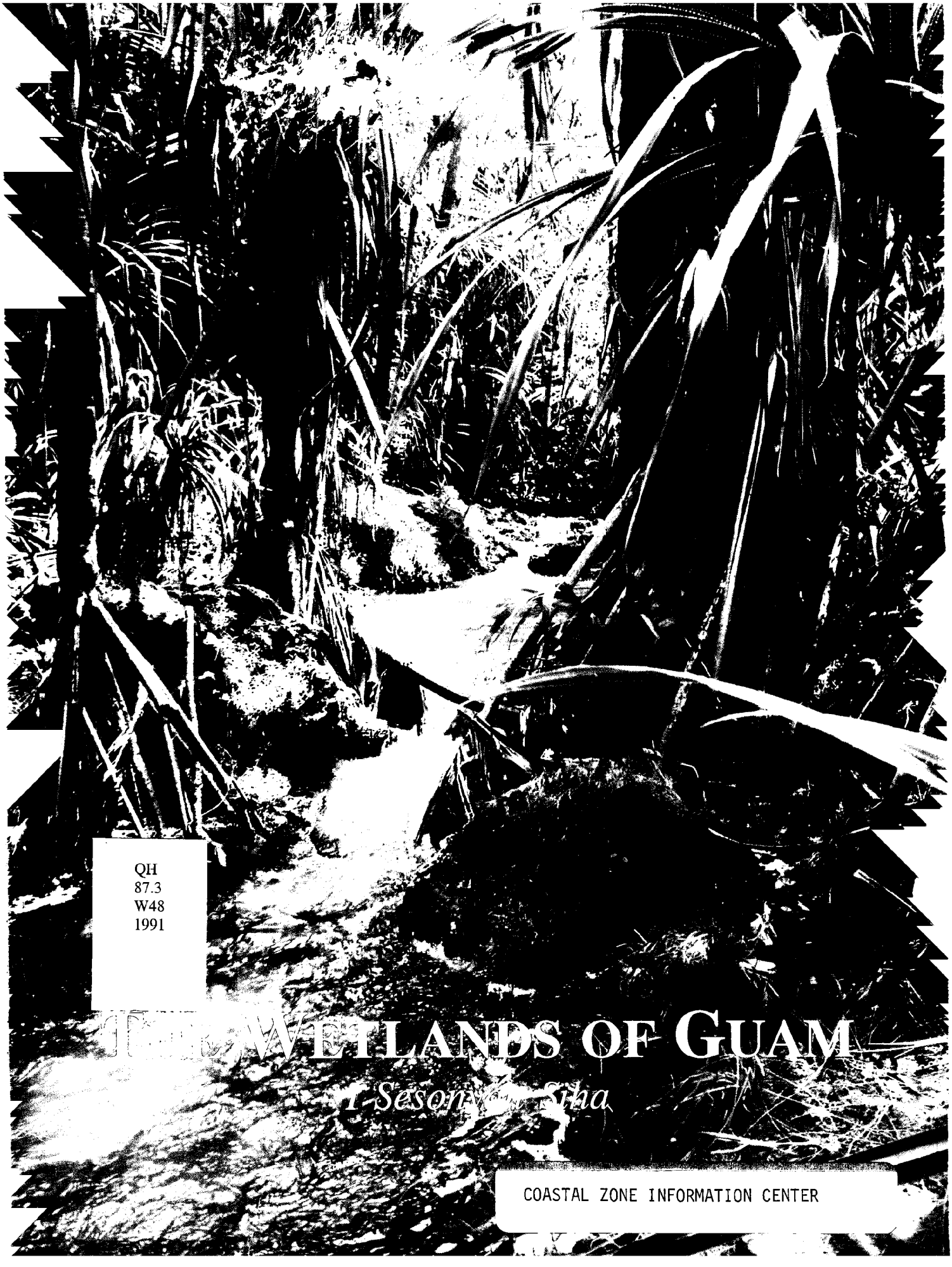

WETLANDS OF GUAM

I Seson Siha

THE WETLANDS OF GUAM

I Sesonyan Siha

A GUIDEBOOK FOR DECISION MAKERS

Funded by the U.S. Department of Commerce, Office of Ocean and Coastal Resource Management and the Guam Coastal Management Program.

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PREFACE

I SESONYAN SIHA

The people of Guam are becoming more aware that wetlands are an integral and necessary part of our Island's ecosystem, but many of us still do not know precisely why this natural resource is so valuable. As a result, these areas have not received the special treatment and attention on a local level that they so desperately require in terms of regulation and zoning laws specifically designed to protect wetlands.

With Guam's limited land resources, and as more and more development moves inland, the potential for losing the last few thousand precious acres of wetland resources has grown substantially. It is critically important for Island citizens and officials be informed about the ecological importance of wetlands, and all of the different types of regulations and procedures that need to be instituted to minimize the loss of their life giving benefits for generations to come.

Mangroves, swamps, and other wetlands are necessary assets to our Island. They function in the protection of private and public property from erosion and provide a barrier against the ravages of typhoons. Wetlands improve our water quality, foster new plant and animal life, provide opportunities for recreation, and overall, add to the exquisite beauty of our island.

When these wetlands are filled or changed, these benefits are lost forever. Draining of wetlands, for example, eliminates the natural biological process of filtering water that rains down into our drinking water sources, and increases the potential for flooding in areas where a natural balance previously existed. Rare birds who depend on these areas for primary natural habitat will no longer have a nesting place or a future.

This report is designed to help local government officials, landowners and the public gain a better understanding of what wetlands are, and why they are an absolutely necessary part of Guam's ecosystem. It also contains suggestions on what you can do to protect the future of this precious resource for ourselves, and most especially, for our children.

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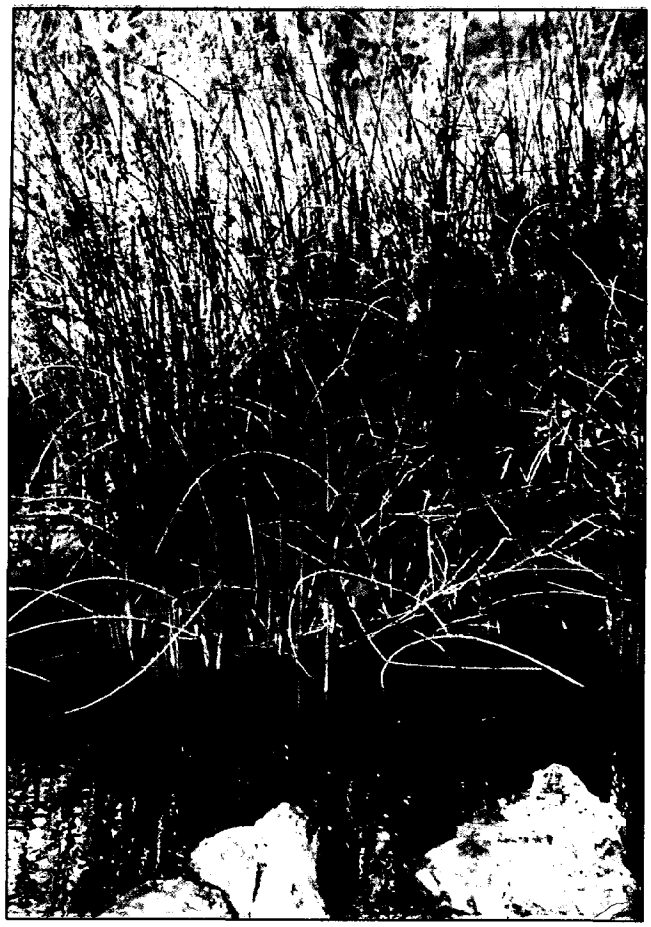


SOME OF THE EASIEST WETLANDS TO FIND ARE THE REEDS ALONG RIVERS AND STREAMS IN THE SOUTHERN PART OF THE ISLAND.

THE HARDEST TO FIND AND PERHAPS THE MOST ALLURING ARE THE PONDS AND SPRINGS CRADLED IN GUAM'S VALLEYS.

Chapter One

What Are Wetlands ?

Since the earth was created it is believed that practically all of the water that was created with it, the water that gave her life, remains on the globe in one form or another. The cycle of water from the oceans to the rivers and the streams to the plants and animals that depend on it for living, is a complex one, and one that has just begun to get the attention of people around the world concerned with rescuing our environment before we have caused irreversible damage to the precious and limited natural resources that we now control.

Guam has an especially intimate relationship with water, as we are surrounded by sparkling ocean with a culture that is strongly woven around our coasts. But it is not only the coastal waters that are important in the delicate balance of nature, for the inland bodies of water are just as crucial a link to the chain of life.

"To waste, to destroy, our natural resources, to skin and exhaust the land instead of using it so as to increase its usefulness, will result in undermining in the days of our children, the very prosperity which we ought by right to hand down to them amplified and developed.

PRESIDENT THEODORE ROOSEVELT
Message to Congress December 3, 1907

THE ISLAND

Located in the Humid Tropical Domain, Guam lies in the Western Pacific at approximately 13 degrees 28' N lat. and 144 degrees 45' E long. or 3,700 nautical miles WSW of Honolulu, 1,500 nautical miles south of Tokyo and 1,500 nautical miles east of the Philippines.

Guam is 212 square miles in size (135,680 acres) about 30 miles long and between 4-8 miles wide. Described as a 'high island' with 12 smaller islands along the reef, Guam is characterized by sloping hills, intersected by low lying basins that are periodically flooded during certain times of the year.

The rocky cliff-bound seaward coast fringed by coral reefs characterize a broad, gently undulating limestone plateau in the northern half. Volcanic formations and perennial streams with fringing reefs make up the southern half.

It is within the northern plateau that the largest source of fresh groundwater on the island can be found. That "water table" lies beneath the highly permeable limestone plateau and consists of a Ghyben-Herzberg lens system of freshwater floating upon a seawater base. The lens is charged by rainwater percolating through the limestone cachement, and surfaces at coastal regions near sea level forming freshwater caves, springs and seeps. Small lakes, marshes or even short streams may be fed by this lens.

Grassy flats in the central area are important for the recharge of the central aquifer which is a much smaller lens, yet the lens least affected by saltwater intrusion. Some water from this aquifer reaches the surface at Agana Springs and disperses into the Agana Swamp.

The south contains two basic volcanic formations, the Alutom formation and the Umatac formation. There are approximately 40 rivers and streams that form a surface drainage pattern that meanders through ravine forests, floodplains, and wetlands.

Averaging 86 degrees Fahrenheit year-round, Guam has a rainy season that runs from July to November and a dry season from Jan to May. The average yearly rainfall is between 85 and 115 inches, less along the coast slightly more rain falls in the

mountains. The yearly average humidity is 66%. Storms varying from smaller thunderstorms to large typhoons frequently hit the island bringing short periods of torrential rain.

GUAM WETLANDS

Wetlands are a unique part of the island's natural land area. They include swamps, marshes, mangroves, springs and river valleys that are usually covered with water. Some of the smaller areas may dry up during the dry season, while others remain inundated with surface water year round.

The wetlands of Guam are mostly confined to the southern half of the island and frequently occur along stream beds where both brackish (salty) and freshwater species can be found. In many instances, a remarkably clear cut demarcation can be seen where saltwater reed marshes merge into swampland.

As the interface between the land and the water, wetlands perform functions that are very important for the reefs of Guam as well. Their functions as filters to keep sediment away from our coral reefs, and as a nursery for juvenile fish are just a few of the vital links they have with our oceans, while they also provide much needed shoreline protection during storms.

The wetlands of Guam are affected more by geology than by rainfall distribution. The northern limestone plateau is home to only a few ponding basins, the clay in the south however, is fraught with wetland areas. The reason for this is the low permeability of the soil. While water can drain easily through the porous limestone, the clay tends to hold water better, creating wetland areas.

Of the 46 rivers on Guam which empty into the ocean, nine exhibit extensive estuarine (mixed salt and freshwater) conditions while two others have minor estuarine conditions which exist only at each river mouth.

DEFINITION OF WETLANDS

The U.S. Fish and Wildlife Service, which has had much experience in mapping wetlands throughout Guam, the United States, and several Pacific islands, acknowledges there is no

single, correct, indisputable, ecologically sound definition for wetlands primarily because of the diversity of wetlands and because the demarcation between dry and wet environments can vary depending on the time of year, or other special circumstances.

Biological Description

Wetlands are those lands where saturation with water is the dominant factor determining the nature of soil development and the types of plants and animal communities living in the soil and on its surface. More specifically, wetlands are transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.

In August 1991, President George Bush unveiled a revised wetland policy. It is not known at the time of this publication if this new policy will supersede current policy. Basically, the new policy would tighten the definition of a wetlands and assign a value to each area with the intention of preserving the more "valuable" areas first. Environmentalists have criticized this action saying millions of acres could be lost nationwide.

For purposes of definition for this book, wetlands are defined according to the US Army Corps of Engineers technical manual adopted in 1989 which states that wetlands must have at least one of the following three attributes:

1) HYDROPHYTIC VEGETATION: At least periodically, the land supports a predominance of plant life that depends on saturated soil. These plants are known as hyrdophytic and lists are available on what plants fall in this category.

2) HYDRIC SOILS: Saturated, flooded, or ponded soil which creates anaerobic conditions (lacking oxygen) for at least 14 consecutive days.

3) WETLAND HYDROLOGY: Presence of water for a week or more at the site. This category is hardest to determine since it is seasonal.

The 1989 manual has been revised in 1991 however, and it is anticipated that the definition could change, perhaps reverting to a previous definition by the Army Corps which requires

wetlands to have all three characteristics.

Legal Definition

The latest definition used by the Government of Guam can be found in the Territorial Land Use Commission/Territorial Seashore Protection Committee (TLUC/TSPC) Wetlands Rules and Regulations (Title XVIII and XIV of the Government Code of Guam):

> *Those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, mangroves, natural ponds, surface springs, estuaries and similar such areas.*

Guam's definition differs from the official federal definition in that the wording used on Guam includes references to aquatic life and specifically includes pond, surface springs, and by reference, many marine based wetlands.

Primary Map

Although no comprehensive map of all Guam wetlands has ever been completed, an interim map which identifies most sites has been adopted through Executive Order 90-13. This order adopted the 1983 National Wetland Inventory by the U.S. Fish and Wildlife Service Map as the official map until a study is completed.

The adoption of the map has improved wetland monitoring and preservation considerably. Now the regulatory agencies of the Government of Guam and the Federal Government have greater enforcement authority, and developers and landowners have a good idea of what areas may require special consideration without extensive surveys.

How do you determine if an area is wetland?

The U.S. Army Corps of Engineers has federal manuals that explain the procedure for delineating wetland areas, but there are some easy indications that the average citizen can use to at least get a preliminary idea of their wetland boundary.

As outlined in the definition of a wetland, there are three essential criteria for determining wetlands. Even if only one or two of these criteria are met, there is a good chance you have encountered a wetland, and that in the rainy season the other criteria will be met.

The first step in finding your wetland boundaries is to research all available information on the site. The National Wetland Inventory Map, available at the Bureau of Planning is a good place to start. Once you locate the property on the map, you may want to research other written documentation of wetland areas, and ask nearby residents about the history of flooding and standing water at the site.

Next, you will want to walk through the area and see for yourself what characteristics make up the landscape. If there is standing water on the property that you know has been there for a while, you are in a wetland.

After this, you want to determine the dominant types of plant life. The most water dependant plants are "Obligate", these are plants that are found in wetlands 99% or more of the time. Next is "Facultative Wetland", which are found in wetlands between 66% and 99% of the time. Next are "facultative", which are found in wetlands 33% to 66% of the time. A common example of an obligate plant is Phragmites, a reed known in Chamorro as "karriso". If this plant is present, you have a good indication that this area is a wetland. Biologists at the Department of Agriculture and the University of Guam College of Agriculture have publications that identify these plants.

If the plants have been destroyed, or you are unable to judge, the next step is to look at soils. "Hydric Soils", as they are called, are soils that are saturated with water for "more than two weeks during growing season". That definition by the federal government identifies "growing season" as any time the soil

temperature is above 47°F. On Guam, that is year round.

What does a hydric soil look like? A sample taken to a depth of about 18 inches should give a good indication. The top would probably be thicker and darker in color than upland soils, while the middle section may have what are called "mottles". Mottles are the result of a chemical reaction between oxygen and the iron present in the soil. Just as your car rusts when you expose the metal to the air, iron in the soil will "rust" or change color when there is oxygen. Hydric soils, however, do not have much oxygen because water is keeping the soil inundated. Therefore the colors of the soil will be much duller than the brighter colors upland.

Finally, the deepest layers will be "gleyed". Greenish, grayish and bluish colors will characterize this layer which is constantly saturated with water, and gets no oxygen.

The U.S. Soil Conservation Office at Dean's Circle has a list of hydric soils for Guam.

Other indications of a wetland include drift lines, vegetation scattered along water lines, sediment deposits, water stained leaves, drainage patterns, and signs of plants trying to adapt to water.

For a true delineation of wetland boundaries, however, you will need to hire professionals to study the area. Ask the Guam Environmental Protection Agency, the Department of Agriculture, or the U.S. Army Corps of Engineers for more information on how obtain a field survey so you will know for sure.

WETLANDS CLASSIFICATION SYSTEM

Many of Guam's wetlands can be found where fresh river water mixes with the salty sea water. These areas are collectively called "estuaries". Sometimes fresh water also seeps from underground. The fresh water tends to remain on the top while saltwater, which is heavier, sinks to the bottom, creating different environments for the creatures and plants that live there. Many species of fish depend on this habitat to raise their young.

This system also provides many different types of nutrients. Plants, for example, take in the nourishment from the riverbed and

the sunlight. They die, and the fragments, called "detritus" are eaten by bacteria. Detritus and algae produce important nutrients for shellfish, and other small creatures, which in turn are food for larger fish and birds. Thus starts one of the most productive life cycles on earth.

The U.S. Fish and Wildlife service has compiled a sophisticated classification system for wetlands. This is used on many documents, including Guam's Official Wetlands Map. However, for purposes of this book, we have simplified the classifications down to the following categories:

Estuarine

E1. Saltwater Aquatic -

These wetlands are routinely flooded by saltwater. Vegetation such as sea grasses and algae can be found in certain areas. Others support corals while still others are intertidal reefs and unconsolidated shore. A highly productive ecosystem, this area provides a feeding ground for juvenile fish. Shallow waters are home to such species as hawksbill and green turtles, fish and shellfish. Included here are those wetlands identified as marine system, tidal ponds.

E2. Coastal Marsh -

Predominantly herbaceous vegetation, sedges and grasses grow here under the influence of brackish (salty) water. Reed marshes are included in this category. Often located at the mouth of a river where outlet meets ocean water (transitional), these wetlands include intertidal estuarine emergent persistent wetland.

E3. Mangrove Swamp -

Estuaries in which grow plants with extensively intertwining prop root systems are called mangrove swamps. Dominated by mangrove species, these areas also have brackish water and support other woody species. They may have a distinctive odor at low tide.

Freshwater

F1. Freshwater Aquatic -

Fringe areas of stagnant ponds, slow-moving streams or lakes that support wetland species. Permanently flooded by freshwater, these areas usually contain floating species without well-developed structural support. Includes reservoirs as well and can provide food for waterbirds. Also described as riverine, aquatic bed, lacustrine and limnetic.

F2. Marsh Land -

Also called grassy marsh, sedge marsh, reed marsh. Little open water choked with reeds and sedges. Places where the water table is at or near the surface permanently and which supports an herbaceous type of vegetation usually in pure stands. Can also contain mass of floating vegetation, and shrub vegetation. Found in lowland and upland, they can occur in savannah wetlands that probably came about as a result of massive disturbances that altered soil characteristics. These areas are important waterbird habitat. Also described as emergent riverine wetland, palustrine and scrub-shrub wetland.

F3. Swamp Land -

Dominated by secondary vegetation, swamps are created when marshland becomes invaded by shrubs or trees due to a buildup of sediment. Nypa and Hibiscus swamps can be recognized on Guam. "Endangered" plants may occur in these areas which occur as swamp forest mangrove stands along mudflats, and ravine forests. Predominantly woody species in dense stands characterize these areas that are periodically inundated or waterlogged especially in low lying areas. Forested palustrine wetland is another classification given here.

Artificial

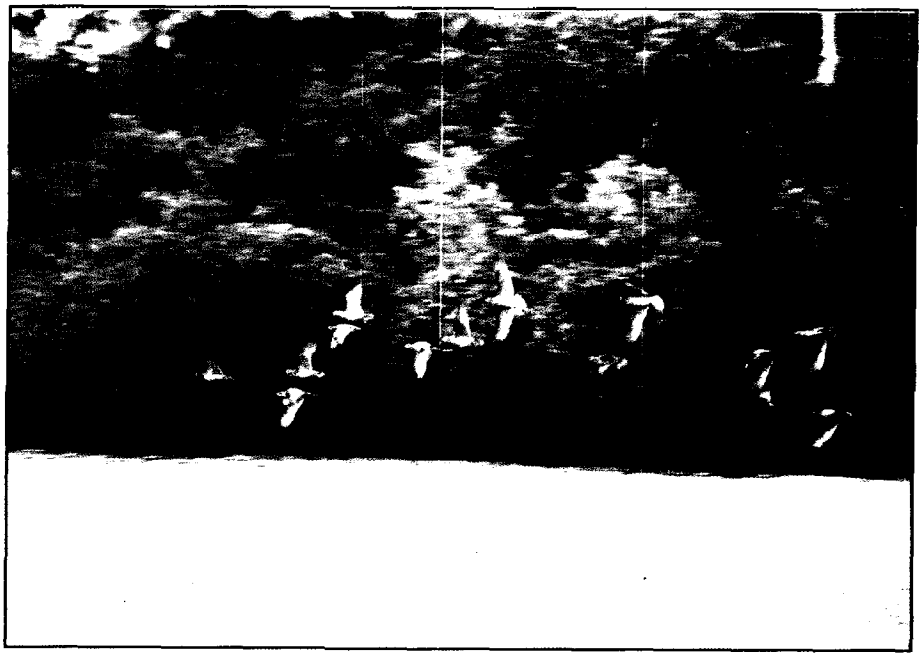
A1. Cultivated Wetland -

Vegetation of cultivated crops requiring wetland conditions and the associated weedy species make up this category. Rice or taro are common species to be grown by farmers on wetland, however such wetlands are currently not seen on Guam.

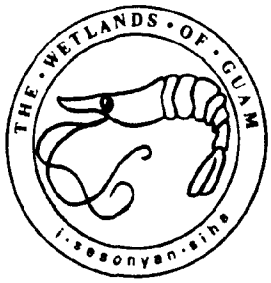
A2. Other Manmade Wetlands -

Created wetlands including positive-artificial such as ponding basins, ditches etc. and negative-artificial including those areas that due to disturbance by man, are saturated for a significant amount of time such that the species that live in the area are classically wetland species. They can be temporary in nature.

WETLANDS PERFORM MANY FUNCTIONS INCLUDING PROVIDING HABITAT FOR JUVENILE FISH.



WETLAND MARSHES ARE ALSO A FAVORITE PLACE FOR BIRDS WHO FIND FOOD CLOSE TO SHORE.



Chapter Two

Why Are Wetlands Important?

Wetlands are among the most productive ecosystems in nature. Wetlands protect homes, farmland, villages, and urbanized areas from flooding by slowing and storing floodwaters. They trap and modify pollutants from stormwater and runoff. Wetlands provide the basic connection between estuary and freshwater food webs. They are essential areas for feeding, nesting, cover, and breeding of a vast variety of birds, fish, reptiles, invertebrates, and mammals.

> ***Knowing that nature never did betray the heart that loved her.***
>
> WILLIAM WORDSWORTH

For many years it was thought development, and the jobs and taxes that resulted, were more important than preserving these areas. However when you consider development in a wetland area, the negatives can be far more irreplaceable and significant including the loss of: existing use, flood reduction functions, water treatment, wildlife habitat and recreation.

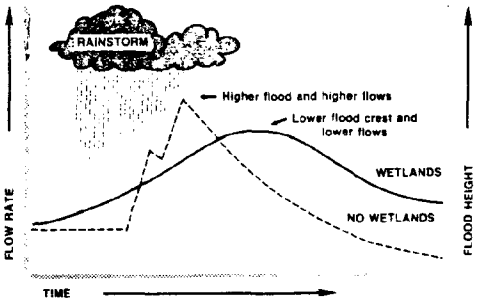
Three major categories of wetland values are discussed in more detail below:

Ecological Value

Wetlands act as a source of freshwater and as floodplains. When it rains, they catch the water and store it for dryer days, much like a sponge. They also are a "safety-valve" providing a

natural area for water to seep to after a heavy rain so that homes and businesses are protected from floodwaters.

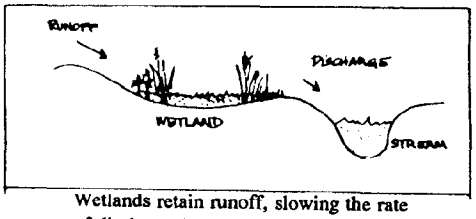
The dynamics of a natural wetland include both land-building and land-holding or erosional protection. They provide shoreline stabilization and protection from the wind, floods and waves. As water washes in, the wetland vegetation slows down the flow inland. The prop root system in mangroves, for example, reduces tidal currents and traps much floating debris resulting in the extensive deposition of sediments and eventual creation of more land. Floodwaters from the interior of Guam by the same token, are slowed by the same process, and released at a lower velocity downstream. As land builders, mangrove areas, with their tangle of prop roots and vegetation, trap particles and sediment that is running through them. This gradually raises the level of a the wetland until a dryer patch of land is created. At the same time, wetlands plants and animals venture further out into the ocean to claim more area.



Kusler, 1983

Wetlands also have among the highest biological productivity in the world, and possibly represent the best example of the food chain. The sun's energy is changed into plant tissue at a rapid rate, while lots of oxygen is produced. While a fertile hayfield, for example, may produce 4 tons per acre per year of organic material, the average wetland produces 10 tons per acre per year (Odum). These areas produce edible delicacies such as oysters, shrimps, clams and mussels, and in several areas on the mainland, can provide raw materials used in making paint varnish, ink, lipstick, soap, insect spray, and other items.

Groundwater discharge is also an important function. Agana, Bonya and Almagosa Springs are examples where groundwater seeps to the surface.



Wetlands retain runoff, slowing the rate of discharge into streams and rivers.

Active wetlands serve to reduce the nutrient load in runoff and protect the ecological balance in estuarine and marine waters by limiting the type, amount, and nature of algae growth. Excess algae grwoth or an unnatural distribution can wreak havoc with marine communities such as coral reefs.

Wetlands preserve the integrity of the water lens system, and in fact many scientists have linked the wetlands to Guam's water tables and groundwater recharge. Wetlands enhance water quality by retaining pollutants and converting them through a

biochemical process to less harmful substances. They also transform and retain nutrients, reduce sediment and filter surface runoff.

Values and importance to wildlife

Wetlands support aquatic plants and animals, providing food and serving as a wildlife habitat. Some of Guam's birds are endangered, and rely heavily upon this habitat. Some examples of birds that are wetland dependant include:

"And the pond's stillness nippled as if by rain instead is pocked with life."

Maxine Kumin
Creatures, 1972

1) Marianas Common Moorehen
   Locally known as "pulattat" the Gallinula chloropus guami is a black bird with a red bill tipped in yellow. Its legs and feet are olive and it lays 4-8 eggs which are buff colored with lavender and brown spots, in a platform of nest reeds. This bird feeds on aquatic insects and plants.
2) Marianas Mallard
   Now extinct, Anas oustaleti was known to grow to 20 inches in length. A dark brown duck with grey wings and buff cheeks, throat and eyestripe, the mallard carried a bluish green spot on its wing, characteristic of the species. The mallard lived and nested in reed swamps and was last recorded on Guam in an area across from Navy PWC in Piti around 1968.
3) Nightingale Reed Warbler
   Now found only on Saipan and Alamagan, this bird, Acrocephalus luscinia was known as the only true songbird of Guam. Sporting a pale-yellowish breast, brown back, and curved bill, it is called "ga-karriso" in Chamorro.
4) Yellow Bittern
   Ixobrychus sinensis or "kakkak" in Chamorro, is a common medium-sized buff, yellow, and brown striped bird. Nests are found in dense strands of reeds and grasses. They lay 3-6 pale blue eggs in nests of dead plant material. They can be distinguished in flight by their long bill and long legs trailing behind.

5) White-browed Crake

Porzana cinerea or "bako" in Chamorro, was a small species of rail that became extinct on Guam sometime after World War II. It used to occur in the Agana Swamp and other wetlands.

Wetlands also serve as a nursery ground for juvenile plants and animals. Just a few examples of the types of species found in these habitats include native freshwater eel Anguilla marmorata which are especially abundant during the rain. Tilapia Oreochromis mossambicus and Tilapia zilli which were introduced to Guam are also abundant. There are also catfish "itot", gobies "atot", and flagtails "umatan".

Mudflats associated with mangroves provide burrows for mud crabs while the prop roots of plants provide attachment sites for a variety of mollusks. In general, wetlands are also the preferred habitat of most commercially viable shellfish. In fact freshwater shrimp, or "uhang" are found occasionally in springs on the island.

Bufo marinus or toads, introduced from Hawaii in July of 1937 to control the black garden slug, also live in wetlands. The Agana Swamp in particular is home to numerous household pets released in the wild such as turtles, carp, goldfish and guppies.

Juvenile mullet and dominant invertebrates, crustaceans and mollusks also live in the swamp as well as green algae Enteromorpha compressa. Mudskippers, Periophthalmus koelreuteri or "macheng", especially like the mangroves, as do worms, clams and snails. Mudskippers are interesting creatures that live in salt and freshwater, as well as out of water. Their bulging, rotating eyes give them a great view. They are known to dig burrows up to 20 inches below ground. There is a distinct chimney they build over the entrance to this burrow. They can be seen skipping and jumping on land, swimming, or climbing prop roots and trees.

There are also many varieties of land crabs that live here including "panglao" Cardisoma carnifax and mangrove crabs "admangao" Scylla serrata which are also found in estuarine wetlands on Guam.

Perhaps the most lively animal that you are bound to find at a mangrove swamp such as Apra Harbor, is the fiddler crab. Given that name for the "fiddling" motion the male makes with its large claw to attract a mate, the small crabs are quite captivating. Males can be identified by their oversized feeding claw which is often red, pink, yellow or blue. These crabs can live in or out of water, and dig burrows in the mud for shelter. They are territorial and feed on organic debris in the mud. Fiddler crabs have a special biological timeclock that alerts them to the changes in the tides, and even when separated from their natural environment, they exhibit behavior that indicates it is time to burrow under the mud when the tide is coming in.

Other wetland plants include the Uchaga-lane or Eleocharis ochrostachys, ground chestnut. Some vegetation may not be endemic to Guam, but may have been introduced during long periods of administration by the Spanish, Japanese or Americans, however freshwater wetlands usually contain endemic species and can support special life forms.

Dredging or filling of wetlands would mean either total elimination of waterbird habitat or severe impairment rendered to the very complex nutrient exchange process. Normal ecological succession can also be accelerated, retarded, or totally destroyed by increased siltation and by altering the photosynthetic process. Adverse water levels, flow turbidity, salinity, temperature and wave action also influence the quality of a waterbird habitat. These in turn determine the amount and composition of food and cover available for species using wetland habitat. Erosion can also be an acute problem, removing ground cover. This, combined with high temperatures can result in loss of topsoil leaving baked hardpans, lower fertility, lower water capacity and more rapid runoff. Construction of dams and irrigation channels may seriously alter biotic communities attuned to natural flooding and could drastically alter soil salinity and nutrient distribution. Permanent re-routing of water can also alter vegetation patterns encouraging invasion of plants that are not compatible with waterbirds and placing critical nesting sites underwater.

These are just some of the biological results of disturbance of wetland areas. There are a myriad of other ways that the animals and plants that depend on wetlands would be affected in the face of developement, and these impacts must be considered before development is allowed to take place so that projects can

compliment and enhance nature.

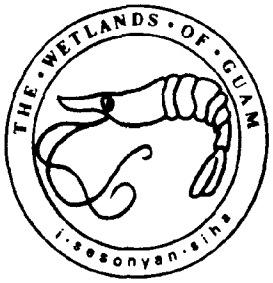
Other values

Wetlands are also a very valuable financial resource. Ten Billion Dollars ($10 B) worth of commercial marine harvests were gathered in the United States in 1990, the bulk of this harvest was wetland dependent.

Other uses for wetlands include aesthetic beauty and recreation. These are natural areas with biological diversity. They are also important educational tools. Lastly, wetlands are a vanishing resource that must be managed and protected.

THESE MAJESTIC LILY PADS ARE FOUND BENEATH A BRIDGE NEAR THE AGANA SWAMP.

A CLASSIC MANGROVE STAND, THESE PLANTS HAVE PROP ROOTS THAT HOLD THEM AGAINST INCOMING TIDES.



Chapter Three

Location Of Guam Wetlands

"Nature is trying very hard to make us succeed, but nature does not depend on us. We are not the only experiment."

RICHARD FULLER 1978

There are a number of areas on Guam that are recognized and delineated as wetlands. These regions have been named below but do not represent all of the wetlands on the island, only the main ones. Acreage is approximate, and was based on a compilation of existing research of the areas.

A. AGANA SWAMP
   Agana Swamp/Agana Spring 306 acres
B. SASA MANGROVES AND MARSH
   Outer Apra Harbor 252 acres
C. ATANTANO RIVER VALLEY AND MANGROVES
   Atantano River 321 acres
D. NAVAL STATION MARSHES
   Naval station 5 sites : 7 acres 36 acres 7.8 acres: Apalacha River, Freshwater Basin
E. NAMO RIVER FLOODPLAIN
   Formerly part of Namo River Basin now a sanitary landfill, Rizal Beach, Namo River tributaries in hills above Agat. 81.5 acres.
F. UMATAC MARSH
   Umatac 27.1 acres sloping valley springs and seeps feeding and draining into Umatac River, with carabao

G. GEUS RIVER ESTUARY

Merizo 4.8 acres : Geus River/Mamoan Channel

H. ACHANG BAY MANGROVES

Achang Bay/Manell and Suyafe Rivers Achang Creek Manell Channel 37.7 acres

I. AJAYAN ESTUARY

Ajayan Bay, Agrigan Island 11.5 acres (narrow river valley lined with mudflats)

J. AGFAYAN ESTUARY

Agfayan Bay, Bear Rock, Agfayan River 69.2 acres

K. INARAJAN RIVER ESTUARY

Inarajan Bay ,Inarajan River 99 acres

L. TALOFOFO RIVER VALLEY

Talofofo River, Ugum River 538 acres

M. PAGO RIVER ESTUARY

Pago Bay, Pago River 23.1 acres

O. FENA RESERVOIR

Fringing areas support wetland flora and fauna -- 200 acres.

In addition there are other estuarine rivers as listed in the Atlas of Reefs and Beaches on Guam:

a. Ylig River
b. Togcha River
c. Pauliluc River
d. Cetti River

Amount of Wetlands on Guam

According to the National Wetlands Inventory conducted on Guam in 1983, there are 14,216 acres of wetlands and deepwater habitats on Guam. Coral reefs dominate with a total acreage of 9,080 followed by forested/scrub-shrub wetlands 2,346 acres and emergent wetlands 1,400 acres.

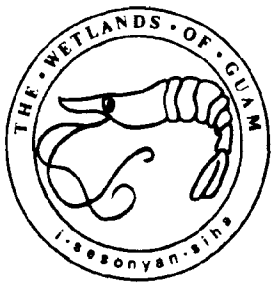
Subtracting the coral reefs, there are 5,136 acres of wetland, presumably on land. That, divided by Guam's approximate land acreage of 135,680, gives a figure of 3.8% of Guam is wetlands, most of that located south of Agana.

Breakdown of National Wetlands Inventory of Guam by FWS category

CATEGORY		ACREAGE
Marine System		9,516
Coral Reefs	9,080	
Seagrass Bed	353	
Unvegetated Shoreline	83	
Estuarine System		915
Open Water	713	
Mangrove	176	
Other	26	
Palustrine		3,853
Forested/ShrubScrub	2,170	
Emergent	1,386	
Open Water/Aq Bed	27	
Lacustrine		198
Riverine		4

PANDANUS TREES ARE OFTEN FOUND IN WETLAND AREAS AS WELL AS RAVINE FORESTS. THEIR COLORFUL FRUIT EATEN BY MAN AND ANIMAL ALIKE.

NOT OFTEN SEEN BY MOST PEOPLE, FENA LAKE LIES IN THE MIDDLE OF GUAM'S SOUTHERN TIP AND IS RICH IN ANIMAL AND PLANT LIFE.



Chapter Four

Living with our Wetlands.

There are many things that we can do to help our wetlands grow, and just as many things we can do to enjoy them. The involvement of every citizen in environmental issues will not only make Guam a more beautiful and clean place to live and raise your children, but your involvement can also help reduce the impact of such forecast crisis situations as the "greenhouse effect", "global warming", or "sea-level rise".

"It isn't easy being green"

KERMIT THE FROG

When we talk about protecting our wetlands and the natural resources that are linked with them, it is important to know that there are just not enough government inspectors to be at every development, islandwide, every day. Therefore, it is up to the citizens, who see the environment being damaged, to call in to their government agencies and report violations. Every month, several tips are made to regulatory agencies, and as a result, our beaches, rivers, and air are saved from some damage.

Many opportunities exist for private citizens, corporations, government agencies and others to work together to slow the rate of wetland loss and, where necessary, to improve the quality of our remaining wetlands. Citizen participation in wetlands protection is essential to success. Some options for private citizens to improve the status of wetlands are:

a) Seeking compatible uses for wetland areas
b) Selecting upland sites for development

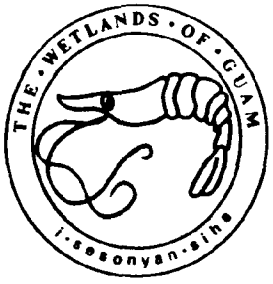
c) Donating wetland areas for public conservation.
d) Maintaining wetlands and adjacent buffer strips as open space
e) Constructing ponds in uplands and managing wetland and aquatic species
f) Supporting wetland conservation initiatives by public agencies and private organizations
g) Participating in program by reviewing public notices, and, in appropriate cases, commenting on permit applications.

But living with our wetlands does not only mean policing them. It also means enjoying them. Wetlands are a great place to take your children to show them the cycle of nature. They are beautiful locations for still and video photographers too. And, if you want to catch an occasional glance at a few of the bird species left on the island, a good place to do that is in the wetlands.

Sporting events, such as catch-and-release fishing at Fena Lake have proven to be great fun, and while you satisfy your sporting desires, you can also enjoy the sheer beauty of Guam's largest lake. These activities may grow as the public demands more contact with our inland waterways, and if we show that we care about protecting and preserving these areas.

How many people know about all of the rivers that run throughout southern Guam? There are swimming holes that have been created along some of Guam's bigger rivers, and one entrepreneur has even turned a river into a ride for tourists. The more we know about our wetland areas, the harder it will be for developers to close off the last few spots left.

Educators are encouraged to teach children about their island environment which includes not only the mountains and beaches, but also the wetlands. Fieldtrips can be arranged for your classes. For more information, contact the Department of Agriculture. Wetland areas such as the Agana Swamp are great places for kids to see for themselves how this unique and complex ecosystem works.



Chapter Five

The Need for Better Regulations.

There are several reasons for wanting to improve our existing laws, rules and regulations governing wetlands. But first, we need to understand what activities affect wetlands, and would be subject to regulation.

There are three basic methods of altering wetlands:

1) PHYSICAL - this includes filling, draining, excavating or dredging, diverting water, clearing, flooding, withholding sediment, shading, or conducting activities in an adjacent area.

"Almost all islands with human populations have been subjected to widespread destruction of vegetation and animals. This deterioration goes on and in many areas has caused irreversible destruction. The few islands that remain with virgin vegetation and intact animal life,or that have not been too markedly damaged by human activity, are of inestimable scientific value and may well prove significant for human welfare." **CURRY-LINDHAL, 1972**

2) CHEMICAL - altering nutrient levels or introducing toxins.

3) BIOLOGICAL - including grazing and disrupting the natural population by such activities as introducing exotic species.

All of these methods have an impact on wetland areas and as such should be subject to review by authorities before any such activities are undertaken.

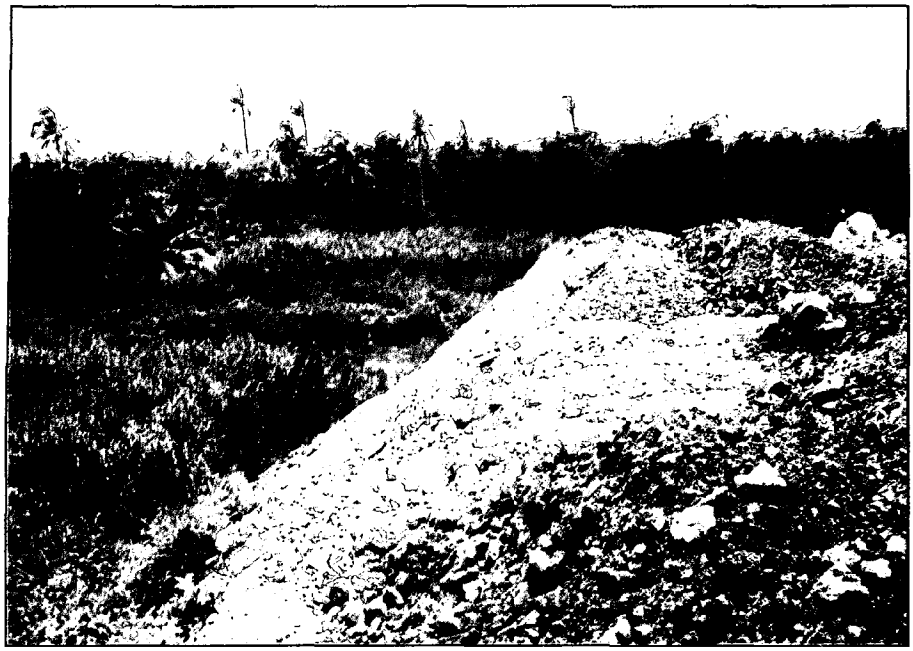
There are several reasons for stronger local protection of wetlands. A few of the stronger arguments are mentioned below.

1. ENVIRONMENT - The first argument that probably comes to mind is protection and management of our environment. The public is becoming more and more aware of ecological concerns as we progress into the nineties. Guam residents and voters will react to lawmakers who act to keep our drinking water clean, prevent floods from inundating their homes, and safeguard our endangered wildlife. These things can be done by passing local laws that manage our wetland areas. Many of the birds that depend on wetlands are near extinction, if not already extinct. Once their nesting and breeding grounds are gone, these winged creatures will never roam the island, or for that matter, the earth, again. It is our responsibility as caretakers of the island to offer protection to the other creatures and plants and share this land with us.

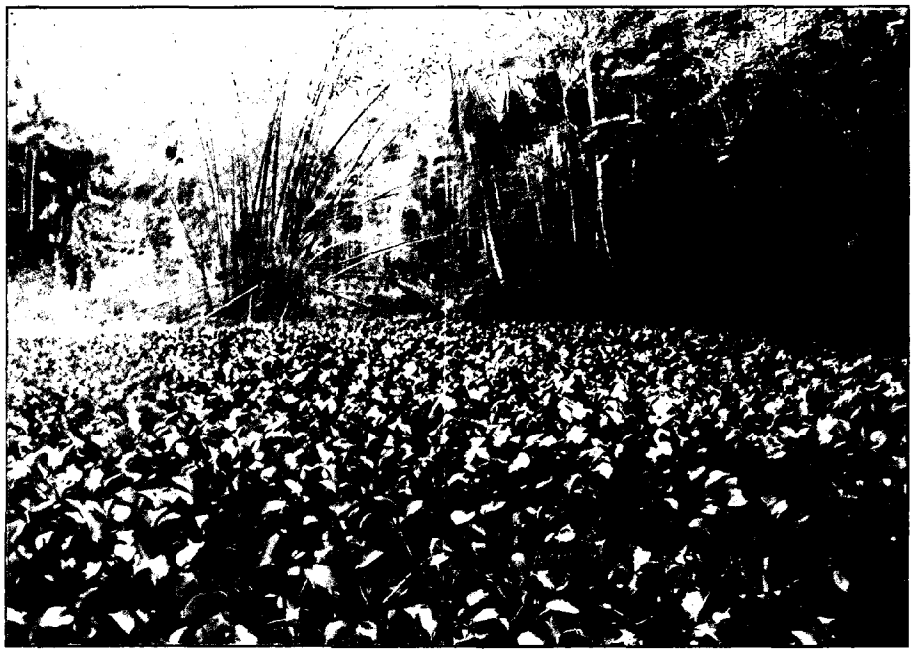
2. DEVELOPMENT - Although you may not make the connection at first, more comprehensive wetland regulations can work out to the benefit of developers too. Understanding the resources and natural constraints of a piece of property before expensive plans are put in motion can save developers lots of money. Wetlands are not good areas to build on because they tend to flood and be unstable. Knowing the boundaries of a wetland and building around it will save expensive engineering decisions. Filling a wetland may also cause flooding on other sections of property. These constraints may not normally be noticed until late in a project, causing expensive delays and redesign.

Wetlands are also attractive additions to the natural landscaping of an area. An important point must be made here. The objective of creating wetland regulations is not to restrict development. Rather, it is to better manage it for the benefit of all the people on Guam.

3. SOVEREIGNTY - Guam is at a crossroads now of a new political identity -- Commonwealth. Struggling to attain more autonomy in areas such as our economy and control over immigration show our determination to decide our own destiny. If we are that certain we can take responsibility for our political future, we must also shoulder the responsibility of managing our environment. Numerous conferences on the wetlands have concluded that the more a local government takes control over their environmental issues, the more control the federal government will turn over. After all, who knows best the land use issues of our island than ourselves. While many environmental



AN EXAMPLE OF ONE FILL PROJECT GOING ON IN THE AGANA SWAMP AREA WITH MANY CONSEQUENCES FOR THAT WETLAND AREA.



THE AGANA SPRING IS ANOTHER FRESHWATER SOURCE THAT IS HOME TO FISH AND BIRDS.

decisions remain in the hands of federal agencies stationed in Honolulu and San Francisco, it is our people who live with the changes in landscape, and the loss of a precious river or ravine forest.

4. FINANCE - When one developer was fined $1.3 million by the U.S. Army Corps of Engineers for destroying several acres of wetland, it was the Federal Government that collected the bulk of that money. Guam received just a small share. Local regulations would mean that the Government of Guam could impose fines of her own and those monies would be retained on island to be put towards possible wetlands enhancement or other related projects.

5. ECONOMIC FUTURE - Tourism. Yes, tourism is connected with wetlands, just as so many other facets of our lives are. How do we draw this connection? What is it that draws the tourists to Guam rather than any other vacation spot? Well, proximity may be one reason, but perhaps a better reason is our natural beauty and the variety we have to offer. Part of that beauty is our natural coastline resplendent with coral and fish, our rivers that feed the ocean, and our greenery. Once any part of that intricate web of nature is disturbed, there is a domino effect. If the wetlands are destroyed, the coral reefs will be destroyed. Then Guam will no longer have any reason to draw tourists, and the wonderful economic expansion we are enjoying today could be just a memory.

Another way in which tourism is connected with the wetland issue is in its affect on development. With the increase in tourism comes an increase in development. Aside from the northern water lens, new sources of drinking water must be located, controlled and protected. This can only be achieved through accessing the runoff from the volcanic lands of southern Guam where numerous streams and rivers are found. The wetlands associated with the southern watercourses are exceedingly complex and fragile. The ecological balance between seasonal rainfall patterns and water dependent fauna and flora is in great danger of being upset and, along with it, the utility of the potential water source represented by the surface water in streams and wetlands.

6. PUBLIC WELFARE - Protecting wetlands means protecting the public health, safety and welfare in a myriad of

ways from numerous environmental impacts of development such as:

1) Unnecessary maintenance and replacement of public facilities, including the dredging of ports and navigation channels;

2) Publicly funded mitigation of avoidable impacts;

3) Cost for public emergency rescue and relief operations; and

4) Potential litigation from improper construction practices authorized for wetland areas.

When elephants fight, it is the grass that suffers.
Kikuyu (African) Proverb

Case studies of wetland issues

Manengon Hills

The $800 million Manengon Hills Development in Yona has initiated extensive environmental control measures under the guidance of the Guam Environmental Protection Agency following a series of problems.

In December of 1989, the Manengon Hills contractors began clearing and grading. Without the proper environmental impact planning in place, several acres of wetlands were filled in, and erosion and runoff began to affect the pristine Ylig Bay area. By January of 1990, the US Army Corps of Engineers had ordered that work on the site cease and desist.

When the issue had been settled, the Federal Government had collected $1.3 million in fines from the developers, the Government of Guam received $250,000 for wetlands programs, and a complex plan to control erosion and to rebuild the wetlands was in place. Among the actions taken by the developer was the reduction of wetland impact from over 90-acres to just 6.85 acres.

Replacement of any affected wetlands on a 2:1 basis creating two acres for every acre filled.

Aside from the fines, the contractors had to redesign the project and suffer many weeks of down-time which can only be estimated in the million of dollars. Had the issue of wetland mitigation been considered in the initial planning stages, no doubt much money would have been saved by the developer.

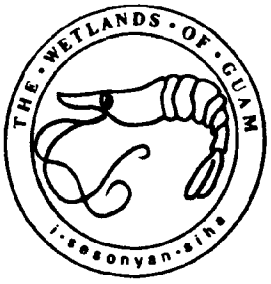
A complex model was created to deal with the project site by an environmental contractor hired following the violation. An elaborate system of ponds and ditches control water flowing over the projects hills. Over 60 control ponds collect water at the site. In these ponds, sediment or silt settles to the bottom, clean water is skimmed from the surface by a pipe, and that water then washes down a culvert on the other side of the pond's retaining earthen berm. The pond berms are covered by grasses which help the filtration process. The culverts are then fronted by a gabion, a wire basket filled with rocks that also prevents erosion.

Vegetation is seen as the key to erosion control, and tens of thousands of trees are being transplanted on the site. Silt fences are also used extensively, over 15 miles of these fences cover the property.

The Manengon project is now viewed as a model for other developers, especially golf courses, as an example of environmental protection plans that will work.

REED STANDS LIKE THIS ONE ARE SCATTERED ALL THROUGHOUT THE VILLAGE OF PITI WHICH IS RICH IN WETLAND HABITAT.

THESE SEEDS WILL EVENTUALLY SPRING UP TO FORM THE MANGROVE FORESTS THAT PROTECT THE SHORE NEAR APRA HARBOR.



Chapter Six

Programs & Policies

Regulatory authority in the area of wetlands falls on the shoulders of both the federal and local government. The prime regulatory agency for the federal government is the US Army Corps of Engineers. Other Federal regulations for wetlands include Executive Order 119900, and the Clean Water Act Section 404. Local permits are handled primarily by the Territorial Land Use Commission/Territorial Seashore Protection Commission, the Development Review Committee and the Guam Environmental Protection Agency.

FEDERAL REGULATIONS

"The goal of life is living in agreement with nature."

ZENO 335-263 B.C.

1. The US Army Corps of Engineers (ACOE) has been regulating activities in waters throughout the 50 states and the territories since the 1890's. Until the 1960's the primary purpose was to regulate navigation. Since then, the program has been broadened to include the full public interest for both the protection and utilization of water resources. The regulatory authorities and responsibilities of the ACOE are based on the following laws: Section 10 of the Rivers and Harbors act of 1899 (33 U.S.C. 403), Section 404 of the Clean Water Act (33 U.S.C. 1344), and Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413). The main ordinance is Section 404 of the Clean Water Act. All activities in or affecting a wetland on Guam are required to apply to the ACOE for a permit. Individual applications are processed in Honolulu. All marine areas and

nontidal areas such as rivers fall under this act.

The individual applications require much detail and are best coordinated at an early stage. There are, however, "nationwide permits" which cover smaller projects and require less review. These "nationwide permits" were designed with the continental United States in mind, and with Guam's small land mass and the critical role played by the few acres of wetland, local leaders do not feel that Guam should be covered by this short-cut process. On June 5, 1990, the GEPA issued a letter to ACOE denying 401 certification (401 certification will be explained in more detail below) for each of 40 proposed nationwide permits. Instead, GEPA suggested that each project under a nationwide permit be handled under a 404 permit application with their agency.

A review of ACOE records for the period January 1986 - March 1991 reveals over 27 violations of wetland regulations, most of which did not have permits to begin with. Permits were issued after violations were found, and corrected.

ACOE WETLAND VIOLATIONS

1990	11
1989	4
1988	5
1987	3
1986	2

Of the 20 permits reviewed by ACOE, 6 individual permits were reviewed, one was withdrawn and two were canceled. The remainder, or 14 permits were "nationwide permits", of which 5 were violations. Most permits were requesting to fill a wetland area, and five involved areas that supported endangered species. The total area that was involved in violations comes to 495,560 square feet (11.17 acres).

2. Executive Order No. 119900, Protection of Wetlands, signed May 24, 1977 applies to any federal agencies that have programs, facilities or plans involving federal wetlands. The applicability to Guam concerns the sites located on Military Installations specifically 5 sites on naval station. The order does not exclusively prohibit new projects, improvements or assistance in wetland areas. Instead, new construction is permitted if alternative sites are impractical or if such construction includes all practical measures to minimize harm to wetlands. Significantly the

agency head proposing such construction is also given discretion to determine if the project qualifies for development in a wetland. If the director approves some improvement, it seems unlikely that he will reverse that decision with the loopholes afforded by this order. He can also rely on economic, environmental and other pertinent factors to reach a supportive judgement. The order does place more responsibility on agencies to share their wetland plans with the public and conduct a type of short-circuited environmental impact assessment for all wetland projects. Construction plans for federal wetland areas must be available for public review. EO 119900 will not significantly protect federal area, but does officially recognize the unique nature of such natural resources, although enough loopholes are available for a federal agency director to proceed with a project without violating the executive order.

GOVERNMENT OF GUAM REGULATIONS

Federal permits are only one step in the process, however. There are also local regulations that must be followed.

1. The Guam Environmental Protection Agency issues Water Quality Certificates under the authority of section 401 of the Clean Water Act. In addition, whenever a wetland permit is applied for, GEPA requires an Environmental Protection Plan before construction can begin. Problems identified in an Environmental Impact Assessment are addressed here, showing an evaluation of the environmental controls that will be used to mitigate any impact. This plan frequently includes an erosion control plan, siltation ponds, monitoring plans during construction and perhaps monitoring of water quality even after construction is finished.

2. There is also a requirement for federal consistency determination from the Guam Coastal Management Program at the Bureau of Planning.

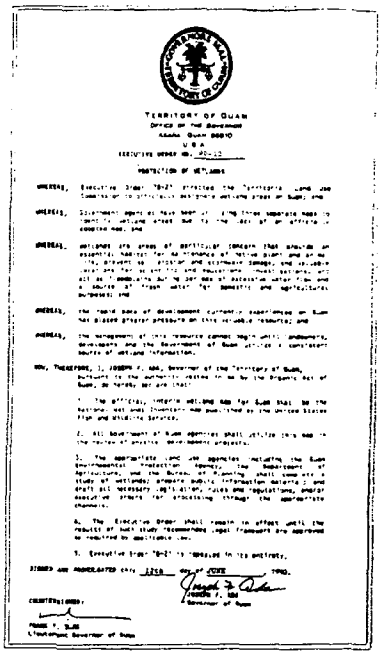
3. Clearance from the Historic Preservation Officer may also be needed to protect the integrity of cultural and historical sites.

4. Finally, there are a series of land use and building permits that are needed from bodies such as the Territorial Land Use Commission, the Territorial Seashore Protection Commission

(TLUC/TSPC), the Development Review Committee(DRC), and the Department of Public Works.

The first local regulation regarding wetlands was signed in September of 1978, Executive Order No. 78-21, which authorized the Territorial Planning Commission (now TLUC) to designate Guam wetlands as Areas of Particular Concern and promulgate Wetland Rules and Regulations.

Conservation Land Use Districts encompass wetlands as well, being one of four land use districts in Guam designated through Executive Order 78-23. Conservation Districts protect water resources, historic sites, parkland, forests, savannahs, beaches, native plants and animals and the prevention of erosion and floods. Executive Order 78-20 also indirectly affects Guam's wetlands. Since all wetlands inherently qualify as flood prone areas, all wetland sites fall within the purview of these regulations but are supplemental to the subsequent compliance with the Wetland Rules and Regulations.



Recently, a new Executive Order was signed to update wetland rules and regulations. Executive Order 90-13 was signed in June of 1990 and tasked GEPA, Agriculture, and the Bureau of Planning, to "complete a study of wetlands; prepare public information material; and draft all necessary legislation, rules and regulations, and/or executive orders".

In addition Executive Order 90-10 can also be construed as another tool in protecting and preserving wetlands. This order, signed in May of 1990 requires an Environmental Impact Assessment be submitted with each development application. The order institutes a mandatory review period by a special committee, the Development Review Committee (DRC), which is a group made up of 9 government agencies that have expertise in all areas of development impact.

Once all local wetland approvals are obtained, one of the final steps is the clearing and grading permits which are obtained from the Department of Public Works. These permits also require the concurrence of GEPA, the utilities, and any other governmental bodies that may have an interest in the project.

5. The Department of Agriculture is responsible for control and regulation of fish and game. Their legal authority

comes from : Article 1, Chapter 4, Title XII Government Code of Guam Section 12314; Endangered and Threatened Species Law PL 13-83; and the local responsibility charged in the Federal Endangered Species Act of 1973.

Although Agriculture is not a regulatory agency as Public Works is, GEPA will consult with Agriculture and their division of Aquatic and Wildlife Resources before any decisions are made regarding wetland areas. Biologists at the Department of Agriculture assess the impact development will have on the animals and plants in the area, and those indirectly affected by any proposed development.

Discussion of Recommendations

Any draft regulations regarding wetlands must deal not only with the screening of applications, but also the impact of any actions that will affect a wetland. A major part of any discussion of wetland protection and restoration involves "mitigation". Mitigation is sometimes considered an afterthought or add-on after the planning process. It is important, however, that mitigation become part of the planning process when dealing with wetlands, and not something done just to get by the permitting process.

MITIGATION

Mitigation is defined by the Council on Environmental Quality (40 CFR 1508.20) by a sequential definition -- meaning emphasis is put on the first level before the second, and so on.

1) Avoiding the adverse impact (prevention)
2) Minimizing impact (limit the degree of impact)
3) Rectifying impact (repair, rehabilitation, restoration)
4) Reduce or eliminate impact over time (preservation, maintenance)
5) Compensation (replace or provide substitute resources or environment)

Mitigation Strategies include:

1) Avoidance - The best option is avoidance. It is estimated that it will cost almost $75,000 per acre to build a wetland, and at that the success of such an endeavor is questionable.

Real wetlands are often the most attractive and natural part of a project and should be kept.

2) Restoration - Fixing a degraded wetland in exchange for the loss of a functional wetland is less risky than creating a new one. This can, however, result in overall wetland loss and policymakers must be aware of this.

3) Enhancement - Enhancement is a very subjective determination. Developers selectively enhance wetland for water fowl, for example, but this may hamper that wetland's function as a flood control. Critics say this is not an equitable exchange and this also results in net loss.

4) Creation - A final mitigation strategy is creation of a wetland. This is the most controversial, costly and likely to fail option. Man can rarely reproduce nature as well as nature herself. It is hard to say if the soil will be right for a wetland, if the plants will take root, or if animals and birds will make their home there. In addition, these disturbed ecosystems are vulnerable to the invasion of exotic species. But if this is the only option, the simpler the system, the better the chance for success. Salt marshes are probably the easiest to create, forested wetlands, the most difficult.

Proper mitigation involves early and thorough planning. Objectives must be outlined early and an assessment made of the wetland values lost and replaced. The location, elevation and hydrology as well as a complete description of what is to be planted, where and when, must be gone over with authorities. Monitoring and maintenance plans must also be discussed as well as contingency plans, and there must be some guarantee that the work will be performed as planned and approved.

With the ideas of mitigation in mind, there are several recommendations that can be looked at when dealing with the issue of wetlands. These are included below.

RECOMMENDATIONS

1) Landfill, dredging, and pollutant discharges should be strictly regulated. Non-Point Source (NPS) Pollutants need to be studied. Loss of wetland and riparian zone areas as buffers

between uplands and parent waterbodies allow for more direct contribution of NPS pollutants to the aquatic ecosystem -- that, along with other alteration of land features can affect drainage efficiency. Excessive fresh water, nutrients, sediments, pesticides, oils, greases, and heavy metals from nearby land use activities may be discharged through storm events and may seep into the water column and downstream to coastal waters without benefit of filtration and attenuation that would normally occur in wetland if present.

2) Walkway systems and nature trails should be constructed to provide both public education and enjoyment as well as access for scientific investigation.

3) Certain wetland areas could be considered for cultivation into taro or rice areas -- growing of food crops is infinitely preferable to paving or filling.

4) It is suggested the short-term goal is to achieve "no net loss" of the remaining wetlands on Guam, defined by acreage and function. It is also the long-term goal to restore and create wetlands, where feasible, to increase the quantity and quality of wetlands.

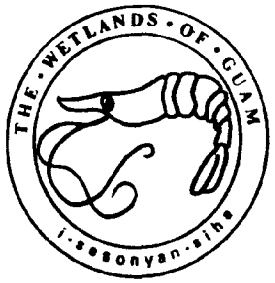
5) The local government should adopt wetlands protection programs providing a consistent level of protection throughout the island. A Model legislation for Guam is included in the following chapter of this book. This legislation is intended to replace the existing outdated and incomplete wetlands rules and regulations.

6) The Territorial Planning Council (TPC) is currently in the midst of putting together a master plan to guide the island through the 21st century. This goal is perhaps the best example of Guam's desire to standardize and streamline governmental operations for more efficient management of our limited resources. In planning a wetland ordinance, it is important that the rules and regulations promulgated are in line with a greater master plan.

7) Education and training is important for the public, farmers, urban dwellers. Technical courses in simple restoration techniques should be available for wetlands.

8) After an analysis of the existing status of wetlands and the adoption of new laws, rules and regulations, there needs to be a

prioritization of wetlands in order to identify those wetlands with the most valuable resources and in need of immediate protection measures. Government decision makers and the public will need to work together to determine a prioritization of our wetland areas.



Chapter Seven

Model Legislation for Guam

"Beauty will not come at the call of a legislature, nor will it repeat in England or America its history in Greece. It will come, as always, unannounced, and spring up between the feet of brave and earnest men."

RALPH WALDO EMERSON 1803-1882

Bill No._____

AN ACT TO ESTABLISH A WETLANDS ADVISORY COMMITTEE AND TO SET FORTH PROVISIONS FOR THE MANAGEMENT AND PROTECTION OF WETLANDS, AND ESTABLISHING THE CRITERIA THEREFOR.

Section 1. Title

This act may be cited as the "Wetlands Protection Act of 1991"

Section 2. Legislative Findings and Intent.

2.1 Legislative Findings

The wetlands of Guam are indispensable and fragile natural resources with significant development constraints due to flooding, erosion, and soil limitations. In their natural state, wetlands serve man and nature. They provide habitat areas for fish, wildlife, and vegetation; water-quality maintenance and pollution control; flood control; shoreline erosion control; natural resource education; scientific study; open space; and recreation opportunities.

A considerable number of these important natural resources have been lost or impaired by draining, dredging, filling, excavating, building, pollution and other acts. Piecemeal or cumulative losses may, over time, destroy remaining wetlands. Damaging or destroying wetlands threatens public safety and the general welfare.

It is therefore necessary for the Government of Guam to ensure maximum protection for wetlands by discouraging development activities in wetlands and those activities at adjacent upland sites that may adversely affect wetlands and to encourage restoration of already degraded or destroyed systems.

2.2 Legislative Intent

THESE SMALL FIDDLER CRABS ARE FORAGING FOR FOOD IN THE MANGROVE, THEIR LARGE RED CLAWS OFTEN USED IN FIGHTS OVER TERRITORY.

MANGROVE FORESTS LINE THE SHORE OF APRA HARBOR. HIKING A TRAIL THROUGH THESE AREAS IT IS EASY TO SPOT BIRDS AND CRABS.

It is the policy of the Government of Guam to encourage or require planning to avoid or minimize damage to wetlands wherever prudent or feasible; to require that activities not dependent upon a wetland location be located at upland sites; to allow wetland losses only where all practicable measures have been applied to reduce those losses that are unavoidable and in the public interest; to provide for compensation in the form of wetland restoration or creation to offset further losses; and to provide for the protection of wetlands under additional laws, rules or regulations already adopted by the Government of Guam including all Department of Public Works clearing, grading, building and other permits; Guam Environmental Protection Agency regulations including all air and water quality, erosion and sedimentation control standards; floodplain zoning; and Executive Order 90-13.

Furthermore, such activities must not threaten public safety or cause nuisances by:

a) Blocking flood flows, destroying flood storage areas, or destroying storm barriers, thereby raising flood heights or velocities on other land and increasing flood damages;

b) Causing water pollution through any means, including location of wastewater disposal systems in wet soils; unauthorized application of pesticides, herbicides, algacides, or fertilizers; disposal of solid wastes or stormwater runoff at inappropriate sites; or the creation of unstabilized fills;

c) Increasing erosion; or

d) Increasing runoff of sediment and stormwater.

In addition, it is the policy of the Government of Guam that activities in or affecting wetland areas do not destroy natural wetland functions important to the general welfare by:

a) Decreasing breeding, spawning, nesting, feeding, or other critical habitat for fish and wildlife, including rare, threatened, and endangered plant and animal species and commercially and recreationally important wildlife;

b) Interfering with the exchange of nutrients needed by fish and other forms of wildlife;

c) Decreasing groundwater recharge including percolation of water to Guam's Northern water lens, the single largest source of drinking water;

d) Destroying sites needed for education and scientific research as outdoor biophysical laboratories, living classrooms, and training areas;

e) Interfering with public rights in waters and the recreation opportunities for hunting, fishing, boating, hiking, birdwatching, photography, sightseeing, and other activities in wetlands; or

f) Destroying aesthetic and property values.

Section 3. Definitions

Words and phrases used in this act shall be interpreted as defined below, and where ambiguity exists, words or phrases shall be interpreted so as to give this act its most reasonable application in carrying out its regulatory purpose.

"Administrator" shall mean the chairman of the Wetlands Advisory Committee.

"Aquaculture Facility" shall mean a facility for the culture or commercial production of aquatic plants and animals for food, sales or distribution.

"Buffer" shall mean a naturally vegetated area or vegetated area established or managed to protect wetlands from human disturbance.

"Committee" shall mean the Wetland Advisory Committee as outlined in Section 4.

"Creation" shall mean a human activity bringing a wetland into existence at a site in which it did not formerly exist.

"Exotic" shall mean any species of plant or animal that are foreign to the planning area.

"Functions" shall mean the beneficial roles wetlands serve, including storage, conveyance, and attenuation of floodwaters and stormwaters; groundwater recharge and discharge; protection of water quality and reduction of sediment and erosion; production of waterfowl, game and nongame birds, mammals, and other living resources; protection of habitat for rare, threatened, and endangered species; food chain support for a broad range of wildlife and fisheries; educational, historical, and archeological value protection; and scenic, aesthetic, and recreational amenities.

"Fund" shall mean the Wetland Restoration/Enhancement fund which shall be established as a separate account in which fines and fees are deposited. Money from that fund shall be used for the investigation and study of the impacts of permit applications, suspected violations, and any related activities that can be construed by this act to contribute toward the restoration or enhancement of wetland areas on Guam.

"Hydric soil" shall mean soil that is saturated, flooded, or ponded long enough to develop anaerobic conditions in the upper part. The presence of hydric soil shall be determined following the methods described in the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands".

"Hydrophytic vegetation" shall mean macrophytic plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

"In-kind" shall mean the restoration or creation of a wetland with vegetation and other characteristics closely approximating those of a specified wetland.

"Off site" shall mean restoration or creation of a wetland at a location not adjacent to or within 25 feet of a previous, specified wetland.

"On site" shall mean restoration or creation of a wetland adjacent to or within 25 feet of a previous specified wetland.

"Out-of-kind" shall mean the restoration or creation of a wetland with vegetation or other characteristics not resembling those of a

specified wetland.

"Practicable alternative" shall mean an alternative to the proposed project that would accomplish the basic purpose of the project and avoid or have less adverse impact on a wetland.

"Regulated activity" shall mean an activity with a significant impact on wetlands including but not limited to:

a) The removal, excavation, or dredging of soil, sand, gravel, minerals, organic matter, or materials of any kind;

b) The changing of existing drainage characteristics, sedimentation patters, flow patterns, or flood retention characteristics;

c) The disturbance of the wetland water level or water table by drainage, impoundment, or other means;

d) The dumping or discharging of material, or the filling of a wetland with material.

e) The placing of fill or the grading or removal of material that would alter existing topography.

f) The driving of piles, placement of obstructions, and erection or repair of buildings or structures of any kind;

g) The destruction or removal of plant life that would alter the character of a wetland and;

h) The conduct of an activity that results in significant change of water temperature, a significant change of physical or chemical characteristics or wetland water sources, or the introduction of pollutants.

"Restoration" shall mean a human activity that returns a wetland or former wetland from a disturbed or altered condition with lesser acreage or functions to a previous condition with greater wetland acreage or functions.

"Wetland" shall mean an area that is inundated or saturated by

surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation. Wetlands generally include swamps, marshes, mangroves, natural ponds, surface springs, estuaries, and similar such areas.

"Wetland buffer" shall mean an area that surrounds and protects a wetland from adverse impacts to the functions and values of a regulated wetland.

Section 4. Wetland Advisory Committee

4.1 Wetland Advisory Committee

There is hereby created within the Government of Guam, a Wetland Advisory Committee.

4.2 Administration

4.2 (a) Composition and Powers

Said commission shall be composed of three (3) voting members:

1) The Administrator of the Guam Environmental Protection Agency
2) The Director of the Department of Agriculture
3) The Director of the Bureau of Planning

The Chief Field Officer for the Guam office of the US Army Corps of Engineers shall serve in an advisory capacity as an ex-officio member.

All actions of the Wetland Advisory Committee shall only take effect through unanimous decision by all three members or their duly appointed representatives.

4.2 (b) Administrator

The Administrator of the Guam Environmental Protection Agency shall serve as the Administrator of the Wetland Advisory Committee.

4.3 Duties and Responsibilities

The Wetland Advisory Committee shall convene at such times as necessary to carry out the mandates of this act and shall have the following duties and responsibilities:

a) To Coordinate and or take action for the approval of plans and projects that in any way affect a wetland area within the Territory of Guam and for that purpose shall have all powers, duties, and responsibilities outlined in this act.

b) To adopt all necessary rules and regulations in accordance with the Administrative Adjudication Law and to exercise all other powers necessary and proper for the discharge of its responsibility.

b) Report to the Governor and Legislature of its annual progress and fiscal year activities and keep the general public informed on all major wetland decisions.

All authority vested in the Wetland Advisory Committee or Administrator by virtue of this Act may with like force and effect be exercised by such employees of the Guam Environmental Protection Agency, the Department of Agriculture, and the Bureau of Planning as the Committee or Administrator may from time to time designate for the purpose of carrying out this act.

4.4 Place of Meeting

The Administrator of the Guam Environmental Protection Agency shall provide suitable quarters for meetings of the Wetland Advisory Committee and for the transaction of other business.

4.5 Compensation

Committee Members shall serve without compensation.

4.6 Conflict of Interest

No member of the Wetland Advisory Committee or his/her designate shall participate in any official capacity whatsoever in any decision to be rendered by the Committee in which he/she has any direct or indirect financial interest.

This prohibition shall not apply, however, if the person concerned advises the Committee in advance of the nature and circumstances thereof, including full public disclosure of the facts which may potentially give rise to a violation of this act, and obtains from the Wetland Advisory Committee a written determination that the contemplated action will not adversely affect the integrity of the Committee. Any such determination shall require concurrence of two members. In the event the conflict involves more than one member of the Committee, the Governor shall make a determination and appoint such members to the Committee to temporarily serve during the review of the project in question.

Any person who violates any provision of this section shall, upon conviction, and for each such offense, be subject to a fine of not more than Ten Thousand Dollars ($10,000) or imprisonment for not more than two (2) years, or both.

Section 5. Cooperation of Departments

Each agency, department, office, commission, or part of the Government of Guam is authorized and instructed to render assistance, information, and cooperation to the Wetland Advisory Committee as is necessary for it to perform its duties as provided in this act.

Section 6. Effective Date

The Wetlands Protection Act of 1991 shall go into effect 30 days following its enactment.

Section 7. Lands to Which This Act Applies

7.1 Official Wetland Areas

This act shall apply to all lands in or within 25 feet of a wetland located within the jurisdiction of the Government of Guam. Areas shown on the 1983 National Wetlands Inventory of Guam and adopted as the Official Wetlands Map through Executive Order 90-13 and hereafter referred to as the "Official Wetlands Map" as being a wetland area are presumed to be wetlands consistent with the definition thereof. Wetlands not shown on this map are presumed to exist in Guam and are hereby designated to be protected under all of the terms and provisions of this act. The Official Wetlands Map shows only the general location of wetlands

and should be consulted by persons contemplating activities in or near wetlands before engaging in a regulated activity. The Official Wetlands Map, together with all explanatory matter thereon and attached thereto, is hereby adopted by reference and declared to be a part of this act. The Official Wetlands Map shall be on file at the Bureau of Planning.

7.2 Rules for Interpretation of Wetland Boundaries

The boundaries of the wetland areas shall ordinarily be determined by the applicant through the performance of a field survey applying the wetland definition. The Official Wetlands Map is to be used as a guide to the general location of wetlands. The applicant is required under Section 10.2 of this act to show a Wetland boundary on a scaled drawing submitted as part of the permit application. Wetland delineations shall be performed in accordance with the procedures specified in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* and any subsequent amendments thereto. Evidence documenting the results of the boundary survey may be required by the Wetlands Advisory.

The Government of Guam, when requested by the applicant, may waive the delineation and, in lieu of direct action by the applicant, perform the delineation. The Wetland Advisory Committee may use remote sensing, hydrology, soils, plant species, and other data, and consult with biologists, hydrologists, soil scientists, or other experts as needed to perform the delineation. The applicant may be charged for costs incurred in accordance with the provisions of Section 10.2 of this act.

Where the Government of Guam performs a Wetland determination at the request of the applicant, it shall be considered a final determination.

Where the applicant has provided a determination of the wetland boundary, the Government of Guam through the Wetland Advisory Committee shall verify the accuracy of, and may render adjustments to, the boundary delineation. In the event the adjusted boundary delineation is contested by the applicant, the Government of Guam may attempt to set mutually agreeable boundaries; or, when such an attempt is unsuccessful, shall, at the applicant's expense, obtain competent services to render a final delineation.

Section 8. Permit Requirements, Enforcement

8.1 Permit Requirements, Compliance

No regulated activity in or within 25 feet of a wetland may be conducted without a permit from the Wetland Administrator and full compliance with the terms of this act and other applicable regulations. All activities that are not permitted as of right or as special permit uses shall be prohibited.

8.2 Temporary Emergency Permit

Notwithstanding the provisions of this act or any other act to the contrary, the Wetlands Advisory Committee may issue a temporary wetlands permit through oral or written authorization, provided a written permit is accomplished within five days, if it deems that an unacceptable threat to life or severe loss of property will occur if an emergency permit is not granted. The emergency permit may be terminated at any time without process upon a determination by the Wetlands Advisory Committee that the action was not or is no longer necessary to protect human health or the environment. The Wetland Advisory Committee may, within 90 days of the emergency permit, require that the action be reconsidered as an after-the-fact permit, subject to any or all of the terms and provisions of this act.

8.3 Enforcement

8.3 (a) Authority to enforce

The Wetlands Advisory Committee, its agents, officers, and employees, shall have authority to enter upon privately owned land for the purpose of performing these duties under this act and may take or cause to be made such examinations, surveys, or sampling as the Wetland Advisory Committee deems necessary.

The Wetland Advisory Committee shall have the power to initiate and conduct an examination of any case in which there is reason to believe that a wetland violation has been committed.

The Wetland Advisory Committee shall have authority to enforce this act; a permit issued thereto; and a violation or threatened violation thereof by violation notices, administrative orders, injunctive action as well as civil and criminal actions. All costs,

fees, and expenses in connection with such actions may be recovered as manages against the violator.

Law enforcement officials, village mayors, or other officials having police powers shall have authority to assist the Wetlands Advisory Committee in enforcement.

8.3 (b) Cease and Desist Order

The Wetland Advisory Committee may serve a cease and desist order if an activity being undertaken on regulated wetlands is in violation of this act. The order shall set forth and contain:

1) A description of the specific nature, extent and time of the violation, damage, or potential damage; and

2) A notice that the violation and/or potential violation cease and desist or in appropriate cases, the specific corrective action to be taken within a given time. A civil penalty may be issued with that order.

3) The cease and desist order issued under this section shall become effective immediately upon receipt by the person to whom the order is directed.

4) Failure to comply with the terms of the cease and desist order can result in enforcement action including, but not limited to, the issuance of a civil penalty.

8.3 (c) Fines and Penalties

Any person who commits, takes part in, or assists in any violation of any provision of this act is guilty of a misdemeanor and may be fined not more than $20,000 for each offense. Each violation of this act shall be a separate offense, and, in the case of a continuing violation, each day's continuance shall be deemed a separate and distinct offense.

In addition to any other penalties, any person who performs any development in violation of this act shall be subject to a civil fine not to exceed Five Hundred Dollars ($500) per day for each day in which such violation persists.

In the event of a violation, the Wetlands Advisory Committee shall

have the power to order wetland restoration and creation measures for the damaged or destroyed wetland area by the person or agent responsible for the violation. If the responsible person or agent does not complete such measures within a reasonable time following the order, the Government of Guam may restore the affected wetland to its prior condition and create or restore other wetlands for the purpose of offsetting losses sustained as a result of the violation. The person or agent responsible for the original violation shall be liable to the Government of Guam for the cost of such actions.

All funds collected under the authorization of this act shall be deposited in the Wetland Fund as described in this act.

To guide restoration and creation actions, the Wetlands Advisory Committee shall have the power to order the violator to develop a plan of action as described in Section 10.5 (b) of this act.

8.4 Abrogation and Greater Restrictions

It is not intended that this act repeal, abrogate, or impair any existing regulations, local or federal, easements, covenants, or deed restrictions. However, where this act imposes greater restrictions, the provisions of this act shall prevail.

8.5 Interpretation

The provisions of this act shall be held to be minimum requirements in their interpretation and application and shall be liberally construed to serve the purposes of this act.

Section 9. Uses by Right and Special Permit Uses in a Wetland Area

9.1 Uses by Right

The following uses shall be allowed as a right within a wetland area to the extent that they are not prohibited by any other act or act and provided they do not require structures, grading, fill, draining, or dredging except as provided herein or authorized by special permit:

a) Conservation or preservation of soil, water, vegetation, fish, shellfish, and other wildlife.

b) Outdoor recreational activities, including hunting, fishing, birdwatching, hiking, boating and swimming;

c) The harvesting of wild crops, such as taro or seeds in such a manner that is not injurious to natural reproduction of such crops and provided the harvesting does not require alteration of the wetland by changing existing wetland water conditions or sources, tilling of soil, or planting of crops;

d) Forestry practices limited to the thinning and harvesting of native timber in accordance with a forest management plan that incorporates best management practices approved by the Forestry Division of the Department of Agriculture pursuant to existing regulations and guidelines.

e) The continued cultivation of agricultural crops, provided no wetlands are subject to cultivation where no such use existed five years prior to the effective date of application;

f) Any aquaculture facilities existing at the time of passage of this act;

g) The occasional pasturing of livestock;

h) Commercial fishing and shellfishing in compliance with the rules and regulations of the Department of Agriculture; and

i) Education, scientific research and nature trails as approved by the Committee;

j) Uses by right that do not require a special permit and that may involve filling, flooding, draining, dredging, ditching, or excavating to the extent specifically provided below:

    1) Maintenance or repair of lawfully located roads, bridges or structures and of facilities used in the service of the public to provide transportation, power, water, sewer,

telephone, telegraph, telecommunication, or other services provided that such roads, structures, or facilities are not materially changed or enlarged and written notice prior to the commencement of work has been given to the Wetland Advisory Committee and provided that the work is conducted using best management practices to ensure that flow and circulation patterns, and chemical and biological characteristics of the wetland, are not impaired and that any adverse effect on the aquatic environment will be minimized;

2) Temporary water-level stabilization measures associated with silvicultural operations, provided a complete reversion to previous hydrological conditions is accomplished subsequent to completed operations;

3) Limited ditching, tiling, dredging, excavating, or filling done solely for the purpose of maintaining or repairing existing drainage systems necessary for the cultivation of agricultural crops, provided that the maintenance or repair activity does not result in the impairment, alteration, or loss of wetlands not previously subject to agricultural use under the terms and provisions of Section 9.1 (e);

4) Limited excavating and filling necessary for the repair and maintenance of piers, walkways, observation decks, wildlife management shelters, boathouses, and other similar water-related structures, provided that they are built on pilings to allow unobstructed flow of water and preserve the natural contour of the wetland, except as authorized by special permit.

9.2 Special Permit Uses

Regulated activities other than those specified in Section 9.1 may not be conducted except upon application to the Wetlands Advisory Committee and issuance of a special permit.

9.3 Buffer area permitted uses

In the event a buffer area is specified in a permit issued under this act, permitted uses for that buffer area are limited to those activities having minimal adverse impact on buffers and no impact on regulated wetlands.

Section 10. Standards and Procedures for Special Use Permits

10.1 Special Permits

Application for a special permit to conduct a regulated activity shall be made in triplicate to the Wetland Advisory Committee on forms furnished at the Bureau of Planning and the Guam Environmental Protection Agency. Permits shall ordinarily be valid for a period of two (2) years from the date of issue and shall expire at the end of that time unless a longer period is specified by the Wetland Advisory Committee upon issuance of the permit. An extension of an original permit may be granted upon written request to the Wetland Advisory Council by the original permit holder or the successor in title. The Wetland Administrator may require additional hearings if, in its judgement, the original intent of the permit is altered or extended by the renewal or if the applicant failed to abide by the terms of the original permit. The request for renewal of a permit shall follow the same form and procedure as the original application except that the Wetlands Administrator shall have the option of not holding a hearing if the original intent of the permit is not altered or extended in any significant way.

10.2 Permit Applications

Any person intending to apply for a Wetlands Special Use Permit is strongly encouraged but not required to meet with the Wetland Advisory Committee during the earliest possible stages of project planning in order to discuss wetland impact, avoidance, minimization and compensation before large commitments have

been made to a particular project design. Efforts put into preapplication consultations will help applicants create projects which will be more quickly and easily processed.

Unless the Wetland Advisory Committee waives one or more of the following information requirements, applications for a special permit for a regulated activity shall be submitted to the Wetland Advisory Committee via the Guam Environmental Protection Agency including:

a) Name and address of the owner(s) of record and of the developer;

b) The exact length and bearing of the exterior boundaries of the project which data shall be referred to the "Guam Geodetic Triangulation Control Network" or such alternative systems of triangulation control as the Territorial Surveyor may direct;

c) The purpose(s) of the project and an explanation of why the proposed activity requires a wetland location or access to wetlands, or cannot be located at other sites as described in section 10.4 (b) of this chapter;

d) A site plan drawn to scale showing the Wetland Area Boundary and the wetland boundary as determined by field survey; the width, depth, and length of all existing and proposed structures, roads, watercourses, and drainageways; water, wastewater, and stormwater facilities; utility installations within 200 feet of a wetland; all known easements and reservations; and the relationship of the proposed activity and any potentially affected wetland to the entire parcel of land owned by the applicant;

e) A description of the wetland or wetlands that will be affected by the regulated activity, including a sketch plan at the scale of 1":400' for the entire wetland showing date, name of the person preparing the map, and north arrow; the area that may be filled or impacted; vegetation type; wetland water

sources; and a general characterization of the habitat, wildlife, and common plants;

f) Soil types on the site and the exact locations and specification for all purposed draining, filling, grading, dredging, and vegetation removal, including the amounts and methods;

g) A key map locating the project in relation to surrounding areas and description of adjacent land use;

h) Elevations of the site and the adjacent lands within 200 feet of the site at contour intervals of no greater than two feet;

i) A discussion of any and all direct and indirect consequences that may result from the action, any adverse effects that can be avoided;

j) A discussion of mitigating measures to ameliorate impacts; and

k) Areas intended to be reserved for public use.

The Wetlands Advisory Committee may require additional information, including, but not limited to, documentation and evidence of a wetland boundary determination by field survey; an assessment of wetland functional characteristics; documentation of the ecological, aesthetic, economic, social, cultural or other values of a wetland; a study of flood, erosion, or other hazards at the site; evidence of any protective measures that might be taken to reduce such hazards; demonstration that sufficient funding is available for the project; and any other information deemed necessary to verify compliance with the provisions of this act or to evaluate the proposed use in terms of the purposes of this act.

Any person who wants to know whether a proposed activity or an area is subject to this act may request in writing a determination from the Wetland Advisory Committee. Such a request for determination shall contain plans, data, and other information as may be specified by the Wetland Advisory Committee.

At the time of an application or request for determination, the applicant shall pay a filing fee specified by the Wetland Advisory Committee. Filing fees of up to a maximum of $1,000 may be required to evaluate the application or request for determination. All fees will be deposited into the Wetland Fund and may be used to retain expert consultants who will provide services pertaining to wetland boundary determinations, functional assessment, and mitigation measures, as deemed necessary by the Wetland Advisory Committee. The Wetland Advisory Committee may assess additional reasonable fees as needed to monitor and evaluate permit compliance and mitigation measures.

An application shall not be deemed formally submitted until and unless all information necessary to evaluate the proposed activity, it impacts, and its compliance with the provisions of this chapter have been provided to the satisfaction of the Wetland Advisory Committee.

Upon receipt of the completed application, the Wetland Advisory Committee shall notify the individuals and agencies, including local and federal agencies, having jurisdiction over or an interest in the matter to provide such individuals and agencies an opportunity to comment as provided in section 10.4 (d) below.

The Wetland Advisory Committee shall establish a mailing list of all interested persons and agencies who wish to be notified of such applications.

10.3 Public Hearing and Recommendations

No later than 45 days after receipt of the permit application and after at least 10 days advance notice that the application has been published in one newspaper having general circulation in the area, the Wetland Administrator shall hold a public hearing on the application unless the Wetland Advisory Committee finds that the activity is so minor as to not affect the wetland and the Wetland Administrator concurs.

All hearings shall be open to the public. A record of the hearing shall be made. The Wetland Advisory Committee shall then review all recommendations made at the hearing during the final decision making process on the application.

Any person may present evidence and testimony at the hearing.

At the hearing, the applicant shall have the burden of demonstrating that the proposed activity will be in accordance with the purposes of this act and the standards set forth below.

10.4 Standards for Special Permits

10.4 (a) Wetland Administrator

The Wetland Administrator, after according consideration to the comments of the general public, other affected landowners, Government of Guam and federal agencies with jurisdiction over the area in question, shall issue a wetland permit only if it is found that the regulated activity is determined to be in the public interest in accordance with Section 10.4 (c) below and that the applicant has demonstrated by a preponderance of the evidence that the regulated activity:

1) Is water-dependent or requires access to the wetland as a central element of its basic function, or is not water-dependent but has no practicable alternative.

2) Will result in minimum feasible alteration or impairment to the wetland's functional characteristics and its existing contour, vegetation, fish and wildlife resources, and hydrological conditions;

3) Will not jeopardize the continued existence of species that appear on federal or local endangered, threatened, rare, sensitive, or monitored species lists;

4) Will not cause significant degradation of groundwater or surface-water quality;

5) Complies with all applicable local and federal laws, including those related to sediment control, pollution control, floodplain zoning, and on-site wastewater disposal;

6) Will provide a wetland buffer area of between 25 and 200 feet between the wetland and upland activities for those portions of a regulated activity that need not be conducted in the wetland as

determined appropriate; and

7) Will not damage nearby public or private property and is no threat to the health or safety of people on or off the property;

8) That the inability to derive reasonable economic use of that property is not the result of actions by the applicant in segregating or dividing the property and creating the undevelopable condition after the effective date of this chapter;

9) Complies with other standards contained in this act, including those pertaining to wetland creation and restoration as required.

10.4 (b) Practicable Alternative Test

For all permit applications, an alternative site for the proposed activity shall be considered practicable if it is available and the proposed activity can be carried out on that site after taking into consideration costs, existing technology, infrastructure, and logistics, in light of overall project purposes.

There is no practicable alternative if the applicant demonstrates all of the following to the satisfaction of the Wetlands Administrator:

1) The basic purpose of the project cannot reasonably be accomplished using one or more other sites in the general region that would avoid or result in less adverse impact on a wetland;

2) The basic purpose of the project cannot be accomplished by a reduction in the size, scope, configuration, or density of the project as proposed or by changing the design of the project in a way that would avoid or result in fewer adverse effects on the wetland; and

3) In cases where the applicant has rejected alternatives to the project as proposed due to constraints such as inadequate zoning, infrastructure, or parcel size, the applicant has made reasonable attempts to remove or

accommodate such constraints.

10.4 (c) Public Interest Test

In determining whether a proposed regulated activity in any wetland is in the public interest, the Wetland Administrator shall consider the following:

1) The extent of the public need for the proposed activity;

2) The extent and permanence of the beneficial or detrimental effects that the proposed regulated activity may have on the public and private uses for which the property is suited;

3) The quality of the wetland that may be affected and the amount of wetland to be disturbed;

4) The economic value of the proposed regulated activity to the general area; and

5) The ecological value of the wetland and probable impact on public health and safety, fish, plants, and wildlife.

10.4 (d) Government Concurrence

In determining whether a proposed regulated activity satisfies the concerns of all Government of Guam and federal agencies having jurisdiction over or interest in the matter, the Wetland Administrator shall solicit input from agencies including the Department of Land Management, the Department of Parks and Recreation, the Department of Public Works, and other agencies as appropriate before a final decision is rendered.

10.5 Acting on the Application

10.5 (a) Special Use Permit Conditions

The Wetlands Administrator may attach such conditions to the granting of a special use permit as deemed necessary to carry out the purpose of this act. Such conditions may include but are not limited to:

1) Limitations on minimum lot size for any regulated activity;

2) Requirements that structures be elevated on piles and otherwise protected against natural hazards;

3) Modification of waste disposal and water supply facilities;

4) Imposition of operational control, sureties, and deed restrictions concerning future use and subdivision of lands, such as flood warnings, preservation of undeveloped areas in open space use, and limitation of vegetation removal;

5) Dedication of easements to protect wetlands;

6) Establishment of vegetated buffer zones separating and protecting the wetland from proposed activities with permitted uses for buffer area being outlined in section 9.3 of this act;

7) Erosion control and stormwater management measures;

8) Setbacks for structures and restrictions on fill, deposit of soil, and other activities in the wetland;

9) Modification in project design to ensure continued water supply to the wetland and circulation of water;

10) Creation or restoration of an area of wetland; and

11) Development of a plan to guide actions involving the creation of a new wetland or the restoration of a damaged or degraded wetland.

The Wetland Advisory Committee may require a performance bond or undertaking in the amount of One Hundred Ten Percent (110%) of the infrastructure costs of the project, and not less than Five Thousand Dollars ($5,000) and with surety and conditions sufficient to secure compliance with the conditions and limitations set forth in the permit. The particular amount and the conditions

of the bond shall be consistent with the purposes of this act. In the event of a breach of any condition of any such bond, the Wetland Advisory Committee may instruct the forfeiture of any portion thereof for failure to comply with any applicable wetland, water quality, or zoning application regulation except as allowed under a variance or other legal exceptions from such requirements; or as is required to complete the site preparation and infrastructure features or restoration of the project should these not be completed by the developer. The Wetland Advisory Committee may also institute an action in the Superior Court of Guam upon such bond and prosecute the same to judgement and execution.

The Wetland Advisory Committee shall release the bond upon determining that all activities including but not limited to mitigation, conditions, or performance standards established for evaluating the effect and success of the project and requirements of this chapter, are met.

10.5 (b) Wetland Restoration and Creation

As a condition of a permit issued or as an enforcement action under this act, the Wetland Advisory Committee may require that the applicant engage in the restoration or creation of wetlands in order to offset, in whole or in part, the losses resulting from an applicant or violator's actions including cessation of a project within a prescribed time period, if any, indicated on the approved permit. In making a determination of whether such a requirement will be imposed, and, if so, the degree to which it would be required, the Wetland Advisory Committee will consider the following:

1) The long- and short-term effects of the action upon the wetland and associated aquatic ecosystem, and the reversible or irreversible nature of the impairment or loss;

2) The type and benefit of the wetland functions and associated resources lost;

3) The type, size, and location of the wetland altered, and the effect it may have upon the remaining system or watershed of which the wetland is a part;

4) Observed or predicted trends with regard to the gains or losses of this type of wetland in the watershed, in light of natural and human processes;

5) The cost and likely success of the possible compensation measures in relation to the magnitude of the proposed project or violation; and

6) The degree to which the applicant has demonstrated a good-faith effort to incorporate measures to minimize and avoid wetland impacts within the proposed project.

The applicant or violator may prepare or be required by the Wetland Advisory Committee to develop a wetland restoration or creation plan for review and approval of the Wetland Advisory Board. The creation or restoration of wetlands shall not be an alternative to the standards set forth in Section 10.4 (a) but shall be used only to compensate for unavoidable losses.

The plan should state the location, by metes and bounds description, of the proposed site; ownership; size, type and complete ecological assessment (flora, fauna, hydrology, wetland functions, etc.) of the wetland being restored or the area where a new wetland will be created; and the natural suitability of the proposed site for establishing the replacement wetland (i.e. , water source and drainage patterns, topographic position, wildlife habitat opportunities, value of the existing area to be converted, etc.). In addition, plane view and cross-sectional, scaled drawings; topographic survey data, including slope percentage and final grade elevations; and other technical information are required in sufficient detail to explain, illustrate, and provide for:

1) Soil and substrate conditions; topographic elevations; grading and excavation; erosion and sediment control needed for wetland construction and long-term survival;

2) Planting plans specifying plant species types, quantities, locations, size, spacing, or density; source of plant materials, propagules, or seeds; timing, season, water, and nutrient requirements for planting; and, where appropriate, measures to protect plants from predation;

3) Water-quality parameters, water source, water depths, water-control structures, and water-level maintenance practices needed to achieve the necessary ambient water conditions and hydrocycle/hydroperiod characteristics;

4) Mid-course corrections and a three-year monitoring and replacement plan establishing responsibility for removal of exotic and nuisance vegetation and permanent establishment of the wetland system and all its component parts; and

5) A demonstration of fiscal, administrative, and technical competence of sufficient standing to successfully execute the overall project.

10.5 (c) Wetland Restoration and Creation Alternatives

Ordinarily, the applicant or violator shall undertake restoration or creation efforts on or adjacent to the site where permanent losses have been sustained or where restoration of a former wetland is possible. Replication "in-kind" of the impacted wetland will be the preferred alternative for creation or restoration efforts. Where the applicant has demonstrated to the satisfaction of the Wetlands Administrator that this approach is infeasible due to technical constraints, such as parcel or wetland size or wetland type, or that a wetland of a different type or location is strongly justified based on regional needs or the functional value of the impacted wetland, the Wetland Administrator may accept or recommend an alternative proposal. Such proposal may involve monetary compensation as provided for in this section or the creation or restoration "out of kind" and "off site".

The Wetland Advisory Committee shall set reasonable fees for compensation of wetland losses based upon the amount that would be required to perform on-site, in-kind restoration or creation. Where the Wetland Administrator determines that the public interest is better served, the Wetland Administrator may require a fee in lieu of direct action on behalf of the applicant or violator to initiate restoration or creation projects. Such fees shall be held in escrow for the express use of wetland creation and restoration projects and shall not be commingled with any other funds.

10.5 (d) Suspension, Revocation

The Wetland Advisory Committee may suspend or revoke a permit if it finds that the applicant has not complied with the conditions or limitations set forth in the permit or has exceeded the scope of the work set forth in the permit. The Wetland Advisory Committee shall cause notice of its denial, issuance, conditional issuance, revocation, or suspension of a permit to be published in a daily newspaper of general circulation.

10.5 (e) Final Approval

The Wetland Advisory Committee shall have 90 calendar days from the formal submission of an application for special use permit to take action or provide written justification to the applicant why action has not been taken. In the event more time is needed, the Wetland Advisory Committee may take up to an additional 90 days. If a decision must be made within that time and there is insufficient information or time to process the application, a denial will be issued.

The Wetland Advisory Committee shall either approve, approve with conditions, or disapprove in whole or in part the proposed tentative project or activity. Upon receipt of approval by the Committee for a special use permit in a wetland area, the applicant should apply for other permits as may be required by both the local and federal government.

Any person including an applicant for a permit, aggrieved by the decision or action of the Wetland Advisory Committee, shall have the right to judicial review of such a decision as outlined in Section 12 below.

10.5 (f) Modification and Resubmittal

The holder of a special use permit for a regulated wetland area may request and the Wetland Advisory Committee may approve modification of a previously issued special use permit.

A special use permit which has been denied may be modified and resubmitted no earlier than one hundred and eighty (180) days following action on the original application.

Section 11. Nonconforming Activities

A regulated activity that was lawful before passage of this act, but which is not in conformity with the provisions of this act, may be continued subject to the following:

a) No such activity shall be expanded, changed, enlarged, or altered in any way that increases its value at the time of its becoming a nonconforming structure, unless the structure is permanently changed to a conforming use;

b) No structural alteration or addition to any nonconforming structure over the life of the structure shall exceed 50 percent of all its value at the time of its becoming a nonconforming structure, unless the structure is permanently changed to a conforming use.

c) If a nonconforming use or activity is discontinued for 12 consecutive months, any resumption of the activity shall conform to this act;

d) If any nonconforming use or activity is destroyed by human activity or an act of God, it shall not be resumed except in conformity with the provisions of the act.

e) Activities or adjuncts thereof that are or become nuisances shall not be entitled to continue as nonconforming activities.

Section 12. Judicial Review

All final decisions of the Wetland Advisory Committee concerning denial, approval, or conditional approval of a special permit shall be reviewable in the Superior Court of Guam through the filing for a writ of mandamus, pursuant to § 1084 et.seq. of Civil Procedure Code of Guam within sixty (60) days after such decision is made.

Based on these proceedings and the decisions of the court, the Wetland Administrator may, within the time specified by the court, elect to:

a) Institute all negotiated purchase or condemnation proceedings to acquire an easement or fee interest in the applicant's land;

b) Approve the permit application with lesser restrictions or conditions; or

c) Institute other appropriate actions ordered by the court that fall within the jurisdiction of the Wetland Administrator.

The provisions of this section shall be in addition to any other remedies available at law.

Section 13. Amendments

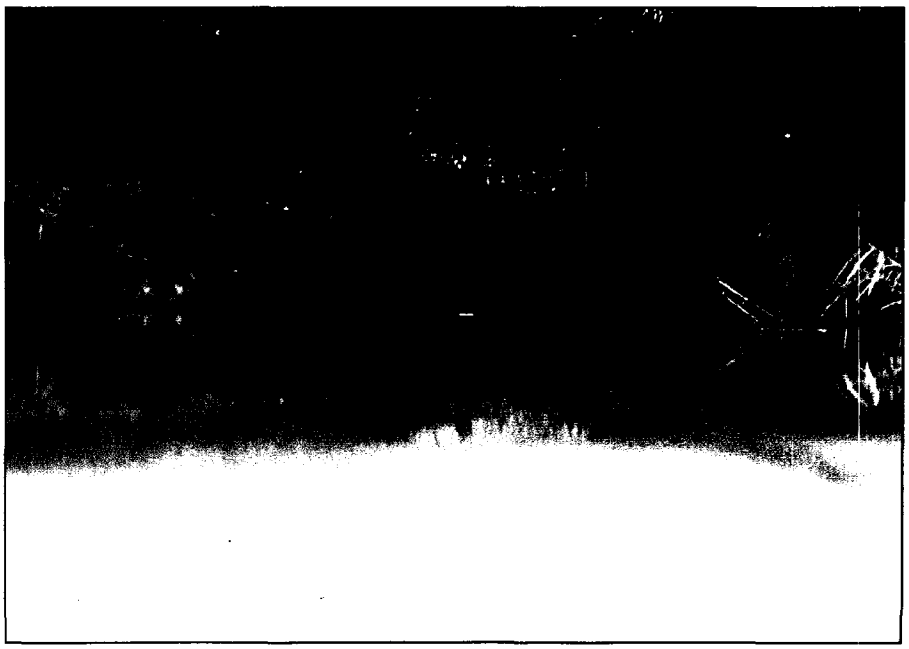
These regulations and the Official Wetlands Map may from time to time be amended in accordance with procedures and requirements in the general statues and as new information concerning wetland locations, soils, hydrology, flooding, or botanical species peculiar to wetlands become available.

Section 14. Assessment Relief

Assessors and boards of assessors shall consider wetland regulations in determining the fair market value of land. Any owner of an undeveloped wetland who has dedicated an easement or entered into a perpetual conservation restriction with the Wetland Advisory Board or a nonprofit organization to permanently control some or all regulated activities in the wetland shall have that portion of land assessed consistent with those restrictions. Such landowner shall also be exempted from special assessment on the controlled wetland to defray the cost of municipal improvements such as sanitary sewers, storm sewers, and water mains.

WETLANDS ARE THE BOND BETWEEN OUR WATER AND OUR LAND. PROTECTING WETLANDS MEANS PRESERVING BEAUTY LIKE THIS FOR OUR CHILDREN.

OUR RIVERS AND STREAMS ARE SOURCES OF FRESH WATER TO DRINK, SWIM AND FISH IN... AN IRREPLACABLE PART OF OUR ISLAND BEAUTY.



Chapter Eight

Wetland Issue Resources

"And afterwards, I always felt mean, jogging back
over that logging road,
As if I had broken the natural order of things
in that swampland;
Disturbed by some rhythm, old and of vast
importance,
By pulling the flesh from the living planet;
As if I had committed, against the whole scheme
of life, a desecration.

THEODORE ROETHKE
Moss Gathering, 1948

If you want to learn more about Guam's wetlands and the resources associated with them, there are several government and private organizations that can provide information. We have listed the main sources of wetland information below.

GUAM ENVIRONMENTAL PROTECTION AGENCY
Fred Castro, Gary Stillberger
P.O. Box 2999
Agana, Guam 96910
(671) 646-8863/5

DEPARTMENT OF AGRICULTURE, DIVISION OF AQUATIC AND WILDLIFE RESOURCES
Antonio Quitugua, Bob Anderson
P.O. Box 2950
Agana, Guam 96910
(671) 734-3944/5

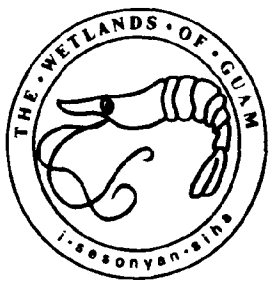
UNIVERSITY OF GUAM:
UOG Station
Mangilao, Guam 96923

-MARINE LABORATORY
Dr. Bob Richmond
(671) 734-9510/9323

-BIOLOGY DEPARTMENT
Dr. Lynn Raulerson
(671) 734-9242

U.S. ARMY CORPS OF ENGINEERS, GUAM OPERATIONS OFFICE
Frank Dayton
238 Archbishop F.C. Flores St.
Agana, Guam 96910
(671) 344-5203

BUREAU OF PLANNING, GUAM COASTAL MANAGEMENT PROGRAM
Peter Leon Guerrero, Michael Ham
P.O. Box 2950
Agana, Guam 96910
(671) 472-4201/3



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