* § 403.9322.

This does not mean that 80% of the vegetative biomass in the existing mangroves will be maintained, however. Since mangroves may be trimmed up to 75% and still be considered "preserved" for purposes of this statement, Florida could lose up to 75% its mangrove biomass under the Act. See *supra* note 75. Furthermore, the remaining 20% which are not preserved or conserved are subject to dredging and filling, or other forms of conversion. Although this is a worst case scenario and some mangroves are fully protected under state and national conservation programs, see FLA. STAT. ANN. § 403.9325 for defined protection programs, it does illuminate the weaknesses of the overall scheme of mangrove regulation.

78. FLA. STAT. ANN. § 403.9323(3) (West 1998) (emphasis added).

79. The DEP may also delegate its regulatory authority under the Mangrove Act to any

definitive legislative intent in the Act does not provide the public, nor the DEP with a clear statement of purpose for the Mangrove Act on which to base their actions, or decisions.

Though the Act provides some trimming protections for mangroves in Florida, it is extremely limited in focus. Section 403.9325 defines mangrove to mean only the three species, *Avicennia germinans*, *Rhizophora mangle* and *Laguncularia racemosa*, and does not protect any other components of the ecosystem.⁸⁰

No restrictions are placed on the private property owner when she wishes to remove other species occurring in the mangrove ecosystem to preserve her riparian view. Depending on the composition of the ecosystem, the removal of the other mangrove species could have fatal effects on those species of mangrove trees which are protected. For instance, if an area of grass was removed from the landward edge of a mangrove and that grass slowed the velocity of runoff before it reached the mangrove trees, the trees would be subject to a higher rate of erosion. The freshwater which contains organic materials used by the mangrove would also flow through the system at a higher rate, and would not be decomposed and used in the food web. Furthermore, by allowing removal of all the other vegetative components of the mangrove, the Mangrove Act does not protect the entire ecosystem as a system, which is the stated policy of FERA.⁸¹

The trimming of mangroves and mandatory removal of the trimmed materials⁸² reduces the unique detrital base of the food web composed primarily of the year-round loss of foliage.⁸³ As noted above, a landowner could reduce the three regulated species on his or her property by 59% in five years. This landowner could then also remove all other plant species in the mangrove, without penalty, for a further reduction in vegetative biomass. This reduction in plant material, which provides the basis for the unique food web, will have significant negative impacts on the proximate seagrasses, coral reefs and fisheries. Clearly, the Mangrove Act fails to preserve or protect the mangrove ecosystems of Florida and the values served by the ecosystem.

local governments which meet statutory requirements and make a request in writing. *See id.* § 403.9324.

80. *See id.* § 403.9325(3). There are at least eight other mangrove plant species in the Floridian mangroves. *See* FLA. ADMIN. CODE ANN. r. 62-301.200 (1999).

81. *See* 1993 Fla. Laws ch. 93-2123.

82. The trimmings and leaves must be removed as they would constitute a pollutant if left on the substrate. *See* DEP v. Monroe County, 610 So. 2d 697 (Fla. Dist. Ct. App. 1992).

83. *See supra* note 10 and accompanying text.

As in dredging and filling, variance relief and mitigation also play a role in mangrove trimming.⁸⁴ However, in the Mangrove Act, mitigation is limited to rectifying transgressions of the trimming provisions and may not be used as part of a proposal to remove all mangroves within an area.⁸⁵ Functionally, however, since offsite mitigation is acceptable under Florida statute section 403.9332, as is purchasing of mitigation credits, a landowner may trim his mangroves beyond the statutory limits, be assessed a penalty, and then mitigate offsite, or buy mitigation credits.⁸⁶ The landowner could trim the mangroves beyond the point of recovery and clear his property of the vegetation so he may obtain the full riparian view through paying a penalty and then buying mitigation credits, or using offsite mitigation.⁸⁷ Clearly, this Act does not provide the protection necessary to preserve and maintain this unique and valuable ecosystem.

V. CONCLUSION

Though the Florida Legislature has proclaimed ecological soundness and protection in its recent acts concerning mangrove ecosystems, it is apparent that the Legislature has failed to account for the real costs of mangrove degradation in either the dredge and fill permitting process, or the Mangrove Act. The mangrove ecosystems of Florida are extremely small in comparison to their original size and are steadily becoming smaller and smaller under the current legal structures. The adjustments proposed in this discussion would remedy some of the current losses incurred. However, a system of regulation to provide the level of protection necessary to protect such a valuable ecosystem requires comprehensive legislation which recognizes the full ecological values provided by the unique and economically valuable mangrove ecosystems of Florida.

84. See FLA. STAT. ANN. §§ 403.9332-9333 (West 1998).

85. See *supra* note 75 and accompanying text; see also *Shah v. DEP, DOAH* No. 98-4920, 1999 WL 402532 (Fla. DEP May 12, 1999) (resolving a petition filed by landowners challenging a consent order entered into by the DEP and a professional mangrove trimmer, hired by the Shahs, who had violated the mangrove trimming provisions. For damage to 235 mangroves on the Shahs' property, the trimmer was required to plant 1020 mangrove propagules and a 40% survival rate had to be achieved by the end of two years. The landowners petitioned to determine their liability under the mitigation plan, and entered into a settlement stipulation withdrawing their petition and stating that the trimmer would be the primarily liable party for the mitigation required).

86. See FLA. STAT. ANN. § 403.9332(1) (West 1998).

87. This is a worst case scenario. However, this example shows how the current regulatory scheme could be manipulated to produce perverse outcomes in direct contradiction to the purposes of the Act.

