I8 Proposal to Make ECO-DAMs

I8.1 Conception of ECO-DAM

Dam is one of the largest facilities and is usually constructed over the beautiful natural river. Then it is undeniable to give various effects on natural ecosystem. There is strong opposition to make dams on such rivers, especially from the NGO people of natural environmental conservation. Currently in the U.S.A., dam construction is said to be almost completely given up, and removal of some existing dams that lost the economical value is said to be started.

The situation in Philippines may be somewhat different from the one in the U.S.A.. Philippines anticipates rapid increase of its population and also improvement of the living standard. These factors usually demand the increase of the water consumption, not only concerning for the domestic usage but also for the irrigation, industrial and service usage and power generation. If increase of the water resources consumption is really unavoidable, construction of water development facilities, especially dams and reservoirs is also inevitable.

If construction of dams and reservoirs is really inevitable, these facilities should be ECO-DAM, that is the dam with affluent natural ecosystem. Of course it is no way to recover the exterminated species, ECO-DAM cannot become the substitute for them. Conservation of the endangered and threatened species is the prerequisite for any dam construction. With conservation of these endangered and threatened species, ECO-DAM shall contribute for the conservation and promotion of the natural ecosystem and global environment.

And much natural ecosystem has already been destroyed and exterminated on vast Philippines land, ECO-DAM with environmental restoration of these area may improve the situation of the natural environment significantly.

The basic idea of ECO-DAM is "Wonderland Meshed with Forest and Lake". Promotion of ECO-DAM consists of two (2) basic strategies, that is, developing the whole dam and reservoir region into;

- Bio-Torp, and
- Eco-School

Bio-Torp is defined as "the living space of the society of living creatures". Developing the whole dam and reservoir region into Bio-Torp means practicing various measures to present abundant living sites for the living creatures in the dam and reservoir region.

It is instructive to present the space for people to encounter with the natural environment, in order to educate them with the manner to manage the natural ecosystem. Dam and Reservoir may become a ECO-School that assume this function, and people can experience and learn about natural environment.

I8.2 Image and Strategy of ECO-DAM

Figure I-8 shows the image of ECO-DAM and Table I-19 shows the strategy of ECO-DAM. With these figure and table, the outline of ECO-DAM will be grasped.

Before proceeding to the explanation of the strategy of ECO-DAM, an explanation of the

effect of dam on ecosystem is given herein.

Dam is one of the largest facilities and is usually constructed over the beautiful natural river. Then it is undeniable to give various effects on natural ecosystem as shown below.

DIRECT EFFECT
Loss of Living and Growing Site of Plants and Animals

- Loss of living and growing site of plants and animals with the reservoir and the related road.
- Loss of living and growing site of plants and animals with the production of dam material and filling the neighbor valley with the remaining soil.

Cutting off the Living Site

- Dam body cut off the upper and lower river, and hinders the pass of animals living in rivers. The animals (fishes), which go up and down the rivers and sea, cannot survive, or are enclosed in the reservoir.
- Filling site of the remaining soil at the neighbor valley cut off the torrent, and hinder the animals in the torrent to pass there.
- Reservoir and the related road cut off the living zone of the small animals that have weak migration capacity.
- Appearance of the Dam Reservoir.
- Ecosystem of the torrent and forest is lost with the appearance of the vast dam reservoir, and the lake ecosystem appear instead.

INDIRECT EFFECT
Effect to the Circumference and the Downstream

- Noise, vibration and dust accompanied by the construction works donate the effects on the animals and plants living around the project site.
- Related facilities such as the operational equipment donated the permanent effects on the animals and plants living around the project site.
- Decrease of the flood and the soil supply are brought about with the dam construction, and this may change the environment of the downstream and the mouth of the river.

Human Kind and the Foreign Enemy Species Invasion

- Careless invasion of human kind and the enemy species give the adverse effect on the nature. Reservoir may hinder these invasion into the forest on the upper stream, and the related road may solicit them instead.

The strategy of ECO-DAM shown in Table I-19 is produced to mitigate these adverse effect of dam construction. This strategy consists of two (2) basic strategies, that is; Bio-Torp Formation, and Eco-School Education.

Bio-Torp Formation has seven (7) strategies, that is;

1) Environmental Assessment. Performs the environmental assessment before dam

construction, and follow up monitoring after the completion of the construction.

2) Setting the Route and Site of the Related Facilities --- Maximum possible consideration are taken when the route and the site of the related facilities are set. The points of this strategy is as follows:

Related Road --- The route of the related road are selected with maximum consideration for the ecosystem, especially the endangered plants and animals conservation. If possible, route over reservoir with the continuous bridges will be employed.

Production Site of the Dam Material --- Production site of the dam material are selected with maximum consideration for the ecosystem, especially the endangered plants and animals conservation. The site in the planed reservoir region is first considered.

Filling Site of the Remaining Soil --- Filling of the remaining soil at the neighboring natural torrent will be avoided. Sometimes these soil will be presented to other projects that needs filling soils, and sometimes these soil will be filled at the mouse of the influent torrent into the planed reservoir.

3) Minimizing the Area of the Environmental Change --- Employ the plan, structure and method of the construction that minimize the change of the living and growing environment of the animals and plants. The points of this strategy is as follows:

Related Road --- Along the ridges of the mountainous area, soil cut off area is reduced with the elevated road longitudinal course and the adoption of the tunnel structure. And torrents and wetland are overpassed with the bridge structure to conserve theses natural ecosystem.

Remaining Soil --- Remaining soil is reduced with the temporary storing of excavated soil and reuse of this soil to refilling at the production of the dam material and at the excavation of the dam basement. For rock fill type dams, dam body zoning method is employed to reduce the remaining rock.

Test Water Storage --- During the test water storage, water level is elevated to the surcharge level and over the constant high level of dams. This causes the destruction of the natural forest that locates at the height between these two (2) water levels. If temporary weir is set at the mouth of the influent river, and water upstream of this weir is pumped out, these natural forests may be conserved.

Temporary Road --- Temporary road used for the construction material transportation is reduced as few as possible. And the unavoidable temporary road is passed in the planed reservoir area.

4) Prompt Recovery of the Temporary Change --- Promote the prompt recovery of the ecosystem when temporary change is incurred.

Denuded Land --- Denuded land at the slope along the road will be replanted promptly with the young tree planting and seeding of the native kind. Surface soil at the site that contains the seeds of natural habitat is used as the refill to the excavated area. Proper combination of trees is selected and proper maintenance is performed to enhance the reforestation.

Land after the Temporary Facilities Removal --- Temporary facilities such as the temporary road, the sedimentation tank and the construction plant have the structure that can be removed easily. Land after the temporary facilities removal is rehabilitated to

enable the animals and plants live and grow. For the temporary road, materials can be put on the plastic sheet to enable the easy removal.

5) Reducing the Adverse Effect when Permanent Environmental Change is conducted --- Reduce the each adverse effects when permanent environmental change is conducted.
Lost of the Living and Growing Site --- Endangered and threatened species of plants and animals living in the planed reservoir area and in the construction area are moved or replanted at the neighboring sites of similar environmental condition. Species of very limited number and species of which replanting is very difficult are conserved in the greenhouse. Such Bio-Torp facilities as the shelter for the insects, substitute cave, man made nest tree and recovery of torrents will be set.
Cutting Off the Living Site --- Fish way is set to pass the aquatic animals of which the passage is hindered by the dam. Related roads pass over any tiny torrents and the animal's way with small bridges and box culverts. Ditches along the road have the slope structure that enable the small animals pass across it.
Construction Conducted --- Cutting the trees in the planed construction area is performed as late as possible, and schedule is adjusted that cutting trees is conducted after the end of breeding period of the endangered and threatened animals. Construction works will be interrupted until the end of the breeding period when the nesting and the egg laying of the endangered and threatened animals are found. When stream of river is changed into a temporary bypass, aquatic animals such as fishes are moved to the safe place. Large construction site with several heavy vehicles and machines is surrounded with the cloth sheet, in order for the small animals to migrate into the site.
Operational Facility --- Maximum consideration is taken concerning the operational facilities of the dam. Illumination for maintenance is constrained minimum, and the usage of the sodium lump that tends to attract few insects is preferred. And some warning seal should be stick on the window glass for the small birds not to collide on it. Sometimes eagle is drawn on that seals, of which small birds are afraid.
Catch the Invader --- Invading animals and pet animals that returned wild should be caught to protect the native species after the dam completion.

6) Formation of New Environment that Presents Living Spaces for Various Living Creatures --- Form the new environment and device the related facilities that present living spaces for various living creatures.
Paradise for Various Living Creatures --- New environment after the appearance of the reservoir is improved to allow more living creatures to live in it. There are many strategies for it. Wet land bio-torp can be set at the inlet of the reservoir that presents the living sites for water born plants and dragonflies. Some ponds should be set on the midway of fish ways of the dam for the fishes to rest, because the length of fish ways of the dam tends to become larger. Floating islands on the reservoir presents the rest and feeding sites for the water born birds. River bio-torp can be formed with securing the maintenance flow. Cave bio-torp can be formed for the bats with reuse of the tunnels used for the dam construction.
Related Facilities --- Many strategies are devised to present affluent living and growing sites when the related facilities of dams are set. Man made nests can be set at the bridge platforms. Some walls of the concrete structures are got uneven for birds and bees to nest. Planting of the stoppage for driftwood is installed.

7) Reduce the Soil Erosion and Soil Precipitation Rate in the Reservoir --- Reduce the soil erosion in the watershed of the reservoir, and also reduce the soil precipitation rate in the reservoir.
Soil Protection and Watershed Management
Sabo Dam at the Mouth of the Influent River --- Eroded soil flowing into the reservoir may be reduced with the sabo dam set at the mouth of the influent river.
Forest Protection --- Deforestation increase the soil erosion. Then forest protection against the reckless deforestation is important to reduce the soil erosion.
Reforestation in the Watershed --- Reforestation should also been conducted as the same reason for forest protection.

Eco-School Education has three (3) strategies, that is;

1) Experience and Study the Nature System --- Furnish the site for visitors to experience and study the nature system.
Eco Museum --- Eco museum is built to educate systematically the visitors with the curriculum of animals, plants and ecosystem. Other nature observation facilities such as the observation road and the instruction board are also installed.
Nature Observation Meeting --- Nature observation and experience meetings is held by the dam management organization. And pamphlets that give the basic information of nature observation are also distributed.

2) Base Site for Eco Tour --- Base site setting for Eco Tour into the surrounding forests.
Base Site Facilities --- Seminar room is furnished in the dam management office and is presented for public. Experience exchange facility of the biological researchers and naturalists is also arranged.
Service for the Visiting Tourist Groups --- Model courses of the nature observation for each tourist groups are arranged. Guide map for these courses is distributed. Environmental guides for these tours are introduced by the dam management. And other necessary equipment for nature observation, such as the field glass and the picture book will be loaned out.

3) Checkpoint for Forest Entrance --- Dam and reservoir can function as the checkpoint for forest entrance of visitors.
Eco Museum --- At ECO DAM, nature conservation is also taught. Visitors should first enter the ECO Museum to learn about the manner of dealing with the nature, and visit the forests thereafter.
Sightseeing Route --- Passing the observation route along the excellent natural ecosystem strictly needs the environmental guide's escort.
Reservoir --- Reservoir can function as the barrier for reckless entrance into the upstream forests, because this separates the upstream from the downstream human residential area.

I8.3 Institutional Arrangements for ECO-DAM

Eco system conservation with ECO-DAM strategy also needs some institutional arrangements. Three (3) items should be considered as shown herein:

1) Proceeds the Study of Ecosystems. --- Various studies and experiments are conducted under the researchers' and specialists' instruction concerning the distribution and the ecology of the endangered and threatened species and the invading animals, or the conservation of ecosystem.
2) Guidance, Instruction, Advice and the Watching of the Researchers and the Specialists --- Ecosystem conservation is conducted under the guidance, instruction, advice of the researchers and specialists. Construction works is also conducted under the biological specialists' watching on the environment.
3) Open Information Offering --- Data and information gained during the survey and research activities should be offered openly to the biological researchers and the public. And the information concerning the strategies taken in this project should be offered to other enterprises.

I9 Alternative Planning Formula of Water Resources Management Plan

An alternative planning formula of Water Resources Management Plan, which is more suitable from the environmental conservation standpoints is proposed hereinafter.

I9.1 Objective and the Coverage of the Plan

I9.1.1 Objective of the WATER RESOURCES MANAGEMENT PLAN

The objective of the WATER RESOURCES MANAGEMENT PLAN is to supply adequate water for such peoples' needs as the municipal/industrial usage, agricultural irrigation, fish pond, without any adverse effects on the environment, and based on the appropriate cost that people are afford to pay for.

I9.1.2 Coverage of the Plan

This WATER RESOURCES MANAGEMENT PLAN covers the whole water resources usage such as municipal/industrial usage, agricultural irrigation, fishpond, urban wastewater, environmental conservation of river flow. Excluded is power generation and flood control, because power generation is non-consumptive use of water, and flood control is usually separately treated when multi-purpose dam is planned and operated. Plan for the power generation and flood control is made independently, and adjustment to the water resources management plan should be conducted later at the multi-purpose dam planning stage, etc.

Contingency plan for water shortage period is included in the WATER RESOURCES MANAGEMENT PLAN, but it is treated separately. The criterion that distinguishes the contingent water shortage situation and the usual one should be designated. In Japan, minimum annually dry flow rate during recent ten (10) years is used for this criterion. (annually dry flow rate = tenth minimum daily flow rate in a year)

I9.2 Basic Items

I9.2.1 Basic Assumptions

1) Population in Philippines is still rapidly increasing.
2) Philippines is a developing country, and has the right to expect the improvement of the life standard of its people.
3) Water resources such as the groundwater and the river flow are over exploited and mis-managed on many regions of this country.
4) Main facilities of water supply, such as the dams, weirs and the main wells is relatively well maintained, however, the number and volume of them is very limited.
5) Whereas, the distribution network of the water supply, such as the waterworks pipelines, the irrigation channel and the sewerage is not well maintained, and prompt rehabilitation of them is necessary.
6) There is very small kilometers of sewerage exists, and most of the effluent is discharged directly into the nearby streams.

19.2.2 Precondition

(1) All water usage are metered; waterworks, irrigation channels and wells.
(2) All water usage is appropriately priced. At least, cost of water supply should be covered with its revenue.

19.2.3 Items for Study

1) Water usage quantity that is commensurate to the level of water tariff. Net revenue for these tariff level. Net amount of money that is available for the redemption of the investment for water works facilities. This item is for the economic measures of the water demand management.
2) Potential quantity of water conserved with the regulatory measures.
3) Tariff levels that people can pay for, or willing to pay for.
4) Financial measures for the investment for water work facilities. Is it possible with the private sector initiative only? Or, some subsidy is necessary?

19.2.4 Institutional Matter

1) Approval system for the commencement of the water related enterprises, its work plan and its tariff system.
2) Measures for bringing forth the appropriate tariff level.
3) Measures for soliciting the private and public water related enterprises to improve their facilities.
4) Mechanism to allocate the water for each users at the water shortage period.
5) Water authority that treats the whole water related items in a river basin + its utilization zones synthetically, such items as the waterworks, irrigation, fish pond, sewerage and the environment.
6) Water conservation planning.
7) Land uses regulation upstream of the water source.
8) Democratic and transparent procedures to forge the consensus on the water resources management plan.

19.3 Formulation of the Water Resources Management Plan – Main Portion (WRMP)

WATER RESOURCES MANAGEMENT PLAN – MAIN PORTION (WRMP) shall cover the whole water resources usage including the municipal/industrial usage, agricultural irrigation, fish pond, urban wastewater, environmental conservation of river flow. Power generation and flood control are excluded. Contingency plan for water shortage period is also not included. This is included in the SUPPLEMENTAL PLAN (SP).

WRMP should be made for each river basin + its water utilization zone, using the river basin concept of integrated water resources management.

Zoning in the river basin + its utilization zone is necessary, concerning the densely populated area (municipality, barangay, city etc.), large factories, lots of agricultural land, large fish ponds etc. And main water distribution lines and its inflow and outflow should be thoroughly understood.

A flowchart for the WATER RESOURCES MANAGEMENT PLAN – MAIN PLAN

(WRMP) is presented in Figure I-9.

I9.3.1 Setting the Target Level for the Domestic, Urban, Industrial, Agricultural, Fishponds and Environmental Water Demands

Target level is set for the final year and also for the appropriate interim years.

As shown in Figure I-9, the water saved at the consumer level is not considered at the first stage. However, this factor is considered at the second stage to reduce the water demand further, if the first stage trial does not solve all of the water related problems or the projects are not financially viable.

Target level is set for each water usage as shown below:

1) Domestic
Water demand per head that is commensurate with the income level is set. Not only the average income level but also its classification should be considered. Multiplying this value with the estimated future population gives the domestic water demand.
And water demand for each purpose should be set, such as for toilet, shower, cleaning, kitchen, other indoor services and outdoor gardening.
Reclaimed water and the urban rain water availability should also be set.

2) Urban
Water demand per square meters of the floor area of the supermarkets, malls, restaurants etc. should be set. These values may be present in the building code or architectural law. Multiplying this value with the estimated future floor area gives the urban water demand.
And water demand for each purposes should be set, such as for toilet, restaurant, hotel guest room, outdoor gardening etc..
Reclaimed water, desalination water and the urban rain water availability should also be set.

3) Industrial
Industrial water demand is not estimated with the inter-sectional GDP value, because the composition of the industrial output changes drastically year by year, and the productivity is perpetually improving. And the recycle ratio (water used in the production process / water input to the factory from outside sources) can also be much increased.
Multiplying sectional output with the unit water consumption and the recycle ratio can give the industrial water demand estimation. For these purposes, Japanese experience for the unit water consumption and the recycle ratio can be utilized.
And industrial enterprises tend to reduce the expenditure for the water usage, it is usually unnecessary to increase the industrial water demand after the appropriate water tariff is levied on the industry.
Reclaimed water, desalination water and the urban rain water availability should also be set.

4) Agricultural

First, main irrigation water canals and its inflow and outflow should be determined. Sometimes, metering at the intake structure may be necessary. Especially, return flow from the agricultural land to the river should be determined.

Next, composition of the crops should be known. Multiplying the unit water consumption and the acreage of each crops gives the water consumption demand of the agricultural section and the degree of water wastage in the irrigation system.

Reclaimed water availability should also be set.

5) Environmental

Maintenance flow at certain points on the river should be set. Even if it is difficult to set this value based on the Philippines' data, Japanese and U.S.A. experience can be utilized.

I9.3.2 Understanding the Current Water Usage Structure in the River Basin + Its Water Utilization Zone

First, make the water usage structure map as shown in Figure I-10. All of the water usage units, such as the farm lots, densely populated area, factories and fishponds etc. are plotted. And main water related facilities, such as the dams, intake weir, irrigation canals, return flow, well zone, effluent line and river are also indicated.

Main flow rates at each water-related facility and the water consumption quantity at each water usage units are elucidated. These flow-rates and the water consumption quantity should be based on the minimum annual dry flow rate during the last ten years.

For the current water usage, problems are listed up, such as;

- Water shortage in urban area,
- Insufficient maintenance flow in the river.
- Over exploitation of groundwater, and the salt-water intrusion.

I9.3.3 Set the Target Level Water Demands for Each Water Usage Units

Target level water demands for each water usage units obtained in section I9.3.1 are indicated on the Figure I-11. This target level is set for the final year and the appropriate interim years. Then, in the real practice, Figure I-11 (1), I-11 (2), I-11 (3) will be prepared.

The water demands for each water usage units are set, and the main water related facilities are not changed.

For the target level water demand, problems are listed up, such as;

- More critical water shortage in urban area.
- No maintenance flow at the usual time.
- More serious salt intrusion.
- No water source for the newly established farm lot, factory and the newly developed town zone.
- River water quality deteriorated.

I9.3.4 Study on the Menu of the Water Usage Situation Improvement

First, menu of available counter measures for the water usage situation improvement is made.

This menu includes such items presented herein, and does not include the water conservation measures at the consumer level.

- Improve the existing distribution line. Leakage of water is decreased -- its possibility, time span, cost (redemption amount per year), expected developmental water volume, cost-benefit analysis (developmental water volume / cost), secondary benefit such as the sanitation improvement.
- New water development scheme including the dam construction – name of dam, expected developmental water volume, cost (redemption amount per year), cost-benefit analysis (developmental water volume / cost), environmental and social restriction.
- Usage of the reclaimed water – available water volume (production, demand site), cost (redemption amount per year), cost-benefit analysis (developmental water volume / cost), secondary environmental benefit such as the water quality improvement.
- Re-allocating the irrigation water to domestic water – its possibility, cost (redemption amount per year), expected developmental water volume, cost-benefit analysis (developmental water volume / cost), social restriction.
- Recharge of the groundwater – water source, its possibility, cost (redemption amount per year), expected developmental water volume, cost-benefit analysis (developmental water volume / cost).
- And other measures.

Priority order for each menu listed is set, and presented as shown in Table I-20.

I9.3.5 Selection of the Menu

Selection of the menu listed in Table I-20 is conducted as follows. These steps shown herein shall go through for the final target year and also for the appropriate interim years.

First, select menu #1, and this information is put on Figure I-10 and I-11. Check whether the problems listed up in section I.9.3.3 and I9.3.4 is solved or not. If all problems listed are solved, then only the menu #1 is adopted.

Select menu #2 in addition to #1, if not all problems listed are solved. Check whether the problems listed up in section I9.3.3 and I9.3.4 is solved or not. If all problems listed are solved, then only the menu #1 + #2 is adopted.

These procedures will go on until all of the problems listed in section I9.3.3 and I9.3.4 is solved. If selected menu is #1 + #2 + #3 + #4, then water usage structure will be as shown in Figure I-12.

These steps will be done for the final year and the appropriate interim years. Then, in the real practice, Figure I-12 (1), I-12(2), I-12(3) will be prepared.

If not all of the problems listed up in section I9.3.3 and I9.3.4 is solved after every menu listed in Table I-20 is adopted, then return to section I9.3.1. Before returning to section I9.3.1, section I9.3.6 "water saving at the consumer level and restriction of the regional growth" should be considered.

I9.3.6 Study of Water Saved at the Consumer Level and the Restriction of the Regional Growth

The measures studied in this stage are only adopted when the first trial measures (from section I9.3.2 to I9.3.5) failed to solve all problems or to finance the facility construction. Such measures shown herein should be considered.

- Domestic water saving devices
- More efficient irrigation method
- Planting of alternative crops (less water consuming variety)
- Change of the products in industry.

If these measures are also shown to be insufficient to solve the problems, restriction on the regional growth should be considered.

I9.3.7 Setting the Effluent Discharge and Treatment Scheme

After the adoption of the selected water resources developmental menu (Figure I-12), municipal/industrial effluent discharge and treatment scheme is adopted.

First, the discharge points should be designated. When discharge points is selected, following item should be considered.

1) Usually municipal/industrial wastewater is treated with the biological methods, such as the activated sludge and trickling filter etc.. They can reduce only the biodegradable organic matters, and are useful for the preservation of the Dissolved Oxygen level in the accepting rivers. However, they can reduce only a tiny portion of the nutrients, and almost no reduction is expected for the very small amount of the halogenated organics such as the PCB and Dioxin, and the environmental hormone. And considerable reduction may be attained for the bacteria, however virus and cysts are not well removed. More advanced method, such as the R.O. membrane method may be employed, however its cost is high. Then, effluent discharge points after the treatment should be where a lot of dilution water is available, such as;
   # Ocean out of the bay. Bottom of the deep sea is better. Discharging near the coast sometimes cause the contamination of the beach,
   # Main river flow where flow rate is large. Cautious consideration is needed after these river water containing the effluent is used for the drinking and recreational purpose.
   However, the cost for the discharge facilities should be considered.

2) Recycling of the effluent to the garden irrigation in the town and to the agricultural irrigation such as for the fruit trees is useful not only for the water resources saving but also for the water quality conservation in the rivers and ocean.
   However, the cost for the discharge facilities should be considered.

3) Treatment method is selected based on the condition of the discharge point. If affluent dilution water is available, only the easier sedimentation method may be sufficient.

4) Figure I-13 shows the water usage structure after the adoption of the effluent discharge and treatment scheme. This figure is also prepared for the final and the appropriate

interim years. Then, in the real practice, Figure I-13 (1), I-13(2), I-13(3) is prepared.

I9.3.8 Construction Plan of Each Facilities

Yearly construction plan of each facilities is made at this stage. This plan should consider the target level at the final year and the appropriate interim years as set in section I9.3.1.

Based on this construction plan, Financial Plan is prepared.

I9.3.9 Financial Plan

Based on the construction plan, financial plan for these facilities are set. And necessary tariff level is estimated based on this financial level, if the amount of ODA or government subsidy is assumed. If this tariff is below the level which people are afford to pay for, then this water management plan is viable. The tariff level that people are affords to pay for is studied in I9.2.3.

If necessary tariff level is more than what people can pay for, or willing to pay for, then returning to section I9.3.1 and section I9.3.6 is needed. Before going back to these stages, measures shown in section I9.3.10 should be considered.

I9.3.10 Reduction of the Life Standard

If the necessary tariff level is more than what people can pay for or willing to pay for, reduction of the life standard is demanded. To minimize the adverse effect of these measures, selection of the policies needs most cautious consideration. Such menu may be listed:

- Decrease the water supply level for some users
- Change the crop production plan
- Extension of the sewerage construction plan

I9.3.11 Study of the implementation plan

(1) *Factors of the implementation plan*

Implementation plan contains such factors:

- Setting the tariff system
- Executive organization
- Administrative organization
- Land uses regulation upstream of the water source
- Water conservation plan

Tariff system that is required for the execution of this WATER RESOURCES MANAGEMENT PLAN is set and presented in the implementation plan.

And, the executive organization for the project construction and maintenance and the administrative organization for this plan are designated also in this plan.

Sometimes, it is beneficial for the water quantity and quality conservation to discourage the development in land located upstream of the water sources, and to regulate the human activities inside of these area. This is also contained in the implementation plan.

Water conservation plan should routinely be prepared by the executive organization, and is submitted to the administrative organization. This is explained next section.

(2) Water Conservation Plan

The objective of the water conservation plan is to make water saving measures listed in section I9.3.1, I9.3.4 and I9.3.6 realized. This plan usually contains such items as shown below:

- Outline of the executive organization -- locations of the organization, area, water usage quantity, water distribution facilities, and tariff system.
- Water usage situation -- where, when and what purpose the water is utilized.
- Elucidation of the subjects on the water usage, and targets of the water resources conservation.
- Existing water conservation measures.
- Priority measures for the water resources conservation.
- Water conservation measures expected to be introduced in future.
- Monitoring the effectiveness of the water conservation measures.
- Environmental review of the water conservation plan.

I9.4 Contingency Plan for Water Shortage Period

This is the sub plan that supplement the MAIN PLAN of the WATER RESOURCES MANAGEMENT PLAN. This plan contains the items shown below:

(1) List up the examples of the critical water shortage episodes, and gather the information and data concerning these events.
(2) Gather the information on the regulatory process of water allocation during the water shortage period, and the records of the damage incurred.
(3) Existing regulatory framework for water allocation, the organization responsible and its power.
(4) Cost estimate of the dam construction for drought.
(5) Study of the drought insurance. Its cost.
(6) Study of the necessary measures, with comparing the results of (2), (4) and (5).

Part – I

Tables

Table I-1 LIST OF RARE AND ENDANGERED SPECIES OF WILDLIFE (A)

COMMON NAME	LOCAL NAME	SCIENTIFIC NAME	CITES APPENDIX
A. FAUNA			
I. MAMMALIA			
1. Dugong	Dugong	Dugong dugon	I
2. Tamaraw	Tamaraw	Anoa mindorensis	I
3. Ant Eater	Pangolin	Manis javanica	II
4. Philippine Deer "	Usa	Cervus sp.	
5. Mouse Deer "	Pilandok	Tragulus nigricans	
6. Philippine Tarsier	Malmag/Mago	Tarsius philippensis	II
7. Calamian Deer	Usa	Axis calamiansis	I
8. Water Buffalo "	Cimaron Tali-rah bali	Bubalus moellendorfi	
9. Mindanao Gymnure	Looey	Podogymnura truei	
10. Philippine Monkey	Tsonggo	Macaca fascialensis	II
II. AVIES			
11. Philippine Eagle	Aguila	Pithecophaga jefferii	I
12. Philippine Falconet	Dumagat	Microhierax e. erythrogon	II
13. Peregrine Falcon	Dumagat	Falco peregrinus	I
14. Palavan Peacock Pheasant	Bartik	Polyplectron emphanum	I
15. Spotted Green Shank		Tringa guttifera	I
16. Pygmy Curlew	Balangkawitan	Numenius minutus	II
17. Nicobar Pigeon	Siete Colores	Caloenas nicobarica	I
18. Mindoro Imperial Pigeon	Balud	Ducula mindorensis	I
19. Bleeding Heart Pigeon	Punalada	Gallicocumba luzonica	II
20. Calabero		Balbopsittacus l. lunulatus	II
21. Philippine Cockatoo	Katala	Cacatua haenialuro pygia	II
22. Philippine Hanging Parakeet	Kolasisi	Loriculus philippensis	II
23. Blueheaded Parrot			
24. Short-tailed Parrot	Loro de paleta	Prioniturus montanus Psittaciformes spp.	II
25. Parrots (All species)	Loro	Balbopsittacus l.	II
26. Kochs Pitta	Liaco	Pitta kochi	I
27. Owl	Kuwago	Strigiformes spp.	II
28. Giant Scops Owl	Kuwago	Otus gurneyi	I
29. Scops Owl	Kuwago	Otus scops longicarnis	II
30. Rufous Scops Owl	Kuwago	Otus rufescens buibidgin	II
31. Oriental Screet Owl	Kuwago	Otus bakkamoena Megalotis	II
32. Phil. Hornes Owl	Kuwago	Bubo philippensis	II
33. Phil. Boobook Owl	Kuwago	Minox p. philippensis	II
34. Phil. Hawk Owl	Kuwago	Minox scutulata randi	II
35. Seleputs Owl	Kuwago	Strix seleputa vaepkeni	II
36. Short-tared Owl	Kuwago	Asio f. flammens	II
37. Rufous Hornbill	Kalaw	Buceros hydrocorax	II
38. Cebu Black Shama "	Siloy	Copsychus cebuensis	
39. Ashy Ground Trush "		Zoothera cinerea	
40. Eastern Sarus Crane	Tipol	Grus antigone sharphi	I
III. REPTILIA			
41. Leatherback Turtle "'	Pavikan	Dermochelys coriacea	I
42. Green Sea Turtle "'	Pavikan	Chelonia Mydas	I
43. Hawsbill Turtle "'	Pavikan	Fretmochelys imbricata	I
44. Olive-backed or Pacific Ridley's Turtle "'	Pavikan	Lepidochelys olivacea	I
45. Loggerhead Turtle "'	Pavikan		
46. Soft Shelled or Freshwater Turtle "'	Bao	Trionyx sp. Crocodylus novaeguineae	
47. Philippine Crocodile	Buwaya	mindorensis	I
48. Saltwater or Estuarine Crocodile	Buwaya	Crocodylus porosus	I
49. Lizards	Bayawak	Varianidae Spp.	II
50. Water Monitor Lizard	Bayawak	Varanus salvator	II
51. Grains Monitor Lizard	Bulaan	Varanus grayi	II
52. Python	Sava/Bitin	Python reticulatus	II
IV. INSECTA			
Mountain Apollo Butterfly		Parnassius apollo	II
Birdwing Butterfly		Trigonopcera Spp. Troiden Spp.	II

Table I-1 LIST OF RARE AND ENDANGERED SPECIES OF WILDLIFE (B)

COMMON NAME	LOCAL NAME	SCIENTIFIC NAME	CITES APPENDIX
B. FLORA			
1. Sander's Alocasia		Alocasia Sanderana	I
2. Striped Alocasia		Alocasia sanderana	I
3. Pitcher Plant		Nepenthes rajah	I
4. Orchids		Orchidaceae Spp.	II
5. Bungang Ipod (Palm)		Arcea Ipod	II
6. Voyavoy		Phoenix hanceana var. philippensis	II
7. Igam		Podocarpus costahis	I
8. Calakab		Sadaceae chamberlainii	II
9. Tagbak		Pedichium philippensis	I
10. Cycas or Pitogo (All Species)		Cycadaceae Spp.	II
11. Ferns (All Species)		Cystheaceae Spp.	II
12. Aloe or Sabila		Aloe Spp.	II
13. Cactus		Caotaceae Spp.	II

Note:

' - Listed in the RED DATA BOOK, International Union for the Conservation of Nature and Natural Resources (IUC
'' - BFD List of Rare and Endangered Species of Wildlife.
''' - Banned Species per NMR Administrative Order No. 12; Series of 1979.

Source: DENR Protected Areas and Wildlife Bureau

Table I-2 CRITERION OF FLOW TO JUDGE THE PRESERVATION OF 12 FISHES

Name of Fishes	Water Depth (cm)				Water Velocity (cm/s)			
	Incubation	Fry	Maturated	Spawn	Incubation	Fry	Maturated	Spawn
Salvelinus leucomaenis f. pluvius	winter-spring	spring-summer --5	all the year	autumn 4-24	winter-spring	spring-summer	all the year 20	autumn --20
Salvelinus leucomaenis	winter-spring	spring-summer --5	all the year	ummer-autumn 4-24	winter-spring	spring-summer	all the year	ummer-autumn --20
Salmo (Parasalmo) masou masou	winter-spring	spring-summer	all the year	ummer-autumn --40	winter-spring	spring-summer	all the year	ummer-autumn --50,10-35
Salmo (Parasalmo) masou macrosto	winter-spring	spring-summer	all the year	ummer-autumn 10-30	winter-spring	spring-summer	all the year	ummer-autumn 30
Salmo (Oncorhynchus) keta	winter-spring	spring-summer	sea	autumn-winter 30	winter-spring	spring-summer	sea	autumn-winter 20,0-40
Plecoglossus altivelis altivelis	autumn-winter	spring	ummer-autumn 20	ummer-autumn 30-60	autumn-winter 3	spring 40-60	ummer-autumn	ummer-autumn 30-70,60-120
Leuciscus (Tribolodon) hakonensis	autumn	winter-spring	all the year	spring-summer 20-70	autumn	winter-spring	all the year	spring-summer 30-70
Zacco platypus	autumn	winter-spring --10	all the year	summer 5-20,5-10	autumn	winter-spring --10	all the year	summer 5-30
Zacco temminckii	autumn	winter-spring --10	all the year	summer 5-20,5-10	autumn	winter-spring --10	all the year	summer 5-30
Cottus pollux	summer	ummer-autumn	all th year 20-90	winter-spring 30	summer	ummer-autumn	all th year	winter-spring 10-100
Cottus nozawae	summer	autumn-spring	all th year 20-90	summer 30	summer	autumn-spring	all th year	summer 10-100
Sicyoplerus japonicus	summer	autumn-spring	all the year	summer 20-100	summer	autumn-spring	all the year	summer

Note; spring: March-May, summer: June-August, autumn: September-November, winter: December-February

Table I-3 AN EXAMPLE OF EPMF ESTIMATION

(1) Water Depth (cm)

Sections of River	A	B				C				D				E			
Season	-	spring	summer	autumn	winter	spring	summer	autumn	winter	spring	summer	autumn	winter	spring	summer	autumn	winter
Fish Species																	
a) *Leuciscus (Tribolodon) hakonensis*		(20)-70	(20)-70	(20)	(20)	(20)-70	(20)-70	(20)	(20)	(20)-70	(20)-70	(20)	(20)		Not selected for study		
b) *Zacco platypus*		--10, (5)	5-10,5-20, (5)	-, (5)	--10, (5)	--10, (5)	5-10,5-20, (5)	-, (5)	--10, (5)		Not selected for study				Not selected for study		
c) *Placoglossus altivelis altivelis*			Not selected for study			--, (20)	20,30-60, (30)	20,30-60, (30)	--, (20)	--, (20)	20,30-60, (30)	20,30-60, (30)	--, (20)		Not selected for study		
d) *Salmo (Parasalmo) masou macrostomus*			Not selected for study				Not selected for study				Not selected for study			(10)	10-30, (10)	10-30, (10)	(10)
Criterion		20	20	20	20	20	30	30	20	20	30	30	20	10	10	10	10
Note		For a) fish, in spring and summer, value for spawn is chosen. The lower one of (20) is set. For a) fish, in autumn and winter, no value is given. Then, value for spring and summer is used for this case. For b) fish, in summer, two values for spawn is given. The lower one is same of (5) for both case, and is chosen. For b) fish, in spring and winter, only upper one for fry is given. Then, value for summer is used for this case. For b) fish, in autumn, no value is given. Then, value for summer is used for this case. Criterion Value Determination Compare the values of fish a) and b) for each season. The bigger (stricter) value is chosen.				For a) and b) fish, it is same with B case. For c) fish, in summer and autumn, two values of 20 for maturated and 30-60 for spawn is given. Select the bigger (stricter) case of 30-60, and the lower one of 30 is chosen. For c) fish, in winter and spring, no value is given. Because fish c) lives all the year, and the value for maturated of 20 is used for this case. Criterion Value Determination Compare the values of fish a), b) and c) for each season. The bigger (stricter) value is chosen.				For a) and c) fish, it is same with C case. Criterion Value Determination Compare the values of fish a) and c) for each season. The bigger (stricter) value is chosen.				For d) fish, in summer and autumn, value for spawn is chosen. The lower one of (10) is set. For d) fish, in winter and spring, no value is given. Then, value for summer and autumn is used for this case. Criterion Value Determination Only the value for d) fish is given, and this is chosen.			

(2) Water Velocity (cm/s)

Sections of River	A	B				C				D				E			
Season	-	spring	summer	autumn	winter	spring	summer	autumn	winter	spring	summer	autumn	winter	spring	summer	autumn	winter
Fish Species																	
a) *Leuciscus (Tribolodon) hakonensis*		(30)-70	(30)-70	(30)	(30)	(30)-70	(30)-70	(30)	(30)	(30)-70	(30)-70	(30)	(30)		Not selected for study		
b) *Zacco platypus*		--10, (5)	5-30, (5)	(5)	--10, (5)	--10, (5)	(5)-30	(5)	--10, (5)		Not selected for study				Not selected for study		
c) *Placoglossus altivelis altivelis*			Not selected for study			(40)-60	30-70,(60)-120	30-70,(60)-120	3, (3)	(40)-60	30-70,(60)-120	30-70,(60)-120	3, (3)		Not selected for study		
d) *Salmo (Parasalmo) masou macrostomus*			Not selected for study				Not selected for study				Not selected for study			(30)	--30, (30)	--30, (30)	(30)
Criterion		30	30	30	30	40	60	60	30	40	60	60	30	30	30	30	30
Note		For a) fish, in spring and summer, value for spawn is chosen. The lower one of (30) is set. For a) fish, in autumn and winter, no value is given. Then, value for spring and summer is used for this case. For b) fish, in summer, values for spawn 5-30 is given. The lower one of (5) is chosen. For b) fish, in spring and winter, only upper one for fry is given. Then, value for summer is used for this case. For b) fish, in autumn, no value is given. Then, value for summer is used for this case. Criterion Value Determination Compare the values of fish a) and b) for each season. The bigger (stricter) value is chosen.				For a) and b) fish, it is same with B case. For c) fish, in summer and autumn, two values of 30-70, and 60-120 for spawn is given. Select the bigger (stricter) case of 60-120, and the lower one of 60 is chosen. For c) fish, in spring, value of 40-60 is given for fry. The lower one of (40) is chosen. Criterion Value Determination Compare the values of fish a), b) and c) for each season. The bigger (stricter) value is chosen.				For a) and c) fish, it is same with C case. Criterion Value Determination Compare the values of fish a) and c) for each season. The bigger (stricter) value is chosen.				For d) fish, in summer and autumn, value for spawn is chosen. The value of (30) is set. For d) fish, in winter and spring, no value is given. Then, value for summer and autumn is used for this case. Criterion Value Determination Only the value for d) fish is given, and this is chosen.			

(3) Criterion for Flow (m^3/s) = Water Depth (cm) * Water Velocity (cm/s) * Water Width (m)(=W) / 10,000 = The Value Shown Below * W

Sections of River	A	B				C				D				E			
Season	-	spring	summer	autumn	winter	spring	summer	autumn	winter	spring	summer	autumn	winter	spring	summer	autumn	winter
Criterion		0.06W	0.06W	0.06W	0.06W	0.08W	0.18W	0.18W	0.06W	0.08W	0.18W	0.18W	0.06W	0.03W	0.03W	0.03W	0.03W

Table I-4 ENVIRONMENTALLY CRITICAL PROJECTS (ECPs)

A. Heavy Industries	1. Non-Ferrous Metal Industries	
	2. Iron and Steel Mills	
	3. Smelting Plants	
	4. Petroleum and Petri-Chemical Indutries, including Oil and Gas	
B. Resource Extractive Indutries	1. Major Mining and Quarrying Projects	
	2. Forestry Projects	# Logging, # Major Wood Processing Projects, # Forest Occupancy (Occupancy of people residing within public forests for livelihood purposes and associated management projects.) # Introduction of Flora & Fauna in Public/Private Forests # Extraction of Mangrove Products, # GrazingProjects
	3. Fishery Projects	# Dikes for/and fishpond development projects
C. Infrastructure Projects	1. Major Dams	This shall refer to all impoudment structures and appurtenances with storage volumes equal to or exceeding 20 million cubic meters.
	2. Major Power Plants	This shall refer to power generating plants utilizing, or are run by, fossil fuels, geothermal resources, the nuclear fission process, natural river discharge, pondage or pump storage. This classification shall include all nuclear power plants, all geo-thermal power plants, thermal power plants with rated capacities equal to or exceeding 10 megawatts and hydroelectric power plants with rated capacities equal to or exceeding 6 megawatts.
	3. Major Reclamation Projects	This shall refer to projects which involve the filling or draining of areas (foreshore, marshes, swanps, lakes, rivers, etc) to or exceeding 1ha
	4. Major Roads and Bridges	This shall refer to the construction of all natioanl and provincial roads and bridges and any significant extension or improvement thereof which will: a) Traverse any highly developed urban area(s); b) Affect the hydrology of the traversed area(s); and c) Substantially increase or impede traffic flow.
D. Golf Course Projects		

Table I-5 ENVIRONMENTAL CRITICAL AREAS (ECAs)

A. All areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries.

B. Areas set aside as aesthetic potential tourist spots.

C. Areas which constitute the habitat for any endangered or threatened species of indigenous Philippines wildlife (flora and Fauna).

D. Areas of unique historic archaeological or scientific interest.

E. Areas which are traditionally occupied by cultural communities or tribes (indigenous cultural communities).

F. Areas frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.)

G. Areas with critical slopes.

H. Areas classified as prime agricultural lands.

I. Recharged areas of aquifers — Recharged areas of aquifers shall refer to sources of water replenishment where rainwater or seepage actually enters the auifers. Areas under this classification shall be limited to all local or non-national watershed and geothermal reservationas.

J. Water bodies characterized by one or any combination of the following conditios:

1. tapped for domestic purposes
2. within the contorolled and/or protected areas declared by appropriate authrities
3. which support wildlife and fishery activities.

K. Mangrove areas characterized by one or any combination of the following conditions:

1. with primary pristine and dense young growth
2. adjoining mouth of major river systems
3. near or adjoining to traditional productive fry or fishing grounds
4. which act as natural buffers against shore erosion, strong winds and storm floods
5. on which people are dependent for their livelihood

L. Coral reefs characterized by one or any of the combination of the following conditions:

1. with 50% and above live coralline cover
2. spawning and nursery grounds for fish
3. which act as natural breakwater of coastlines

Table I-6 CLASSIFICATION OF WATERS

1. FRESH SURFACE WATERS

Classification	Beneficial Use
Class AA	**Public Water Supply Class I.** Waters having watersheds which are uninhavited and otherwise protected and which require only approved disinfection in order to meet the National Standards for Drinking Water (NSDW) of the Philippines.
Class A	**Public Water Supply Class II.** Sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the NSDW.
Class B	**Recreational Water Class I.** Waters for primary contact recreation such as bathing, swimming, skin diving, etc. particularly those designated for tourism purposes.
Class C	1. **Fishery Water** for the propagation and growth of fish and other aquatic resources. 2. **Recreational Water Class II** (Boating, etc.) 3. **Industrial Water Supply Class I** (for manufacturing processes after treatment
Class D	1. *For agriculture, irrigation, livestock watering, etc.* 2. **Industrial Water Supply Class II** (e.g. cooling, etc.) 3. Other inland waters, by their quality, belong to this classification

2. COASTAL AND MARINE WATERS

Classification	Beneficial Use
Class SA	1) Waters suitable for the propagation, survival and harvesting of shell fish for commercial purposes. 2) Tourist zones and national marine parks and reserves established under Presidential Proclamation No.1801 existing laws and/or declared as such by the appropriate government agency. 3) Coral reef parks and reserves designated by law and concerned authorities.
Class SB	1) **Recreational Water Class I** (Areas regularly used by the publixc for batuing, swimming, skinmdiving, etc.) 2) **Fishery Water Class I** (Spawning areas for Chanos-chanos or "Bangus" and similar species.
Class SC	1) **Recreational Water Class II** (e.g. boating, etc.) 2) **Fishery Water Class II** (Commercial and sustenance fishing) 3) Marshy and/or mangrove areas declared as fish and wildlife sanctuaries.
Class SD	1) ***Industrial Water Supply Class II*** *(e.g. cooling, etc.)* 2) Other coastal and marine waters, by their quality, belong to this classification.

Souce:DENR

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (1/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997					
Name of River		Location	Region	Class	Year
1 Abra		Ilocos Sur	I	A	1993
2 Agno	Lower	Pangasinan	I	C	1993
3 Amburayan		Ilocos Sur-La Union	I	C	1993
4 Aringay		La Union	I	B	1993
5 Bacarra-Vintar		Ilocos Norte	I	A	1993
6 Balincaguing		Pangasinan	I	B	1993
7 Barroro		La Union	I	A	1993
8 Bauang	Lower	La Union	I	C	1993
9 Bonga		Ilocos Norte	I	A	1993
10 Buaya		Ilocos Sur	I	A	1993
11 Dagupan	Upper	Pangasinan	I	A	1993
Dagupan	Lower	Pangasinan	I	C	1993
12 Laoag		Ilocos Norte	I	A	1993
13 Patalan		Pangasinan	I	C	1993
14 Abulug		Kalinga Apayao	CAR	C	1993
15 Agno	Upper	Benguet	CAR	A	1993
16 Amburayan	Upper	Benguet	CAR	B	1994
17 Alimit		Mt. Province	CAR	C	1993
18 Ambalanga		Benguet	CAR	C	1993
19 Bokod		Benguet	CAR	A	1993
20 Bued*		Benguet	CAR	C	1995
21 Ibulao		Mt. Province	CAR	C	1993
22 Lamut		Mt. Province	CAR	C	1993
23 Naguillan	Upper	Benguet	CAR	A	1975
Naguillan	Lower	La Union	I	C	1975
24 Tanudan		Kalinga Apayao	CAR	A	1993
25 Tineg		Abra	CAR	B	1993
26 Galiano	Upper	Tuba Benguet	CAR	B	1993
27 Chico	Upper	Mt. Province	CAR	B	1994
28 Abuan		Isabela	2	C	1993
29 Balasig		Isabela	2	D	1993
30 Cabicungan	Upper	Cagayan	2	B	1994
Cabicungan	Lower	Cagayan	2	C	1994
31 Cagayan	Upper	Quezon	2	A	1993
Cagayan	Lower	Cagayan	2	C	1993
32 Diadi		Isabela	2	C	1993
33 Disabungan		Isabela	2	C	1993
34 Ganano		Isabela	2	C	1993
35 Ilagan		Isabela	2	C	1993
36 Linao		Cagayan	2	C	1993
37 Magat		Isabela	2	C	1993
38 Matuno		Nueva Vizcaya	2	C	1993
39 Palanan-Pinacanauan		Isabela	2	D	1993
40 Parred		Cagayan	2	C	1993
41 Pinacanauan		Isabela	2	D	1993

Note: Preliminary Classification

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (2/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997					
Name of River		Location	Region	Class	Year
42 Tangatan*		Cagayan	2	C	1995
43 Sta. Fe		Nueva Vizcaya	2	C	1993
44 Siffu		Isabela	2	C	1993
45 Tamauni		Isabela	2	D	1993
46 Tuguegarao	Upper	Cagayan	2	B	1993
Tuguegarao	Lower	Cagayan	2	C	1993
47 Aguang		Nueva Ecija	2	A	1993
48 Angat	Upper	Bulacan	3	B	1993
Angat	Lower	Bulacan	3	C	1993
49 Bagac Bay		Bataan	3	SB	1993
50 Balagtas		Bulacan	3	C	1975
51 Bamban		Tarlac	3	A	1993
52 Bambang		Bulacan	3	C	1975
53 Bancal		Zambales	3	C	1993
54 Binuangan		Bulacan	3	C	1975
55 Bocaue	Upper	Bulacan	3	A	1975
Bocaue	Lower	Bulacan	3	C	1975
56 Bucao		Zambales	3	B	1993
57 Bulacan		Bulacan	3	C	1975
58 Cabigo Point		Bataan	3	SC	1993
59 Calumpit		Bulacan	3	C	1975
60 Camiling		Tarlac	3	C	1993
61 Eguia		Zambales	3	D	1933
62 Guiguinto		Bulacan	3	C	1975
63 La Paz		Tarlac	3	A	1993
64 Lawis		Zambales	3	B	1993
65 Looc Bay		Bataan	3	SB	1993
66 Mabayuan		Zambales	3	A	1993
67 Marilao	Upper	Bulacan	3	A	1975
Marilao	Lower	Bulacan	3	C	1975
68 Meycauayan		Bulacan	3	C	1975
69 Napot Point		Bataan	3	SC	1993
70 Nayom*	Upper	Zambales	3	B	1995
Nayom*	Lower	Zambales,	3	C	1995
Cagayan	Lower	Cagayan	2	C	1993
71 O'Donnel		Tarlac	3	C	1993
72 Pamatawan	Upper	Zambales	3	B	1993
Pamatawan	Lower	Zambales	3	C	1994
73 Pampanga	Upper	Nueva Ecija	3	A	1975
Pampanga	Lower	Pampanga	3	C	1975
74 Pantabangan		Nueva Ecija	3	C	1993
75 Pantal		Zambales	3	C	1993
76 Parongking		Zambales	3	C	1993
77 Polo		Bulacan	3	C	1975
78 Porac	Upper	Pampanga	3	A	1993

Note: Preliminary Classification

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (3/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997

	Name of River		Location	Region	Class	Year
78	Porac	Lower	Pampanga	3	C	1993
79	Rio Chico		Tarlac	3	C	1993
80	San Fernando		Pampanga	3	C	1975
81	San Juan		Bataan	3	C	1975
82	Sinocalan		Zambales	3	C	1993
83	Sorabia		Tarlac	3	A	1993
84	Sta. Rita	Upper	Zambales	3	A	1993
	Sta. Rita	Lower	Zambales	3	C	1993
85	Sto. Tomas		Zambales	3	A	1993
86	Tarlac		Tarlac	3	C	1993
87	Banadero		Laguna	4	C	1975
88	Balete		Oriental Mindoro	4	C	1993
89	Bansud		Oriental Mindoro	4	C	1993
90	Batangas Bay		Batangas	4	SC	1993
91	Baroc		Oriental Mindoro	4	C	1993
92	Binambang		Batangas	4	C	1975
93	Boac		Marinduque	4	C	1975
94	Bongabong		Oriental Mindoro	4	D	1993
95	Bulalacao		Oriental Mindoro	4	C	1993
96	Buso-buso		Rizal	4	C	1993
97	Butas		Oriental Mindoro	4	C	1993
98	Caguray		Occidental Mindoro	4	A	1993
99	Dacanlao		Batangas	4	C	1993
100	Dumacaa		Quezon	4	C	1993
101	Iyam		Quezon	4	C	1993
102	Kalumpang		Batangas	4	C	1993
103	Katubusan		Palawan	4	C	1993
104	Lagnas		Quezon	4	C	1993
105	Lumintao		Occidental Mindoro	4	A	1993
106	Mag-asawang Tubig		Oriental Mindoro	4	A	1993
107	Magbando		Occidental Mindoro	4	A	1993
108	Malaking ilog		Tiaong, Quezon	4	C	1993
109	Malatgao		Palawan	4	A	1993
110	Malaylay-Buco		Oriental Mindoro	4	A	1993
111	Mamburao		Occidental Mindoro	4	A	1993
112	Masin		Quezon	4	C	1993
113	Mogpog		Marinduque	4	C	1975
114	Molino		Cavite	4	C	1993
115	Pagbahan		Occidental Mindoro	4	C	1993
116	Pagsanjan		Laguna	4	B	1993
117	Palico		Batangas	4	C	1975
118	Pandanan		Palawan	4	C	1993
119	Pansipit		Batangas	4	C	1993
120	Puerto Galera (Mulle Bay)		Oriental Mindoro	4	SA	1996
121	Pula		Oriental Mindoro	4	C	1993

Note: Preliminary Classification

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (4/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997

	Name of River		Location	Region	Class	Year
122	Pulang Tubig		Oriental Mindoro	4	A	1993
123	Rosario		Lobo, Batangas	4	A	1993
124	Sumagui		Oriental Mindoro	4	C	1993
125	San Cristobal		Laguna	4	C	1993
126	San Juan	Upper	Batangas	4	A	1993
	San Juan	Lower	Laguna		C	1993
127	San Pedro		Laguna	4	C	1975
128	Sta. Cruz		Laguna	4	C	1975
129	Sta. Rosa		Laguna	4	B	1993
130	Sapang Baho		Quezon	4	C	1993
131	Tayuman		Palawan	4	C	1993
132	Teretian		Palawan	4	C	1993
133	Tigas		Laguna	4	A	1993
134	Ylang-Ylang	Upper	Cavite	4	B	1980
	Ylang-Ylang	Lower	Cavite	4	C	1980
135	Bicol		Camarines Sur	5	A	1993
136	Bombon		Albay	5	A	1993
137	Cawayan		Sorsogon	5	B	1994
138	Dact	Upper	Camarines Norte	5	A	1993
	Dact	Lower	Camarines Norte	5	C	1993
139	Gumaus		Camarines Norte	5	D	1993
140	Labo	Upper	Camarines Norte	5	A	1993
	Labo	Lower	Camarines Norte	5	C	1993
141	Lagonoy		Camarines Sur	5	C	1993
142	Malaguit		Camarines Norte	5	C	1993
143	Naga		Camarines Sur	5	C	1993
144	Quinale		Albay	5	C	1993
145	Pawili		Camarines Sur	5	C	1993
146	Salog River*	Upper	Sorsogon	5	B	1995
	Salog River*	Lower	Sorsogon	5	C	1995
147	San Francisco		Albay	5	B	1996
148	Tagas		Albay	5	C	1994
149	Talisay	Upper	Camarines Norte	5	A	1993
	Talisay	Lower	Camarines Norte	5	C	1993
150	Tayli		Albay	5	A	1993
151	Yawa		Albay	5	A	1975
152	Aklan	Upper	Aklan	6	A	1993
	Aklan	Lower	Aklan	6	B	1993
153	Alacaygan		Iloilo	6	C	1993
154	Alugon		Capiz	6	C	1975
155	Bago		Negros Occidental	6	C	1993
156	Balantias		Iloilo	6	B	1993
157	Barotac		Iloilo	6	B	1993
158	Batiano		Iloilo	6	C	1994
159	Cairnan	Upper	Antique	6	A	1993

Note: Preliminary Classification

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (5/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997

	Name of River		Location	Region	Class	Year
159	Cairnan	Lower	Antique	6	B	1993
160	Calajunan Creek		Iloilo	6	C	1996
161	Cangaranan		Antique	6	A	1993
162	Guimbal		Iloilo	6	B	1993
163	Himoga-an		Negros Occidental	6	C	1993
164	Ilog	Upper	Negros Occidental	6	A	1975
	Ilog	Lower	Negros Occidental	6	C	1975
165	Jalaur	Upper	Iloilo	6	A	1975
	Jalaur	Lower	Iloilo	6	C	1975
166	Jaro - Agaman		Iloilo	6	C	1993
167	Jaro	Upper	Iloilo	6	A	1993
	Jaro	Lower	Iloilo	6	B	1993
168	Malihao*	Upper	Negros Occidental	6	B	1995
	Malihao*	Lower	Negros Occidental	6	C	1995
169	Palawan		Antique	6	A	1993
170	Panay		Capiz	6	A	1993
171	Pontevedra		Negros Occidental	6	C	1975
172	Salamanca		Negros Occidental	6	C	1975
173	Sicaba		Negros Occidental	6	C	1975
174	Sibalom*		Iloilo - Antique	6	B	1996
175	Sibaloin	Upper	Antique	6	A	1993
176	Sipalay	Upper	Negros Occidental	6	A	1975
	Sipalay	Lower	Negros Occidental	6	C	1975
177	Tumagbok	Upper	Iloilo	6	A	1994
	Tumagbok	Lower	Iloilo	6	C	1994
178	Abatan*	Upper	Bohol	7	A	1995
	Abatan*	Middle	Bohol	7	B	1995
	Abatan*	Lower	Bohol	7	C	1995
179	Argao	Upper	Cebu	7	A	1994
	Argao	Lower	Cebu	7	B	1994
180	Balamban	Upper	Cebu	7	A	1994
	Balamban	Lower	Cebu	7	B	1994
181	Banica*	Upper	Negros Oriental	7	A	1996
	Banica*	Middle	Negros Oriental	7	B	1996
	Banica*	Lower	Negros Oriental	7	C	1996
182	Danao*	Upper	Cebu	7	A	1995
	Danao*	Lower	Cebu	7	B	1995
183	Guindarohan	Upper	Cebu	7	A	1996
	Guindarohan	Lower	Cebu	7	C	1996
184	Loboc*		Bohol	7	B	1995
185	Luyang	Upper	Cebu	7	A	1994
	Luyang	Lower	Cebu	7	C	1994
186	Manaba*	Upper	Bohol	7	A	1996
	Manaba*	Middle	Bohol	7	B	1996
	Manaba*	Lower	Bohol	7	C	1996

Note: Preliminary Classification

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (6/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997					
Name of River		Location	Region	Class	Year
187 Ocoy*	Upper	Negros Oriental	7	A	1996
Ocoy*	Lower	Negros Oriental	7	B	1996
188 Panamangan		Negros Oriental	7	C	1993
189 Sapang Daku	Upper	Cebu	7	A	1994
Sapang Daku	Lower	Cebu	7	C	1994
190 Tanjay		Negros Oriental	7	B	1993
191 Bao		Leyte	8	A	1993
192 Taft		Samar	8	C	1993
193 Tigbao*		Leyte	8	C	1996
194 Mercedes*	Upper	Zamboanga	9	B	1996
Mercedes*	Lower	Zamboanga		C	1996
195 Tumaga*	Upper	Zamboanga	9	A	1995
Tumaga*	Middle	Zamboanga	9	B	1995
Tumaga*	Lower	Zamboanga	9	C	1995
196 Adgawan		Agusan del Sur	10	A	1993
197 Agusan*	Upper	Misamis Oriental	10	A	1996
Agusan*	Lower	Misamis Oriental	10	C	1996
198 Agusan*		Agusan del Norte	10	C	1993
199 Alae*	Upper	Bukidnon	10	A	1996
Alae*	Lower	Bukidnon	10	C	1996
200 Balatocan		Misamis Oriental	10	A	1993
201 Bigaan*	Upper	Misamis Oriental	10	A	1995
Bigaan*	Lower	Misamis Oriental	10	C	1995
202 Cabadbaran		Agusan del Norte	10	A	1993
203 Cagayan		Misamis Oriental	10	A	1993
204 Clarin		Misamis Occidental	10	A	1993
205 Cabulig		Misamis Oriental	10	A	1993
206 Cugman	Upper	Misamis Oriental	10	A	1994
Cugman	Lower	Misamis Oriental	10	C	1994
207 Gibong		Agusan del Sur	10	A	1993
208 Gingoog		Misamis Oriental	10	A	1993
209 Gingoog Bay		Misamis Occidental	10	SC	1993
210 Ihawan		Misamis Oriental	10	A	1993
211 Iponan		Misamis Oriental	10	A	1993
212 Odiongan		Misamis Oriental	10	A	1993
211 Ojot		Agusan del Norte	10	A	1993
214 Oroquieta		Misamis Occidental	10	A	1993
215 Magallanes		Agusan del Norte	10	C	1993
216 Magpayang		Misamis Oriental	10	A	1993
217 Magsaysay		Misamis Oriental	10	A	1993
218 Naawan		Misamis Oriental	10	A	1993
219 Palilan*	Upper	Misamis Oriental	10	A	1993
Palilan*	Lower	Misamis Oriental	10	C	1993
220 Polangi		Bukidnon	10	A	1993
221 Sawaga		Bukidnon	10	A	1993

Note: Preliminary Classification

Table I-7 UPDATED LIST OF CLASSIFIED WATER BODIES OF MARCH 1997 (7/7)

UPDATED LIST OF CLASSIFIED WATER BODIES AS OF MARCH 1997					
Name of River		Location	Region	Class	Year
222 Simulao		Agusan del Sur	10	A	1993
223 Solana		Misamis Oriental	10	A	1993
224 Surigao		Surigao del Norte	10	A	1993
225 Tagolo-an		Misamis Oriental	10	A	1993
226 Tubay		Agusan del Norte	10	A	1993
227 Umalag*	Upper	Misamis Oriental	10	A	1995
Umalag*	Lower	Misamis Oriental	10	C	1995
228 Wawa		Agusan del Norte	10	A	1993
229 Davao*	Upper	Davao City	11	A	1995
Davao*	Lower	Davao City	11	B	1995
230 Digos*	Upper	Davao del Sur	11	B	1995
Digos*	Lower	Davao del Sur	11	C	1995
231 Hijo-Masara*		Davao del Norte	11	D	1995
232 Lasang*		Davao City	11	B	1995
233 Padada*		Davao del Sur	11	D	1995
234 Sibulan*	Upper	Davao del Sur	11	A	1995
Sibulan*	Lower	Davao del Sur	11	B	1995
235 Talomo*		Davao City	11	B	1995
236 Tagum*		Davao del Norte	11	D	1995
237 Tuganay*		Davao del Norte	11	B	1995
238 Agus		Lanao del Norte	12	C	1993
239 Allah*		Sultan Kudarat	12	B	1995
240 Libungan*		Cotabato	12	D	1996
241 Marble	Upper	Cotabato	12	B	1994
Marble	Lower	Cotabato	12	D	1994
242 Matingao		Cotabato	12	B	1994
243 Nuangan*		Cotabato	12	D	1996
244 Panguil Bay*		Lanao del Norte	12	SC	1996
245 Polangi*		Cotabato	12	D	1995
246 Rio Grande de Mindanao*		Cotabato	12	C	1995
247 Marikina	Upper	Metro Manila	NCR	A	1975
Marikina	Lower	Metro Manila	NCR	C	1975
248 Paranaque-Zapote		Metro Manila	NCR	C	1975
249 Pasig		Metro Manila	NCR	C	1975
250 San Juan		Metro Manila	NCR	C	1975
251 Tullahan-Tenejeros		Metro Manila	NCR	C	1975

Note: Preliminary Classification

Table I-8 AREA DISTRIBUTION OF EROSION CLASSES BY ISLAND GROUPING, 1993

(Unit: million hectares)

Island Grouping	Erosion Class										Total	
	No Apparent		Slight		Moderate		Severe		Unclassified			
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
Luzon	4.1	57.7	4.1	46.6	4.1	48.2	1.7	32.7	0.2	50	14.2	(47)
Visayas	1.2	16.9	1.7	19.3	1.5	17	1.1	21.2	0.1	25	5.6	(19)
Mindanao	1.8	25.4	3	34.1	2.9	34.1	2.4	46.1	0.1	25	10.2	(34)
Philippines	7.1	23.7	8.8	29.4	8.5	28.3	5.2	17.3	0.4	1.3	30	(100)

Source: Bureau of Soils and Water Management - Department of Agriculture

Note:

No apparent erosion	=	Sedimentation, deposition
Slight erosion	=	Formation of incipient erosion, mainly sheet and rills and tiny incision along trails and creeks (1 rill/100 m.); no gully
Moderate erosion	=	Occurrence of a considerable numbre of well-defined rills and gullies along waterways and slope breaks on cultivated land (1-4 rills/100 m; 24 gullies/100m.);
Severe erosion	=	Dominance of rock outcrops and 80% of parent materials exposed with patches of thin veneer of grass; an intensity of 74 gullies/100 m distance across slope and landslides providing special features around steep slopes
Unclassified erosion	=	Quarry, river wash and open pit mines

Table I-9 FOREST LANDS BY REGION, 1995

(Unit: hectares)

Year	Region	Unclassified Forest	Classified Forest							Total Forest Lands
			Total	A	B	C	D	E	F	
1995	CAR	21,135	1,467,577	804,795	655,321	6,907	554	-	-	1,488,712
	1	33,155	440,802	226,846	199,140	12,999	288	923	606	473,957
	2	146,305	1,577,389	209,288	1,331,281	26,388	412	8,931	1,089	1,723,694
	3	26,874	744,300	166,104	422,729	32,780	117,019	804	4,864	771,174
	4	175,048	2,371,472	455,395	831,455	1,029,501	3,835	45,278	5,008	2,546,520
	5	29,873	511,316	69,939	412,996	25,276	-	63	3,042	541,189
	6	1,606	611,923	135,344	428,939	23,505	-	235	23,900	613,529
	7	69,555	466,364	49,407	397,450	15,054	4	114	4,335	535,919
	8	38,925	1,080,529	51,508	1,018,238	4,108	176	862	5,637	1,119,454
	9	26,871	810,611	424,924	300,288	2,607	46	2,611	10,135	837,482
	10	50,732	1,715,111	314,816	1,326,965	55,734	-	6,209	11,387	1,765,843
	11	116,774	1,840,061	217,841	1,546,706	53,643	-	19,127	2,744	1,956,835
	12	49,631	840,815	122,346	608,674	20,552	7,996	80,789	458	890,446
	ARMM	94,673	523,329	24,359	465,684	31,943	-	-	1,343	618,002
	PHIL	881,157	15,001,599	3,272,912	10,015,886	1,340,330	130,330	165,746	75,548	15,882,756

Source: Forest Management Bureau, NAMRIA

Note:
A = Established forest reserves
B = Established timberlands
C = National Parks
D = Military and Naval reservations
E = Civil reservations
F = Fishponds

Table I-10 FOREST TYPE, 1990-1994

(Unit: hectares)

Year	Forest Type											
	Total		Dipterocarp		Pine		Submarginal		Mossy		Mangrove	
	Area	%	Area	%	Area	%	Area	%	Area	%	Area	%
1990	6,158,800	100	4,148,800	67.9	236,400	3.7	527,400	8.5	1,113,700	18	132,500	2.1
1991	6,015,400	100	4,029,200	67	235,100	4	519,500	8.6	1,102,400	18.3	129,200	2.1
1992	5,900,200	100	3,936,800	66.7	233,900	4	511,700	8.7	1,091,500	18.5	126,300	2.1
1993	5,787,458	100	3,846,658	66.5	232,700	4	503,900	8.7	1,080,800	18.7	123,400	2.1
1994	5,686,055	100	3,767,555	66.2	231,500	4.1	496,500	8.7	1,070,000	18.8	120,500	2.1

Source: Forest Management Bureau

Table I-11 DEFORESTATION BY REGION, 1990-1995

(Unit: hectares)

Region	1990 Causes						1991 Causes						1992 Causes					
	Kaingin	Illegal Logging	Forest Fire	Others*	Total		Kaingin	Illegal Logging	Forest Fire	Others*	Total		Kaingin	Illegal Logging	Forest Fire	Others*	Total	
	Area	Area	Area	Area	Area	%	Area	Area	Area	Area	Area	%	Area	Area	Area	Area	Area	%
CAR	0	0	2,648.00	51	2,699.00	17.36	0	0	604.93	0	604.93	8.36	0	0	2,429.19	0	2,429.19	4.73
1	29	0	833	489	1,351.00	0.9	44.97	0	398.01	458.4	901.38	12.46	0	0	1,136.11	0	1,136.11	2.21
2	0	0	2,256.00	468	2,724.00	18	0	0	303.45	0	303.45	4.2	0	0	2,886.90	0	2,886.90	5.62
3	0	0	2,792.00	0	2,792.00	18	270	3	2,706.00	0	2,979.95	41.2	0	0	9,937.83	0	9,937.83	19.34
4	0	0	839.99	84	923	6	87	0	1,694.00	0	1,781.00	24.62	34.75	0	368.5	0	368.5	0.79
5	0	0	0	0	0	0	12	26.6	0	0	38.6	0.05	0	0	459.5	0	459.5	0.89
6	89	15	439	1,403.00	1,946.00	13	81.25	0	77.5	72	230.75	3.19	0	0	2,259.36	0	2,259.36	4.4
7	22	0	295	196	513	3.3	5	22	45	0	72	0.09	34.14	0	2,718.10	0	2,718.10	5.36
8	0	0	283	0	283	2	0	0	0	0	0	0	0	0	551.48	0	551.48	1.07
9	82	29	2	0	113	0.07	72.01	0	36.13	0	108.14	2	17	0	975.39	0	975.39	1.93
10	486	45	1,495.00	177	2,193.00	14.1	0	0	0	0	0	0	0	0	11,392.24	0	11,392.24	22.17
11	12	0	0	0	12	0.01	187	20	6	0	213	2	0	0	14,712.17	0	14,712.17	28.62
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,483.61	0	1,483.61	2.87
ARMM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHIL.	720	89	11,872.00	2,868.00	15,549.00	100	759.23	71.6	5,871.02	530.4	7,232.25	100	85.89	0	51,310.38	0	51,398.27	100

(Unit: hectares)

Region	1993 Causes						1994 Causes						1995 Causes					
	Kaingin	Illegal Logging	Forest Fire	Others*	Total		Kaingin	Illegal Logging	Forest Fire	Others*	Total		Kaingin	Illegal Logging	Forest Fire	Others*	Total	
	Area	Area	Area	Area	Area	%	Area	Area	Area	Area	Area	%	Area	Area	Area	Area	Area	%
CAR	0.00	0	1,438.92	0	1,438.92	8.06	0	0	205.27	0	205.27	0.2	355	7.86	1,479.07	0	1,841.93	7.64
1	0.00	0	1,032.83	0	1,032.83	6	0	0	1,850.56	720.4	2,570.96	25	24.73	0	1,678.96	720.4	1,703.69	7.07
2	0.00	0	3,682.68	0	3,682.68	20.62	0	0	905.3	0	905.3	9	25.11	0	4,296.65	0	4,321.76	17.93
3	0.00	0	4,842.49	0	4,842.49	27.11	248.7	0	1,809.84	96.85	2,155.39	21	0	0	1,808.94	12	1,820.94	7.56
4	0.00	0	1,946.56	15.1	2,017.41	11.29	90.08	107.16	305	135	637.24	6.2	0.8	1	14.15	2,238.40	2,254.35	9.35
5	0	0.00	374	2,226.79	2,601.04	14.56	5.23	0	108.74	0	113.97	1.1	3.31	0	0	10,993.00	10,996.31	45.62
6	0.00	0	1,124.17	0	1,124.17	6.3	4.5	0.2	0	0	4.7	0.01	0	0	183.54	0	183.54	0.76
7	0	0	166.4	0	166.4	0.09	129.15	0	555.3	0	584.45	7	0	0	432.8	70.55	503.35	2.09
8	0	0	415.41	0	415.41	2.33	11.32	0	99.3	33.91	144.53	1.4	0	0	43	0	43	0.18
9	0	0	15.9	0	50.24	0.03	11.91	0	5	0	16.91	0.01	0	0	204	0	204	0.85
10	0	0	186.13	200	386.13	2.16	11.32	0	1,677.46	0	1,688.78	16.33	0	0	153.54	40	193.54	0.8
11	0	0	63.97	0	63.97	0.04	6.35	0	148	0	154.35	1.5	0	0	36.07	0	36.07	0.15
12	0	0	40.4	0	40.4	0.02	1,010.00	0	50	0	1,060.00	10.25	0	0	0	0	0	0
ARMM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHIL.	0.00	0.00	15,329.86	2,441.89	17,862.09	100	1,528.56	107.36	7,719.77	986.16	10,341.85	100	408.95	8.86	10,330.72	13,353.95	24,102.48	100

Source: Planning and Policy Studies Service, DENR

Table I-12 INITIAL COMPONENT OF THE NIPAS (1/15)
(1) Distribution of Proclaimed Watershed Reservations

BIOGEO-GRAPHIC ZONE		NAME OF PROTECTED AREA	MUNICIPALITY	PROVINCE	REGION	AREA (ha)	PROCLAMA-TION NO	PROCLAMATION DATE
B	1.	Ambuklao-Binga	Atoc, Bokod	Mt. Province	CAR	63,650	548	4/19/69
	2.	Ambuklao	Atoc, Bokod	Mt. Province	CAR	9,700	320	11/25/66
	3.	Lower-Agno	San Manuel, San Nicolas	Baguio City	CAR	33,304	2320	11/22/83
	4.	Busol	Baguio City and La Trinidad	Benguet	CAR	337	15	4/14/22
	5.	Marcos Highway	Tuba	Benguet	CAR	6,165	1754	6/22/78
C	1.	Infanta	Infanta	Quezon	4	394	158	2/13/67
	2.	Polillo	Polillo	Quezon	4	130	72	8/9/66
	3.	Malawin Spring	Guinayangan	Quezon	4	204	365	1/2/39
	4.	Lopez	Lopez	Quezon	4	418	566	6/22/40
	5.	Calabagan	Casiguran	Aurora	4	4,803	915	6/1/92
	6.	Dipaculao	Dipaculao	Aurora	4	1,786	116	6/10/87
	7.	Dinadiawan River	Dipaculao	Aurora	4	3,387	918	6/9/92
	8.	*Alabat*	*Alabat*	Quezon	4	698	356	9/18/87
	9.	Aurora	Baler	Quezon	4	430	34	2/4/36
	10.	Tibiang-Damagan-Isog	Quezon	Quezon	4	290	295	6/21/38
	11.	Anto River	Casiguran and Dilasag	Aurora	4	6,470	633	8/28/90
	12.	Taluytay River	Dinalungan	Aurora	4	3,626	370	12/3/90
	13.	Binahaan River	Pagbilao and Mauban	Quezon	4	465	735	5/29/91
	14.	Simbahan-Tatigas River	Dingalan	Quezon	4	2,266	905	5/22/92
	15.	Dibalo-Pingit-Zibah-Malayat	Baler and San Luis	Aurora	4	4,528	908	5/25/92
D	1.	Ilocos Norte Metro	Paoay	Ilocos Norte	1	2,934	733	9/7/34
	2.	Magsingal	Batac	Ilocos Norte	1	152	220	7/2/67
	3.	Kibungao Spring	Sinait	Ilocos Sur	1	47	410	10/2/51
	4.	Bighiga Spring	Narvacan	Ilocos Sur	1	135	431	8/16/39
	5.	Santa	Santa	Ilocos Sur	1	25	844	9/26/35
	6.	Lidlidda	Lidlidda	Ilocos Sur	1	1,228	79	9/17/36
	7.	Sta. Lucia	Sta. Lucia	Ilocos Sur	1	174	333	10/18/38
	8.	Naguilian	Naguilian	La Union	1	90	52	4/11/36
	9.	Tanap	Burgos	Ilocos Norte	1	41	83	2/1/71
	10.	Casecnan River	Dupax del Norte and del Sur	N. Vizcaya	2	65,219	135	8/11/87
	11.	Dupax	Dupax	N. Vizcaya	2	425	720	8/8/34
	12.	Bawa	Gonzaga and Lal-lo	Cagayan	2	8,955	108	5/13/87
	13.	Wangag	Gonzaga and Lal-lo	Cagayan	2	6,992	107	5/13/87
	14.	Angat Watershed Metro Water District	Montalban, San Jose, Norzagaray, San Rafael, *Infanta*	Rizal, Bulacan, Nueva Ecija	3	55,707	71	2/10/27
	15.	Pantabangan-Carranglan	Pantabagan, Carranglan	Nueva Ecija	3	84,500	561	5/21/68
	16.	Angat Watershed and Forest Range (Pilot)	Norzagaray, San Jose, Montalban	Bulacan, Rizal	3	6,600	391	4/30/68
	17.	Talavera	Sta. Fe, Carranglan, Lupao, San Jose	Nueva Ecija, N	3,2	37,295	350	12/12/38
	18.	Dona Remedios/General Tinio	Dona Remedios, General Tinio	Bulacan, Nueva Ecija	3	20,760	230	2/23/88
	19.	Marikina (Amended)	Antipolo, Montalban	Rizal	4	18,966	2480	1/29/86
	20.	Mulanay	Mulanay	Quezon	4	26	296	7/21/38
	21.	Buenavista	Mulanay	Quezon	4	356	166	6/27/37
	22.	Torrijos	Torrijos	Marinduque	4	105	463	4/6/32
	23.	Calauag	Calauag	Quezon	4	328	367	1/2/39
	24.	Catanduanes	Virac, Bato, San Miguel	Catanduanes	5	26,010	123	6/23/87
	25.	Lagonoy	Lagonoy	Camarines Sur	5	470	500	9/26/32
	26.	Bahican	Mabulao	Camarines Norte	5	41	592	6/23/33
	27.	Capalonga	Capalongan	Camarines norte	5	752	120	11/25/66
	28.	Abasig-Mategdon-Manang (Amendment)	Labo, San Lorenzo Ruiz & San Vicente	Camarines Norte	5	5,545	836	11/18/91
E	1.	Watershed Purposes of Mariveles (Palanas)	Mariveles	Bataan	3	325		2/25/19
	2.	Olongapo	Olongapo	Zambales	3	6,424	66	3/20/87
G	1.	Calatrava, San Andres, San Agustin	Calatrava, San Andres, San Agustin	Romblon	4	2,670	2,186	4/29/82
	2.	Pan-ay River	Tapaz	Capiz	6	4,350	599	6/28/90
	3.	Aklan River	Madalag & Libacao	Aklan	6	23,185	600	6/28/90
	4.	Jalaur River	Calinog	Iloilo	6	9,228	601	6/28/90
	5.	Ilog-Hilabangan	*Hinumaytan* & Kabankalan	Negros Occidental	6	10,211	602	6/28/90
	6.	Dalanas River	Barbaza	Antique	6	8,558	603	6/28/90
	7.	Bago River	Talisay, Murcia, Don Salvador, Benedicto, Calatrava	Negros Occidental	6	61,926	604	6/28/90
	8.	Tipulu-an Man-it River Watershed	Sibalom	Antique	6	7,737	605	6/28/90
H	1.	Loboc	Balahan, Bilar, Butuan	Bohol	7	19,410	450	12/23/53
	2.	Ahjawan-Canuhay-Anbongan River	Duero, Jagna	Bohol	7	3,630	891	3/20/92
	3.	Pan-as Falls Hay-ban	Catarman & Calbiyog City	Samar	8	7,832	318	12/15/67
	4.	Palompon	Palompon, Villaba	Leyte	8	2,392	212	1/29/88
	5.	Jicontol	Dolores & Canovid	Eastern Samar	8	7,300	882	3/26/92
I	1.	Mananga River (Amendment)	Talisay, Minglanilla	Cebu	7	6,823	581	5/29/92

Table I-12 INITIAL COMPONENT OF THE NIPAS (2/15)
(1) Distribution of Proclaimed Watershed Reservations

BIOGEO-GRAPHIC ZONE		NAME OF PROTECTED AREA	MUNICIPALITY	PROVINCE	REGION	AREA (ha)	PROCLAMA-TION NO.	PROCLAMATION DATE
K	1	Palawan Flora & Fauna	Puerto Princesa City	Palawan	4	4,926	2221	7/14/82
	2	Bacuit	Bacuit	Palawan	4	94	785	3/28/35
	3	Palawan Flora & Fauna (parcel 2)	Puerto Princesa City	Palawan	4	3,224	2425	11/22/85
M	1	Pasonanca	Zamboanga City	Zamboanga del Norte	9	10,560	199	12/17/87
	2	Buug	Buug	Zamboanga del Sur	ARMM	108	81	8/9/66
	3	Siocon	Siocon	Zamboanga del Norte	9	612	155	9/18/87
N	1	Mudela-Manupali	Lantapan & Pangantukan	Bukidnon	10	61,500		
	2	Mt. Malindang NP & Watershed*	Oroquieta, Ozamis City, Calamba, Bonifacio, Jimenez	Misamis Occidental and Zamboanga	10	53,262	R.A. 6266	6/19/71
	3	Mahiblican Falls	Talisayan	Misamis Oriental	10	72	51	4/11/36
	4	Mahogano	Cavayan	Misamis Oriental	10	136	470	4/29/32
	5	Surigao	Surigao City	Surigao del Norte	13	967	635	8/29/90
	6	Andanan River	Sibagat & Bayugan	Agusan del Sur	13	15,097	734	5/29/91
	7	Cabadbaran	Cabadbaran	Agusan del Norte	13	16,025	834	11/13/91
	8	Malagos	Guiguana	Davao	11	235	612	8/21/33
	9	Allah	Isulan, Banga, Surallan, Cianiba	South Cotabato	11	92,450	2455	9/24/85
	10	Sebu	Banga & Kianiba	South Cotabato	11	9,900	65	8/4/66
	11	Mati	Mati	Davao	11	890	222	7/26/67
	12	South Upi	South Upi	North Cotabato	11	1,894	65	6/20/87
	13	Libungao	Libungan and Alamada	Cotabato	12	52,820	563	5/3/90
	14	Lake Lanao		Lanao del Sur	ARMM	180,460	871	2/26/92
	15	Baganga	Baganga	Davao Oriental	11	114	195	12/8/87

REMARKS	Also entered in Table(s)	Site count	Area Count	Region
* Proclaimed both as National Park and Watershed Reserve	2	split	split	10

Source: Protected Areas and Wildlife Bureau 1996 December

Table I-12 INITIAL COMPONENT OF THE NIPAS (3/15)
(2) DISTRIBUTION OF SWAMP FOREST RESERVES
(Proclamation 2152, S. 1981)

BIO-GEOGRAPHIC ZONE	NAME	COORDINATES	LOCATION	REGION
1	Entire Province of Palawan		Palawan	4
2	Palanhangan River up to Maninluto River	Long.12° 42' 44" to 121° 44' 16" and Lat. 13° 58' 10" to 13° 59' 19"	Tayabas Bay, Quezon	4
	Pacong River up to Sandoval Point	Long.122° 19' 36" and Lat.13° 37' 48" ; Long.122° 17' 05" and Lat.13° 34' 26" ; Long.122° 17' 40" and Lat.13° 36' 28"		
	Paluy Point up to Mulanay River, Bondoc Peninsula	Long.122° 19' 36" and Lat.13° 34' 00" ;Long.122° 19' 41" and Lat.13° 337' 36" ;Long.122° 21' 57" and Lat.13° 33' 30" ;Long.122° 23' 50" and Lat.13° 31' 10"		
	Bondoc river in Aurora up to Panunutungan Point, Bondoc Peninsula	Long.122° 30' 00" and Lat.13° 14' 25" ; Long.122° 31' 50" and Lat.13° 20' 58"		
	San Andres to arena Point, Bondoc Peninsula	Long.123° 46' 00" and Lat.13° 15' 05"		
3	Islands of Polillo, Alabat, Cabalete, Jomalig Patnanonga, Kalutlot, Kalongkoosan, Pahasan, Calaboo, Icol and San Rafael		Lamon Bay, Quezon	4
4	Islands of Sta. Cruz and Salomaque		Marinduque	4
	Foreshoreline of Bo. Dapdap and alabo up to the mouth of Tiguan River	Long.122° 04' 12" and Lat.13° 27' 45" ; Long.122° 04' 27" and Lat.13° 28' 25" ; Long.122° 07' 01" and Lat.13° 29' 00"		
	Malinao Creek up to Salomaque Point	Long.122° 06' 42" and Lat.13° 23' 12" ; Long.122° 08' 42" and Lat.13° 22' 18"		
	Foreshoreline of Bo. Cabanyagan to the western side of Dating Bayan River in Calancan Bay	Long.121° 58' 20" to 122° 03' 00" and Lat. 13° 30' 28"		
5	Siburan Island?			4
6	Mangrove areas along the banks of Maniburao River	Long.120° 35' to 120° 36' 14" and Lat. 13° 13' 32" to 13° 14' 29"	Mindoro	4
	Buhagan river to Lagarum River, Naujan	Long.121° 17' 42" to 121° 20' 17" and Lat. 13° 17' 08" to 13° 20'		
	Mangrove areas in the banks of Batel Creek, Sta. Cruz	Long.120° 42' 35" to 120° 41' 05" and Lat. 13° 04' 14" to 13° 06' 29"		
	Salibayan Point up to the mouth of Bagong Sabang River	Long.120° 45' 31" to 120° 46' 00" and Lat. 12° 44' 38" to 12° 50' 34"		
	Bo. Labangan to Calidayuan Point, Ilin Island	Long.121° 02' 42" to 121° 04' 32" and Lat. 12° 18' 14" to 12° 17' 15"		
	Mangroves at the western side of Sukol River Bongabong	Long.121° 28' 21" to 121° 29' 26" and Lat. 12° 45' 00" to 12° 42' 20"		
	Mangroves at the western side of Casiliga River Island of Soguicay			
7	Mangrove areas from Del Pilar River to Palita Island, Bo. Salvacion and Dahican	Long.122° 23' 25" and Lat.14° 16' 08"	Camarines Norte	5
8	Tanglar Point to Bicol River	Long.122° 14' 24" and Lat. 13° 41' 42" ;Long.123° 07' 12" and Lat. 13° 41' 00"	Camarines Sur	5
	Mangroves along the banks of Looc River	Long.123° 18' 57" and Lat. 13° 54' 25" ;Long.123° 24' 10" and Lat. 13° 59' 00"		
	Mangrove areas of Port Tambang including banks of Tambang River and Olas River	Long.123° 24' 40" and Lat. 13° 54' 00" ;Long.127° 27' 56" and Lat. 13° 57' 25"		
	Mangroves in Bo. Gibgos and Tabaon	Long.123° 45' 56" and Lat.13° 50' 00" ; Long.123° 48' 00" and Lat.13° 53' 40" ; Long.123° 48' 20" and Lat.13° 53' 39"		
	Mangroves along the banks of Saling River at	Long.123° 42' 50" and Lat. 13° 52' 00" ;Long.123° 41' 30" and Lat. 14° 03' 30"		
	Mangroves along the banks of Delchi River, Barang Creek and Parusan River in Inaran and Sapitan Bay	Long.123° 15' 00" and Lat. 14° 00' 00" ;Long.123° 17' 30" and Lat. 14° 03' 30"		

Table I-12 INITIAL COMPONENT OF THE NIPAS (4/15)
(2) DISTRIBUTION OF SWAMP FOREST RESERVES
(Proclamation 2152, S. 1981)

BIO-GEOGRAPHIC ZONE	NAME	COORDINATES	LOCATION	REGION
	Mangroves along the banks of Sagnay River	Long.123° 31′ 20″ and Lat. 13° 35′ 48″ ;Long.123° 31′ 25″ and Lat. 13° 36′ 20″		
	Quinabocasan Point to San Vicente Bay	Long.123° 19′ 39″ and Lat. 14° 00′ 28″ ;Long.123° 22′ 00″ and Lat. 14° 05′ 00″		
	Northern Bank of Caima River up Sto Bo. Binahian	Long.122° 58′ 35″ and Lat. 13° 40′ 57″ ;Long.122° 51′ 19″ and Lat. 13° 54′ 09″		
	Caragay Pass to Gimbal Pt. in Caragay Island	Long.127° 27′ 56″ and Lat.13° 57′ 28″ ;Long.123° 52′ 41″ and Lat. 13° 20′ 40″		
	Islands of Lahuy, Tuesuhin, Haponan, Quinabangan, Inidabungot, Iunit and Batan	13° 17′ 50″		
9	Pigbucan to Paron Point	Long.123° 50′ 57″ and Lat.123° 54′ 08″	Manito, Albay	5
10	Putian River to Malbog River	Long.123° 40′ 33″ and Lat.12° 55′ 00″ ; Long.123° 41′ 30″ and Lat.12° 58′ 40″ ; Long.123° 00′ 00″ and Lat.13° 00′ 00″	Sorsogon	5
	Getumbo Point up to the Municipality of Sorsogon	Long.123° 55′ 30″ and Lat.124° 00′ 00″ ;Long.12° 57′ 12″ and Lat. 12° 59′ 12″		
	Malacambo Point to the Municipality of Juban in Sorsogon Bay	Long.123° 55′ 28″ and Lat.12° 50′ 35″ ;Long.124° 00′ 00″ and Lat. 12° 53′ 24″		
	Mangroves along the banks of Dansol River	Long.123° 50′ 57″ and Lat.123° 54′ 08″		
	Papucha Point in Sugot up to Bo. Quidolog, Prieto Diaz boundaries divided into 2 quadrants (a) Sta. Lucia to Buenavista, (b) Buenavista to Dingay Point	Long.124° 03′ 39″ to 124° 06′ 15″ ; Long.124° 04′ 10″ to 123° 12′ 35″ ; Lat.123° 50′ 57″ to 13° 04′ 47″		
	Pamantingan Point in Gubat up to Tagdon River in Barcelona	Long.124° 55′ 24″ to 12° 24′ 39″ ; Long.124° 05′ 40″ to 124° 09′ 07″ ; Lat.12° 55′ 24″ to 12° 59′ 10″		
	Sinagatan Bay to Manley Point in Gitalalan	Long.124° 44′ 00″ to 124° 06′ 15″		
11	Mahuping River up to Mabung River	Long.124° 08′ 28″ to 123° 11′ 52″ ; Lat.12° 54′ 23″ to 13° 00′ 00″	Burias Island	5
	Cueva Point up to Kamartines Point	Long.124° 04′ 10″ to 123° 12′ 35″ ; Lat.13° 04′ 25″ to 13° 07′ 19″		
	Kabugao Point up to Kabalong Andang Point	Long.123° 08′ 53″ to 123° 12′ 17″ ; Lat.12° 53′ 44″ to 13° 01′ 19″		
12	Basin Island		(near Burias Island)	5
	Olay up to Buno Sanlay	Long.123° 48′ 00″ to 123° 46′ 43″ ; Lat.12° 21′ 25″ to 12° 23′ 30″	Masbate	5
	Ocijan River in Batuan Bay	Long.123° 45′ 28″ to 123° 46′ 43″ ; Lat.12° 24′ 30″ to 12° 25′ 19″		
	Mangroves along the banks of Sta. Rosa River in San Jacinto town	Long.123° 41′ 49″ to 123° 43′ 14″ ; Lat.12° 31′ 06″ to 12° 35′ 00″		
	Mangroves between Bo. Tamosa and Bagacico	Long.123° 40′ 00″ to 123° 41′ 51″ ; Lat.12° 37′ 53″ to 12° 38′ 39″		
	Magtanay Point up to Tagnotic Point	Long.123° 18′ 29″ to 123° 20′ 00″ ; Lat.12° 28′ 21″ to 12° 25′ 16″		
	Bo. Magtanay to Malobago, Port Barrera	Long.123° 20′ 00″ to 123° 21′ 51″ ; Lat.12° 28′ 21″ to 12° 33′ 30″		
	Guinobatan River up to Barlis	Long.123° 21′ 51″ to 123° 23′ 13″ ; Lat.12° 28′ 39″ to 12° 31′ 08″		
	Bojnar Cove to Tinago Cove	Long.123° 24′ 11″ to 123° 25′ 19″ ; Lat.12° 31′ 06″ to 12° 31′ 30″		
	Mangroves along the banks of Pasil River, Magdalena	Long.123° 31′ 44″ to 123° 32′ 32″ ; Lat.12° 26′ 29″ to 12° 27′ 30″		
	Mangroves in Toos Cove in Mandaon	Long.123° 12′ 58″ to 123° 15′ 19″ ; Lat.12° 13′ 53″ to 12° 15′ 32″		

Table I-12 INITIAL COMPONENT OF THE NIPAS (5/15)
(2) DISTRIBUTION OF SWAMP FOREST RESERVES
(Proclamation 2152, S. 1981)

BIO-GEOGRAPHIC ZONE	NAME	COORDINATES	LOCATION	REGION
	Bagumbayan Point to Amutag Point	Long.123° 15' 34" to 123° 17' 58" ; Lat.12° 22' 24" to 12° 27' 52"		
	Mangrove areas along the banks of Danga River			
	Mangrove areas from Dinag river to Lomocab River	Long.124° 13' 31" to 124° 15' 16" ; Lat.11° 57' 18" to 11° 54' 59"		
	Island of Canoga			
14	Islands of Pontoon, Poro, Pacijan		Camotes Sea, Bohol	7
15	Islands of Pasaumian, Handayan and Mojanay		Camotes, Bohol	7
	Islets of Bunsoy and Lapinig Chico			
	Mangrove areas east of Soom River to Pampang	Long.124° 25' 84" to Lat.10° 05' 35" ; Lat.10° 02' 02" to 10° 36' 00"		
16	Islands of Ambugan, Pangangan, Cabilao and Sandingan		Cebu Strait, Bohol	7
	Islets of Batas			
	Mangrove areas east of Inabanga River to Bo. Pampang	Long.125° 07' 00" to Lat.10° 02' 02"		
17	Mangrove areas from Agio Point up to the municipality of Carmbuyao		Mindanao Sea, Bohol	7
	Mangrove areas from Bo. Baibas to Bo. Ondol including Bo. Condray, and Jungdan except the Island of Tintiman which is a mangrove Wilderness area	Long.124° 32' 58" to 124° 36' 00" ; Lat.09° 56' 48" to 09° 59' 18"		
	Basiao Point up to Kasog Point at Lapinig	Long.124° 33' 09" and Lat.10° 03' 24" ; Long.124° 36' 18" to 10° 05' 24"		
18	Island of Panglao		Mindanao Sea, bohol	7
	0 from the west of Loboc River to the municipality of Laya	Long.123° 56' 09" and Lat.09° 40' 40"		
19	Mangrove areas along the coastline of Dupon bay from Sacoy Point up to the mouth of Dupon River	Long.124° 24' 20" to Lat.10° 54' 42" ; Long.124° 26' 02" to 10° 54' 42" ; Long.124° 24' 20" to Lat.10° 51' 21" ; Long.124° 26' 02" to 10° 57' 21" ;	Leyte	8
	Apali Point to Cabunangan Point	Long.124° 28' 24" to 124° 30' 54" ; Lat.10° 52' 12" to 10° 52' 24"		
	Puerto Bello to Lao	Long.124° 31' 20" to Lat.10° 58' 36" ; Long.124° 33' 48" to 11° 01' 30"		
	Mangrove areas from Bo. Tabon and Bo. Manpagui in Santa Cruz	Long.124° 47' 00" to Lat.124° 48' 42" ; Lat.11° 21' 47" to 11° 23' 36"		
20	Mangrove areas from Liangan River up to Lipatan River of the municipality of Lapayan		Lanao del Norte	10
21	Bo. Bagumbang to Malanlan River	Long.123° 39' 41" to Lat.123° 49' 19" ; Lat.08° 01' 53" to 08° 08' 14"	Ozamis City, Misamis Occidental	10
22	Mangrove areas from Baculin Point to Lakud Point	Long.126° 34' 12" to Lat.17° 26' 43" ; Lat.07° 26' 43" to 07° 34' 39"	Davao	11
	Mangrove areas from Tanup Point in Bunao to Kinablangan Island	Long.126° 32' 16" to 126° 34' 49" ; Lat.07° 41' 49" to 07° 43' 50"		
	Island of Samal			
23	Islands of Siargao, Bucas Grande, Middle Bucas and East Bucas in Dinagat	Long.126° 32' 16" to 126° 34' 49" ; Lat.07° 41' 49" to 07° 43' 50"	Dinagat Sound, Surigao del Norte	13
24	Islands of Dinagat, Hikdop, Sibale, Hanigad		Surigao Strait, Surigao del Norte	13
25	Mangrove areas along the municipalities of Lanigan and Valencia up to town River of the municipality of Barcelona	Long.126° 25' 24" to 126° 30' 00" ; Lat.07° 10' 00" to 08° 15' 00"	Surigao del Sur	13
	Islands of Masopelid, Mahaba, Condona, Bayagnan, Balabid and Caye			
26	Mangrove areas in Tumalong Bay, Buong River and Pongao Bay		Zamboanga del Sur	ARMM

Table I-12 INITIAL COMPONENT OF THE NIPAS (6/15)
(2) DISTRIBUTION OF SWAMP FOREST RESERVES
(Proclamation 2152, S. 1981)

BIO-GEOGRAPHIC ZONE	NAME	COORDINATES	LOCATION	REGION
26	Mangrove areas in Tumalong Bay, Baong River and Pongao Bay		Zamboanga del Sur	ARMM
	Mangrove areas from Mabubog Point up to the municipality of Sambulawan including the Island of Pasan	Long.123° 21′ 36″ to 123° 28′ 08″ ; Lat.07° 33′ 10″ to 07° 33′ 10″ to 07° 38′ 10″		
	Islands of Sagayapan, Tinduman and Sacol			
27	Mangrove areas from the municipality of Tigbisay to the mouth of Tigbao River including east of Vitali island	Long.122° 16′ 00″ to Lat.07° 25′ 00″ ; Long.122° 22′ 00″ and Lat.07° 18′ 00″	Sibuguay Bay, Zamboanga del Sur	ARMM

REMARKS	Also enters in table(s)	Site count	Area count	Region
1 Also proclaimed as Game Refuge and Bird Sanctuary, covers other protected area sites	3	split	"	4
2 Covers Mt. Guiting-guiting Natural park	9	full	"	4

Source: PAWB December 1996

Table I-12 INITIAL COMPONENT OF THE NIPAS (3) (7/15)

	NAME	REGION	LOCATION	ESTABLISHMENT LEGISLATION	ESTABLISHMENT DATE	AREA (ha)	SPECIAL FEATURES	EXAMPLES OF FLORA AND FAUNA
National Park	Casecnan Hill	CAR	Benguet, Abra	Proc 1305	8/20/74	57	Panoramic view of Benguet and its surrounding area	Mahogany (Swietenia sp.), teak (*Tectona grandis*), Hawks, owls, finches
Resource Reserve	Mt. Data	CAR	Along the Baguio-Bontoc National Road, Benguet, Ifugao and Mt. Province	Proc 65, Proc 634	6/3/36, 10/8/40	(2398), 5,512	Pine forests, natural scenery, deep ravines, temperate climate	Pine forest Pinus insularis as dominant species, Swifts, swallows, starling, *tayuh* and deer
Resource Reserve	Mt. Pulog	CAR	Baguias & Kabayan Benguet, Kiangan, Ifugao and Kayapa Nueva Vizcaya	Proc 75	2/20/87	11,550	Pine forests, habitat of unique species of cloud rats, mountain lake, dwarf bamboos, deep ravines temperate climate	Dwarf bamboos (*Arundinaria pulcherrima*). Pinus insularis, Cloud rats (*Crateromys schadenbergi*)
Resource Reserve	Balbalasang-Balbalan	CAR	Balbalan, Kalinga Apayao	R.A. 6463, Proc 1357	6/13/72, 12/9/74	1,338	Pine forests, sparkling streams and temperate climate	Predominantly pine trees
Protected Landscape/ Seascape	Papay Lake	1	Papay, Ilocos Norte	R.A. 5631, P.D 1554	6/21/69; 6/11/78	(1711), 340	Freshwater Lake	Zebra dove, painted quail
Natural Monument	Tirad Pass I	1	Cervantes, Ilocos Sur	Proc 294, Proc 433	7/20/38, 7/23/68	6,320	Historical outdoor recreation area under the National Shrine	Pine and mossy forest, bats, wild cats, monitor lizard, squirrel
Natural Monument	Besang Pass	1	Cervantes, Ilocos Sur	Proc 55	8/10/54	304	Formerly part of Tirad pass historical and superb natural scenery, mountainous terrain, cool climate with landmark of World War II	Pine and mossy forests, Hawks, doves ducks, finches and wild boar
Strict Natural Reserve	Puyot Springs	2	Baguet Isabela	Proc 327	10/8/38	819	Springs, caves, rock formations	Lowland dipterocarp forest. Wild pig, deer, monkey, birds belonging to the families of Ralidae and Columbidae
Natural Monument	Northern Luzon Heroes Hill	1	Sta. Maria & Narvacan, Ilocos Sur	Proc 132	7/2/63	1,316	Historical Panoramic	Molave (Vitex sp. forest, the rest are grasslands under cultivation)
Protected Landscape/ Seascape	Agoo-Damortis	1	Agoo & Rosario, La Union	R.A. 4570	6/19/65	10,917	Extensive shoreline with sandy beaches ideal for swimming colorful fishes recreational resort	Basically disturbed ecosystem, no significant record on diversity
Strict Natural Reserve	Marikking Spring	1	Manaoag-an, Pangasinan	Proc 612	9/3/40	92	Medicinal hotsprings and health resort	Natural growth dipterocarp forest with portion covered with grasslands wild pigs, wild chicken, hornbills, coleto
Strict Natural Reserve	Hundred Islands	1	Alaminos, Pangasinan	Proc 1816	1/30/79	1,676	Island groups, resort, Karst residue, administered by PEA	Limestone Forest, birds
Strict Natural Reserve	Callao Cave #2	2	Penablanca cagayan	Proc 827, (Proc 416)	7/16/35, 6/29/91	(192, (4,136)	Multi-chambered caves: deep canyons, rock formations beautiful stream, recreational resort	Rubiaceae, putaceae, molave (Vitex sp.) and narra (Pterocarpus) 51 birds and 29 mammals
Strict Natural Reserve	Mindiungao	3	Gapan & Gen. Tinio, Nueva Ecija	R.A. 5100	6/11/67	2,018	Cathedral like caves: exquisite rock formation: natural swimming pool	Dipterocarps, molave, rattan, deer, monkey, reptiles, birds
Natural Monument	Capas Death March Monument	3	Capas, Tarlac	R.A. 826	8/14/52	2	Erected in honor of the Worl War II death march participants	Disturbed very limited information on fauna
Resource Reserve	Mt. Arayat	3	Arayat & Magalang Pampanga	Proc 594, Proc 203	6/27/33, 9/16/37	(371403) ; 3,715	Remnant of natural forest, natural scenic spots recreational resort	Teak, narra, fire tree ipil-ipil, deer, wild boar, snakes, wild ducks pigeons
Strict Natural Reserve	Aurora Memorial	4	Bongabon Nueva Ecija and Baler Quezon	Proc 229, Proc 744	11/11/37; 8/11/41	(2366), 5676	Oforests streams and Qsprings for swimming	Covered with dipterocarp forest, deer, monitor lizard, lemur, shrew buds
Natural Monument	Biak-na-bato	3	San Miguel and Dona Remedios Trinidad, Bulacan	Proc 223, Proc 2204, Proc 84, Proc 401	11/16/37; 6/9/82, 3/9/87; 4/11/89	(2117), (330.62); (2117.69), 659	(Historical where Pact of Biak-na formation; caves, remnants of dipterocarp forest	Alibungbung (Bauhinia sp.), Dao (Dracontomelon dao), Tibig (Ficus nota) and Lanuy (Planchonia spectabilis); Phil. deer (Cervus sp.) Bats (Fadunda spp.); Philippine monkey (Macaca fascicularis) and Philippine mallard
Natural Park	Quezon Memorial Ninoy Aquino parks and Wildlife Nature Center	NCR	Diliman, Quezon City; Diliman, Quezon City	Proc 42; proc 1402, MNR Adm. Or No. 4	7/5/54;3/20/75; series of 1986	(1978), 59	Man-made lagoon, mini-zoo, playgrounds, picnic areas, recreational area	Man-made forest, Enclosed in the Mini-zoo are eagles, crocodiles, lions, tigers, snakes, etc

Table I-12 INITIAL COMPONENT OF THE NIPAS (3) (8/15)

	NAME	REGION	LOCATION	ESTABLISH-MENT LEGISLATION	ESTABLISH-MENT DATE	AREA (ha)	SPECIAL FEATURES	EXAMPLES OF FLORA AND FAUNA
Natural Park	Luneta	NCR	Ermita, manila	Proc 231	12/19/55	16	Urban Park, playgrounds, picnic areas Manila Sunset, administered by the National Parks Development Committee adjacent to Manila Bay planetarium	Man-made forest, orchidarium
Protected Landscape/ Seascape	Manila Bay Beach Resort #1	NCR	Manila and Pasay Cities, Paranaque	Proc 41, P.D 1085	1954/75, 2/4/77	465	Transferred under the administration to the Public Estates Authority	Manila Bay
Protected Landscape	Taal Volcano Island #3	4	Batangas	Proc 235	7/22/67	(4537)	Famous & picturesque active volcano within a lake, a unique natural phenomenon	Grassland and patches of forest sparrow, woodpecker, etc
Resource Reserve	Mts Palaypay-Matawa na Guled	4	Ternate and Maragondon, Cavite	Proc 1501	10/26/76	4,000	Dipterocarp forest	Dipterocarps, kamagong, etc deer snakes, wild chicken, wild boar, birds
Resource Reserve	Mt Makiling #1	4	Los Banos and Calauban, Laguna, Sto Tomas, Batangas	Proc 552; Proc 692	2/23/33, & 2/60	3,329	Dipterocarp Forest Natural Laboratory of UPLB outdoor recreation mudspring, etc	Dipterocarpd, snakes, birds, monkeys, rattan, vines, etc
Protected Landscape/ Seascape	Pagsanjan Gorge #1	4	Cavinti, Lumban, Laguna	Proc 392, proc 1551	3/28/30, 5/31/76	153	Outdoor recreation area	Waterfalls
Strict Nature Reserve	Mt Banahaw-San Cristobal #2	4	Majayjay, Laguna, Lucban Tayabas, Quezon	Proc 716; Proc 715, E.O 224	5/21/41, &9/66, 2/16/87	(11133.3), (11133.3), undetermined	Twin-mountain: natural scenery waterfalls dipterocarp forest mystical caves springs rock formations and invigorating climate	Red Lauan, tanguile, mayapis, rattan and vines: Giant rats, bats, wildcats, reptiles and ground lizards
Resource Reserve	Quezon	4	Atimonan, Padre Burgos and Pagbilao, Quezon	Proc 740; Proc 594	10/25/31, &5/40	(535.08), 980	Virgin dipterocarp forests, winding road, deep ravines, rock formations, superb scenery	Dipterocarps, Diospyros sp. hornbills, Philippine deer, forest kingfisher, spotted wood kingfisher and Luzon little crow. philippine rufous rat
Natural Park	National Park Wildlife Sanctuary and Game Preserve #5	4	Provinces of Laguna, Quezon, Rizal and Bulacan	Proc 1635, Exec Or 192; Proc 196, Proc 225	6/18/77, 6/10/87, 12/10/87, 3/1/88	(16310), (31681); 34,681	Dipterocarp forest, invigorating climate	Dipterocarps, deer, reptiles, many species of common birds
Protected Landscape	Hinulugang Taktak	4	Antipolo, Rizal	R.A 6964	9/18/90	1	Picnic area	
Resource Reserve	Bicol	5	Bicol and Daet, CAmarines Norte & Sipocot & Lupi Camarines	Proc 657, proc 655	2/13/34, 12/23/10	(4225); 5,201	Dipterocarp forest, natural swimming pool, scenic spots, recreational area	Hanging parakeet, cockatoo, cloud rat, palm and malay civet, dipterocarps
Strict Nature Reserve	Libmanan	5	Libmanan, Camarines Sur	Proc 654	2/6/31	19	Scenes of cystid caverns and cataracts with stalagmites and stalactites	Coconut and other agricultural crops, monitor lizards, cuscal, swifts, bats civet cat
Protected Landscape/ Seascape	Caramoan	5	Caramoan, Camarines Sur	Proc. 291	7/20/38	347	Caves, panoramic hills, superb shoreline recreational areas	Parrots, parakeets, gallinules, pigeons and owls
Resource Reserve	Mt Isarog	5	Naga, Calabanga, Tinambac, Goa, Tigaon and Pili, camarines Sur	Proc 293	7/20/38	10,112	Home of Negritos, gorges; wonderful canyons, deep ravines, waterfalls approximately 40 meters, with natural swimming area; dipterocarp forest, endemic wildlife, invigorating climate, superb scenery	Flying fox (Harpiocephala harpyia) bats (Murina cyclotis), Philippine cobra, monkeys and parrots
Strict Nature Reserve	Mayon Volcano	5	Camalig, Guinobatan, Libon, Ligao, Malilipot & Tabaco, Albay	Proc. 292	7/20/38	5,459	Famous active volcano with almost perfect cone, hot springs, rock formations, superb natural scenery	Dwarf trees, grasses and few dipterocarp trees, many birds, Wild pig, wild cat and monitor lizard
Strict Nature Reserve	Bulusan Volcano	5	Casiguran, barcelona, Irosin & Juban, sorsogon	Proc. 811	6/7/35	3,673	Famous crater, mineral hot springs; peculiar rock formations	Kingfisher, woodpecker, hawks, zebra and green imperial pigeons
Resource Reserve	Tiwi	5	Tiwi, Albay	Proc. 47, Proc 739	7/10/54, 8/14/70	17,611	Geothermal Reservation under NPC	Limited information on flora and fauna
Natural Biotic Area	Olongapo Naval Base Perimeter	3	Olongapo City, Zambales	Proc 478	10/22/68	9	Open space with stream within the heart of Olongapo City	Disturbed: highly insignificant as a reserve
Protected Landscape/ Seascape	Roosevelt	3	Hermosa & Dinalupihan, Bataan	Proc 567; Proc 508	3/30/33, 12/17/65	(1,485); 1,335	Dipterocarp forest, natural spring, recreational resort	Dipterocarps, mahogany, narra, heron, quails,orioles

Table I-12 INITIAL COMPONENT OF THE NIPAS (3) (9/15)

	NAME	REGION	LOCATION	ESTABLISHMENT LEGISLATION	ESTABLISHMENT DATE	AREA (ha)	SPECIAL FEATURES	EXAMPLES OF FLORA AND FAUNA
Natural Monument	Balete	3	Hermosa Orani, Samal, Abucay pilar, Balanga, bagac and Morong, Bataan	Proc 24; Proc 25,Proc 1956, Proc 192	12/1/45, 4/18/66, 3/25/80, 11/27/87	(31000), (29853); (23853); 23,668	Historical, tropical moist forest, waterfalls, with sandy beaches along the coastal zone	Leucaena l., Psidium guajava, Gliricidia sepium and bamboos; hornbill, quail, woodpecker and sparrow, squirrel, deer, bats
Protected Landscape/ Seascape	Naujan Lake	4	Naujan Pola and Victoria, Oriental Mindoro	Proc 292, Proc 335	4/27/56, 1/25/68	(21655), 21,655	Freshwater lake, dipterocarp forest	Coconut, rambutan, coffee, least bittern, cattle egret, swamphen
Resource Reserve	Mts Iglit-Baco	4	Sablayan, Occidental Mindoro & Bongabon, Oriental mindoro	R.A. 6248	11/9/70	75,415	Habitat of tamaraw (Bubalus mindorensis), natural grasslands; dipterocarp forest	Families of the trees are Leguminosae, Euphorbiaceae, Dipterocarpaceae and Anacardiaceae, pigeons, hornbills, swifts, swiftlets, kingfisher
Strict Nature Reserve	Balabog-Putian	6	Dingle & San Enrique, Iloilo	Proc 760	6/11/61	854	Presence of "tisok" a natural hole where rain water percolates; caverns springs	Dao, molave, antipolo, nara, teak, bats, swifts
Resource Reserve	Mt Canlaon	6	Bago La Carlota, La Castellana Murcia, Canlaon, San Carlos Negros Occidental and Valleehermosa Negros Oriental	Proc 721	8/8/34	24,558	Picturesque cone of the active volcano, waterfalls, hotsprings, gorges, rock formations, virgin forest, cathedral-like cave, dipterocarp forest teeming with wildlife	Sanggumai (Dendrobium anosmum), pitcher plant (Nepenthes spp.) and staghorn fern (Platycerium stouh); Spotted deer, wild pigs, Philippine monkey, reptiles and lizards
Natural Park	Sohoton Natural Bridge	8	Basey, Samar	Proc 831	7/19/35	840	Natural stone bridge, other rock formations, winding Sohoton river, cathedral-like cave, dipterocarp forest teeming with wildlife	Dipterocarps are the dominatn species combined with the families Anacardiaceae, Moraceae, Sapindaceae, deer, hornbill, giant scops owl, Philippine eagle
Wildlife Sanctuary	Kuapnit-Relimsayao	8	Baybay & Abuyog, Leyte	Proc 142	4/16/37	364	Home of bats and swifts, caves with guano deposits	Palm civet, wild pig, philippine macaque, reptiles like monitor lizard (Varanus salvator) and land turtle (Cyclemysamboinensis)
Natural Monument	MacArthur Landing (Imelda Park)	8	Palo, Leyte	L.O. 1532	3/12/77	7	Historical, extensive shoreline recreational	Caladiuchi, American roses, green yellow Japanese bushes and Macarthur
Strict Nature Reserve	Mapagnao	8	Burauen & La Paz Leyte	Proc 284	8/27/37	635	Rock formation, peaceful lakes, panoramic view, dipterocarp forest	Dipterocarps e.g. Shorea negrosensis, S contorta mahogany
Resource Reserve	() Spring	8	Ormoc City, Leyte	Proc 161, Proc 1112	6/14/37, 2/23/73	272	Geothermal Reservation under NPC	
Wildlife Sanctuary	Rajah Sikatuna	7	Carmen, Sierra, Bullones, Valencia, Garcia, Hernandez, Dimiao, Bilar, Batuan, Bohol	Proc 429	7/10/87	9,023	Last remaining forested portion of Bohol Island, Home of Flying Lemur Philippine Tarsier, Mossy forest	Flying lemur, Philippine tarsier, Dipterocarp sp., mossy forest, philippine cockatoo, Philippine tregon, wild pig, Malay civet, Philippine palm civet, monitor lizard, green imperial pigeon, black-backed coleto, Philippine grass owl, screech owl
Strict Nature Reserve	Talibong Island	6	Guimaras, Iloilo	Proc 525	2/8/90	1,143	White sandy beaches interesting coves and coral reefs, two major islands surrounded with 46 islets	Rabbit fish (94 species), sea grass, invertebrates
Protected Landscape/ Seascape	Sudlon	7	Cebu, Cebu	Proc 56	4/11/36	696	Caverns, watchole; wonderful scenery; temperate climate; historical	Molave trees, pine, Dipterocarp species, Sun bird (Nectarina jugularis), swiftlet (Collocalia esculenta) Bulbul (Pycnonotus goiavier) and wagtail (Motacilla cinerea robusta)
Natural Monument	Central Cebu	7	Balamban, Toledo City, Cebu	Proc. 202, Proc 835-A	9/15/37, 3/27/71	(15393.58), 11,894	Where President Magsaysay met his fiery death	Cinammomum cebuensis. Coleto, sunbird, black shama, starling, white eye, pied chat, kingfisher

Table I-12 INITIAL COMPONENT OF THE NIPAS (3) (10/15)

	NAME	REGION	LOCATION	ESTABLISHMENT LEGISLATION	ESTABLISHMENT DATE	AREA (ha)	SPECIAL FEATURES	EXAMPLES OF FLORA AND FAUNA
Strict Nature Reserve	Guadalupe Mabugnaw-Maint Hot Springs	7	Cebu City, Cebu	R.A. 6429, MNR Adm. Or. No. 32	6/17/72, 5/30/86	Undetermined, 58	Cold and hotsprings recreational resort, caves interconnected and characterized by stalagmites and stalactites	Mahogany, katoan bangkal and ornamental trees; zebra dove, fruit dove, painted quail, gecko olive backed sunbird, swallow, glossy swiftlet
Strict Nature Reserve	St. Paul Subterranean River	4	Puerto Princesa, Palawan	Proc. 835	3/26/71	3,901	Underground river	Dracontomelon dao, Diospyrus spp. and Pometia pinnata, Philippine monkey, mound builders (labon birds), pacific reef egrets, philippine cockatoo, talking
Strict Nature Reserve	Tubbataha Reef	4	Central Sulu Sea, Palawan	Proc. 306	8/11/88	33,200	High diversity of reef fish and fauna diverse coral (46 coral genera, 379 fish species, 40 fish families), coral cover (70%-80%). Two atolls	Brown boobies, Red footed boobies, tern, Common noddy, Sooty tern, Crested tern, Euphorbia sp., macro algae and seagrasses, Tridacnid clams, helmet shells, black tip shark, manta rays, eagle rays, marine turtle
Natural Monument	Mt. Dajo	ARMM	Patikul and Talipao, sulu	Proc. 261	2/28/38	213	Historical only mountain in Jolo, sulu	No data on flora and fauna
Natural Monument	Rizal (Dapitan)	9	Dapitan, Zamboanga	Proc. 616	9/3/80	10	Where Dr. Jose Rizal was exiled scenic seascape	Saluno (Mangifera caesia), Ipil, Philippine bulbul, coleto, morning dove,
Protected Landscape/ Seascape	Basilan	9	Lamitan, Basilan	Proc. 457, Proc. 1531	9/25/39, 2/2/76	(6451), 3,300	Waterfalls: natural swimming pool, virgin dipterocarp forest moist forest, abundant wildlife invigorating climate	Dipterocarps, Podocarpus, Pandanus, wild boar, phyton, green parrots, hanging parakeets, woodpeckers, owls, orioles, Philippine eagle, tarsier, giant scops, owls, rufous hornbill, Philippine
Protected Landscape/ Seascape	Sta. Cruz Islands #5	9	Zamboanga City	Proc. 654; Proc. 1801	2/4/75, 11/10/78	Undetermined	Also covered by Proclamation 1801 declaring the area as Tourist Zone and Marine Reserve under PTA Beach areas, etc.	Beach forest, limited information on fauna
Wildlife Sanctuary	Mt. Kitanglad	10	Mandoi-Fortich, Sumilao, Impasugong Malaybalay, Lantapan Talakag, Baungon & Libona, Bukidnon	Proc. 677	12/14/90	31,297	Habitat of Philippine Eagle, virgin ipterocarp and mossy forest, composed of range of mountains /with features such as: waterfalls, small mountain lake, caves and rock formation	Dipterocarps, Podocarpus philippinensis, Klehovia hospita, Philippine eagle, serpent eagle/ Brahminy kite, hornbill, finches, mynah
Strict Nature Reserve	Mt. Malindang NP & Watershed	10	Oroquieta, Ozamis City, Calamba, Bonifacio and Jimenez in Misamis Occidental and Zamboanga	R.A. 6266	6/19/71	53,262	Has many high peaks and intact forest covered for mountaineering and nature observation; climate good for relocation, crater lake in Lake Duminagat, Liboran Valley, many big rivers and beautiful sceneries. Dipterocarp,mossy forest, pine rainforest	Almaciga, Calmon, Bakon Binunga, Gubas, etc., Hagonoy, Lingatong, Pugahan, Aruborg, Liveworth, Kaningag, Kapok, Mayana, ferns, Pul tarsier, flying lemur, deer, flying squirrel, deer, macaque, wild boar, Palm civet, Tinggalong, giant flying fox. etc
Strict Nature Reserve	Mainit Hotsprings	11	Compostela, Davao	Proc. 416	12/12/57	1,381	Medicinal hotsprings, dipterocarp forest, rock formation and cold	Dipterocarps: no record on fauna
Natural Park	Mt. Apo #8	11	Kidapawan, North Cotabato & Guianga & Sta. Cruz, Davao	Proc. 59, Proc. 35	5/9/36, 5/8/66	(76900), (72813.59); 72,113	Volcanic mountain; rock formations, waterfalls, mountain lakes, medicinal hotsprings, home of the Phil. Eagle, dipterocarp forest, the highest peak in the Phil.	Flying lemur, Philippine monkey, wild pig, Philippine deer, Philippine eagle Dipterocarps (84 recorded spp. of birds)
Resource Reserve	Sacred Mountain1	ARMM	Marawi City, Lanao del Sur	R.A. 4190	5/5/65	94	Panoramic mountain, forest rich with interesting wildlife	Pigeons, hawks, snakes, lizards
Resource Reserve	Ringkunan #9	ARMM	Ramain, Lanao del Sur	R.A. 4190	5/5/65	Undetermined	Beautiful sparkling stream, virgin forest, invigorating climate	Pigeons, hornbills, hawks, crow, kingfishers, orioles, parrots, wild boar, snakes, lizards, deer
Protected Landscape/ Seascape	Lake Dapao	ARMM	Pualas, Lanao del Sur	R.A. 4190	5/5/65	1,500	Scenic Lake, recreational	Giant scops owls, woodpeckers, pigeons, hornbill, parrots
Protected Landscape/ Seascape	Lake Butig	ARMM	Butig, Lanao del Sur	R.A. 4190	5/5/65	66	Recreational area, swimming resort, invigorating climate	Dipterocarps, hornbill, parrots, woodpeckers, Philippine monkey, wild ducks
Protected Landscape/ Seascape	Sablata #9	ARMM	Lumba Bayambao, Lanao del Sur	R.A. 4190	5/5/65	Undetermined	Basin of Gata river, peculiar rock formations, scenic landscape	Dipterocarps, various orchids, wild chickens, hornbill, deer wild boar, snakes

Table I-12 INITIAL COMPONENT OF THE NIPAS (3) (11/15)

NAME	REGION	LOCATION	ESTABLISHMENT LEGISLATION	ESTABLISHMENT DATE	AREA (ha)	SPECIAL FEATURES	EXAMPLES OF FLORA AND FAUNA
Protected Landscape *Pantawarayo*	ARMM	Sagurien, Lamo del Sur	R A 4190	5/5/65	20	Recreational resort	Herons, wild ducks, kingfishers
Strict Nature Made Hotspring Reserve	12	*Awang, Cotabato*	*R A 456*	9/25/39	48	*Medicinal hotspring, natural* swimming pool and health resort	Southern side is organ and eastern parts planted with coconut and other agricultural crops, owls, parrots, wild ducks, Philippine deer

REMARKS	Also entered in table(s)	Site count	Area Count	Region
#1 Under the jurisdiction of other government agencies	none	full	full	
#2 Amended as Protected Area Landscape-Seascape by virtue of Proclamation 416 dated 29 June 1994	9	trans-ferred	tranferred	2
#3 Newly Proclaimed as Natural Park	9	transfern	tranferred	4
#4 part of the initially defined site has been placed under the jurisdiction of NPC by virtue of E O 224 dated 16, July 1987	none	full	undetermined	
#5 Park has been proclaimed as Protected Landscape	*none*	*full*	*full*	
#6 Landscape jurisdiction of other government agencies also proclaimed as a tourist zone and marine reserve under Proclamation 1802 dated 1978	7	split	undetermined	9
#7 Proclaimed both as National Park and Watershed Reservoir	6	split	split	10
#8 part of the () has been placed under the jurisdiction of () of Proclamation 553 dated 30, January 1994	11	full	full	
#9 Also proclaimed as Natural Park				
#10 Under the jurisdiction of other government agencies area()	none	full	full	ARMM

Source PAWB

Table I-12 INITIAL COMPONENT OF THE NIPAS (12/15)
(4) Distribution of Game Refuges and Bird Sanctuaries

BIOGEOGRAPHIC ZONE	NAME	REGION	LOCATION	AREA (ha)	PROCLAMATION NO.	DATE ESTABLISHED
D	1 Magapit (Natural Park)	2	Callao & Gattaran, Cagayan	4,551	Adm. Order No. 10, Proc. No. 839, Proc. No.	8/15/47;12/28/55 ; 4/20/76
	2 Salinas Deer Refuge (Natural Park)	2	Salinas, Bambang, N. Vizcaya	5,565	Proc. No. 53; Proc. 240	11/29/26; 12/28/55
E	3 Lake Malimanga (Strict Nature Reserve)	3	Candelaria, Zambales	12	Proc. No. 1949	3/14/80
F	4 Calavite & F. B. Harrison (Natural Park)	4	Sablayan and Mamburao Occidental Mindoro	140,000	Executive Order No. 9	1/28/20
I	5 Olango Island #1 (Resource Reserve)	7	Sta. Rosa and Panganan, Lapu-lapu, Cebu	920	Proc. No. 903	5/14/92
J	6 Calauit (Wildlife Sanctuary)	4	Busuanga Island, palawan	3,400	Proc. No. 1578	8/31/76
K	7 Palawan #2 (Resource Reserve)	4	Palawan	763,399	Proc. No. 219; Proc. No. 530-B; Proc. No. 1232; Proc. No. 1440	7/2/67; 3/8/68; 2/6/74; 6/19/75
N	8 Lake Buluan (Strict Nature Reserve)	12	Korondal, Buluan, Kidapawan, North Cotabato	6,300	Proc. No. 56	12/1/26; 12/1/26

REMARKS:	Also enterd in table(s)	Site count	Area count	Region
1 Also proclaimed as Tourist zone and Marine Reserve by virtue of Proclamation No. 1801 dated 1979, RAMSAR Site	7	split	split	7
2 Also proclaimed as Mangrove Swamp Forest Reserve, covers other protected areas	6	split	split	4

Source: PAWB

Table I-12 INITIAL COMPONENT OF THE NIPAS (13/15)
(5)PROTECTED LANDSCAPE / SEASCAPE

NAME	LOCATION	REGION	LEGISLATION	DATE	AREA (ha)	SPECIAL FEATURES/REMARKS
1 Penablanca Protected Landscape/Seascape[1]	Penablanca, Cagayan	2	Proc. 827; Proc. 416	07-16-35; 06-29-94	(192,000); 4,136	Multi-chambered caves; deep canyons rock formations; beautiful stream; and recreational resort
2 Palaui Island Protected Landscape/Seascape	Sta. Ana, Cagayan	2	Proc. 447	08-16-94	7,415	Terrestrial and Marine Ecosystem
3 Batanes Protected Landscape/Seascape	Batanes group of islands	2	Proc. 335	02-28-94	213,578	Terrestrial and Marine Ecosystem
4 Masinloc-oyon Bay Marine reserves	Masinloc and Oyon, Zambales	3	Proc. 231	08-18-93	7,568	Coastal and Marine Ecosystem Mangrove, seagrass and coral reefs
5 Pamitinan Protected		4	Proc. 901	10/10/96	600.00	Cave Ecosystem
6 Taal Volcano Protected Landscape		4	Proc. 906	10/6/96	62,292.00	Lake and volcanic ecosystem
7 Apo Reef		4	Proc. 868	9/6/96	15,792.00	Marine Ecosystem
8 Mt. Guiting-guiting Natural Park[2]	Cajicdecan, magdiwang and San Fernando in Sibuyan Is.	4	proc. 746	2/20/96	15,265	Terrestrial Ecosystem
9 Sagay Protected Landscapes/Seascape	Islands of Molacaboc, Diutay, Matabas & Suyag & surrounding reefs and reefs of Carbin and Maca	6	Proc. 592	06-1-95	28,300	Terrestrial and marine ecosystems, mangroves, coral reefs and seagrass beds.
10 Apo Island Protected Landscape/Seascape[3]	Zamboanganita, Negros Oriental	7	Proc. 439	08-09-94	691	Coral reef ecosystems, terrestrial and marine
11 Guiuan Protected Landscape/Seascape[3]	Guiuan, Eastern Samar	8	Proc. 469	09-26-94	60,448	Terrestrial and amrine ecosystems, mangroves, coral reef and seagrass beds
12 Siargao Protected Landscape/Seascape		10	Proc. 902	10/10/96	278,914.00	
13 Pujada Bay Protected Landscape/Seascape	Mati, Davao Oriental	11	Proc. 431	07-13-94	21,200	Coastal and marine ecosystems, seagrass, mangrove and coral reefs
14 Mt. Apo Natural Park		11	Proc. 882	9/24/96	72,113.00	
15 Mt. Matutum Protected Landscape	Tupi, Tampakan and Polomonok, South Cotabato, Malungon, Sarangani	12	Proc. 552	03-20-95	15,600	Diverse biological resources
16 Sarangani Bay Protected Seascape	Maituon, Kiamba and Maasin, Sarangani	12	Proc. 756	3/3/96	(215950)	Marine Ecosystem

REMARKS:	Also enterd in table(s)	Site count	Area count	Region
1 Covers former Callao Cave National Park	2	full	full	2
2 Part of Sibuyan Island Mangrove Forest Swamp Reserve	6	full	full	4
3 Originally covered by Proclamation 1801	7	full	full	4

Source: PAWB 1996 December

Table I-12 INITIAL COMPONENT OF THE NIPAS (14/15)
(6) WILDLIFE SANCTUARY AREAS

	NAME	LOCATION	REGION	PROCLAMATION NO.	PROCLAMATION DATE	AREA
Natural Park	1 Isabela (Monte-Alto Timber Resource Corporation- parcel I and	Echague and San Mariano, isabela	2	120	June 19,1987	1095
Wildlife Sanctuary	2 Palanan Wilderness Area	Isabela	2	LOI 917 and 917a	August 22,1979 and September 7, 1979	undetermined
Wildlife Sanctuary	3 Island of Alibijaban	Ragay gulf, bondoc peninsula in quezon	4	2151	December 29,1981	430
Wildlife Sanctuary	4 Islands of Basot, Quinalaang and Malebungot	Camarines Sur	5	2151	December 29,1981	306
Wildlife Sanctuary	5 Islands of Guinatuayan, Naro, Chico and Pober	Asid Gulf in Masbate	5	2151	December 29,1981	141
Wildlife Sanctuary	6 Islands of Majaba and Napayauan	Sibuyan Sea, Masbate	5	2151	December 29,1981	18
Wildlife Sanctuary	7 Island of Dampalit	Samar Sea in Masbate	5	2151	December 29,1981	undetermined
Wildlife Sanctuary	8 Island of bantayan	Visayan Sea in Cebu	7	2151	December 29,1981	undetermined
Wildlife Sanctuary	9 Islands of Catiil, Colangaman, Lomislis, Tangangdio, Tiliman and the Islat of Pamasuan	Caniagao Channel in Bohol	7	2151	December 29,1981	210
Wildlife Sanctuary	10 Islands of Budlanan;/ Bugatusan;/ Pangan;/Cabgan, Canconstino, Tabaon, Maagpit and Islets of basilan of Bugatusan, hayan, Inanoran and Poom Point	Cebu Strait in Bohol	7	2151	December 29,1981	19;/ 6;/ 19;/ undetermined; / undetermined; /
Wildlife Sanctuary	11 islands of Nanaon;/ Basaan;/ Saac;/ Tambu;/ Bambanon	Camotes Sea, bohol	7	2151		599;/ 148;/ 45;/ 194;/ 67
Wildlife Sanctuary	12 Island of Pandasan	Davao Gulf, Davao del Sur	11	2151	December 29,1981	undetermined
Wildlife Sanctuary	13 Islands of Iamagon, Cepaya and Corbeto	Panag bay, Surigao del Norte	13	2151	December 29,1981	undetermined
Wildlife Sanctuary	14 Islands of rasa	Hinatuan passage, surigao del norte	13	2151	December 29,1981	undetermined
Wildlife Sanctuary	15 Islands of Siargao, Poneas, Dahican, Tona, Iaonan, Abanay and	Dinagat Sound, Surigao del Norte	13	2151	December 29,1981	undetermined
Wildlife Sanctuary	16 Islands of Awasan, Cabilan Capaquian, Sugbuhan and	Awasan Bau, Surigao del Norte	13	2151	December 29,1981	undetermined
TOTAL						3297+

Source: PAWB 1996 December

Table I-12 INITIAL COMPONENT OF THE NIPAS (15/15)

(7) Distribution of Protected Areas declared through Administrative and Memorandum Order

BIOGEO-GRAPHIC ZONE	NAME	CATEGORY	REGION	LOCATION	AREA(HA)	DATE	LEGISLATION
C	1 Minasawa Island	Game Refuge and Bird Sanctuary	4	Patnanongan, Quezon	4	9/15/61	P&W Adm Order No. 7
G	2 El Nido	Marine Reserve	4	El Nido, palawan	95,000		
	3 Sampunong Bolo	Game Refuge and Bird Sanctuary	6	Juaneza, Sara, Iloilo	52	1987	RED's Adm. Order No. 25
	4 Lake Danao	Game Refuge and Bird Sanctuary	7	San Francisco, Pacijan, Island Camotes Group.	480	12/24/65	Adm. Order No.1
H	5 Imelda Lake (Lake Danao)	Tourist Resort	8	Ormoc City, Leyte	2193	6/2/72	Memorandum to DANR from the
I	6 Panagatan	Marine Turtle Sanctuary	6	Antique		6/8/82	MNR Admin Order No.
K	7 Ursula Island	Game Refuge and Bird Sanctuary	4	Bataraza, Palawan	20	4/30/60	Adm. Order No. 14
	8 Halog Island	Marine Turtle Sanctuary	4	Palawan		6/8/82	MNR Admin Order No.
	9 Tanobon Island	Marine Turtle Sanctuary	4	Palawan		6/8/82	MNR Admin Order No.
	10 Panata Cay	Marine Turtle Sanctuary	4	Palawan		6/8/82	MNR Admin Order No.
	11 Kota Island	Marine Turtle Sanctuary	4	Palawan		6/8/82	MNR Admin Order No.
O	12 Bancauan Island	Marine Turtle Sanctuary	9	Tawi-tawi		6/8/82	MNR Admin Order No.
	13 Baguan Island	Marine Turtle Sanctuary	9	Tawi-tawi		6/8/82	MNR Admin Order No.
	14 Ligausan Marsh	Game Refuge and Bird Sanctuary	12	Dulawan, Liguasan, South Cotabato	30,000	12/1/26	FAO adm. Order No. 19
Total	14				127,749+		

Source: PAWB 1996 December

Table I-13 UNIT WATER CONSUMPTION (MWSS)

(Unit: Lpcd)

Year	Domestic	Commercial	Industrial	Sub-total	Revenued Water	Non-Revenued Water	Total
1995	127	26	6	159	44%	56%	361
2000	148	30	7	185	50%	50%	370
2005	161	32	8	201	55%	45%	366
2010	173	35	9	217	60%	40%	362
2015	186	37	9	232	65%	35%	357
2020	196	39	10	245	70%	30%	350
2025	206	41	10	258	70%	30%	368

Dara Source: MWSS (For the year of 1995), Study on Supply and Sewerage Master Plan of Metro Manila in the Republic of the Philippines for the period from 2000 to 2015

Notes: 1. Unit water consumption for the period from 2000 to 2020 was projected on the basis of the trend described in the Master Plan.
2. Non-revenue water ratio was modified referring to the present condition.

Table I-14 WATER DEMAND FOR METRO CEBU WATER DISTRICT

Year	Population*		Service Coverage			Water Demand*			Production		
	Cebu City, Lapu-Lapu, Mandaue, Others	Pop. Servd. (MCWD)	House connect.	Public faucet	Total*	Unit Consumption	Water Demand	NRW	Groundwater	Surface Water*	Total
	(*1,000)	(*1,000)	(%)	(%)	(%)	(Lpcd)	(MCM/year)	(%)	(MCM/year)	(MCM/year)	(MCM/year)
1996	1,332	315	N.A.	N.A.	24	355	41	38	53		53
2000	1,499	479	N.A.	N.A.	32	337	59	30	53	12	65
2005	1,738	788	N.A.	N.A.	45	323	93	30	53	12	65
2010	2,014	1,282	N.A.	N.A.	64	323	151	30	53	12	65
2015	2,015	1,390	N.A.	N.A.	69	384	195	22	53	12	65
2020	2,277	1,867	N.A.	N.A.	82	360	245	20	53	12	65
2025	2,573	2,444	N.A.	N.A.	95	337	300	20	53	12	65

Notes: * ; The data on population, Population served, water demand and NRW up to the year of 2010 were provided by MCWD, and the figures after 2015 were estimated in this study.
** ; The surface water development is on-going on the Mananga River.

Table I-15 DETAILS OF DISTRIBUTED WATER IN MWSS

	Revenued Water 42.57%	Billed Water		42.57%
			Under registration of Meter	8.24%
			Malfunction of Meters	
			Improper Meters	0.21%
			Improper Size	0.41%
Distributed	Non-Revenue	Non-Revenue Water (NRW),	Tampered Meters	3.49%
Water	Water (NRW)	but Effectively Used	Illegal Use	
100%	57.43%	22.34%	Illegal Connections	6.05%
			Illegal Drawings	1.76%
			Operational Use	
			Flushing and Disinfection	0.98%
			Fire Fighting	1.20%
		Lost	Leakage/Breakage	20.90%
		35.09%	Unspecified Losses	14.19%

Source: MWSS Operational Report, Oct.-Dec. 1993

Table I-16 WATER SUPPLY CONDITIONS BY EACH SERVICE AREAS OF MWSS

City/Municipality	Water Supply Conditons					
	Condition (1)	Condition (2)	Condition (3)	Condition (4)	Condition (5)	Score
Manila	*not experienced*	*few*	*prevailing*	*prevailing*	*few*	3.5
Pasay		south area	north area			2.5
Quezon	few	south of Balara and Bagbag	south and north portion	central	central	4
Caloocan	few in the north		east		west	4
Mandaluyong	center		rest			2
Las Pinas		All along Manila Bay				2
Makati		*found*	*predominant*	along main *roads*	*found*	3
Malabon	partly		partly			2
Marikina		north		other	other	3
Muntinlupa	by groundwater					
Navotas			in the municipality			3
Paranaque		mostly	some portion			2
Pasig			portions adjacent to Rizal province	center and rest	center and rest	4.5
Pateros		experienced	experienced	experienced		3
San Juan		central portion	remaining portion			2.5
Taguig		most area	some portion	some portion	some portion	2
Valenzuela	partly		rest of municipality	portions along the main road		3.5

Water Supply Conditons
(1) No water in daytime (2) Intermittent/Low pressure
(3) Low pressure: 0-5 psi (4) Moderate pressure: 6-15 psi
(5) High pressure: more than 16 psi

Sorce: Study on water supply and sewerage master plan of metro manila in the republic of the Philippines, Final report volume III supporting report, JICA, Feb. 1996.

Table I-17 WATER USAGE IN CEBU RESORT HOTELS

Name of the Hotel		SJ Hotel	MB Resort	CB Hotel	TB Hotel	CP Hotel	WF Hotel	EGI Resort	Total
Area (m^2)	Lot Area	130,000	50,000	17,600	-	68,200	14,500	-	
	Floor Area	-	1,520	9,000	-	-	3,000	-	
	Number of Stories	7	1	2 or 3	-	22	6	8	
Type of Resort		Beach Resort	Beach Resort	Beach Resort	Beach Resort	City Hotel	City Hotel	Condominium Hotel	
Resort Facilities in the Hotel		Restaurant, Gift Shop, Pool, Shower House, Function Room, Plants, etc.	Shooting Gallery, Tennis Court, Clinic, Restaurant, Gift Shop, Pool, Gazebo, Volleyball Area, Shower House, Function Room, Plants	Basket Ball, Tennis Court, Function Hall, Gazebo, Restaurant, Gift Shop, Shower Room, Pool, Volley Ball, Plants	Shooting Gallery, Tennis Court, Restaurant, Gift Shop, Pool, Shower House, Plants, Waverunner, Jacuzzi, Function	Mini-Golf, Sports Center, Tennis Court, Function Hall, Restaurant, Gift Shop, Plants	Pool, Beach Shower, Restaurant, Function Hall, Plants	Restaurant, Pool, Shower House, Plants, Function Room	
Number of the Guest Rooms	Single	232	66	0	-	-	-	-	
	Double	312	-	91	-	-	-	16	
	Family	-	12	9	0	-	-	-	
	Other	Suites 3	-	0	-	Selling Rooms 385	-	twin 36	
	Total	546	78	100	114	520	169	52	
Number of the Emolvees		770	175	115	178	546	390	25	
Number of the Guests in CY1997 (#/yr)		196,456	27,000 100 at full	50,000	2,000 300 at full	At Dec. 1997: 7,537 Estimated annualy: 75,000 Including Functions 47,435	36,500	- 100 at full Estimated annualy: 70,000	416,956 #/yr = 1,142 #/yr
Yearly Average Occupancy (%)		80	75	70	4	50	50	-	
Water from MCWD in CY1997 (m^3/yr)		1,928	3,193	18,057	743	106,460 at Dec. 1997 8,974	37,383	18,778	186,542
Water from Other Sorc	Quantity (m^3/yr)	400,000 1,140 m^3/day at	max 87,000 240 m^3/day at	5,500	0	100,000 at Dec. 1997 9,000	28,263		0 from desalination: 428,263
	Source of the Water	Desalination	deep well & softener	Truck Transportation from Remote Reservoir	-	from Deep Well	Desalination	-	from private well 192,500
Effluent Treatment		Activated Aeration, Sludge Anaerobic Digestion,	w/o treatment, dispose to sea, DENR requesting to install	unkown	unkown	Septic Tank, Discharge directly into ditch	Aeration type STP, Sludge to disposal, Effluent discharged to sea	Septic Tank to Canal	
Per Guest Water Consumption (m^3/#)	from MCWD	0.0	0.1	0.4	0.4	1.2	1.0	0.5	
	from Other Source	2.1	2.4	0.1	0.0	1.2	0.8	0.0	
	Total	2.1	2.5	0.5	0.4	2.4	1.8	0.5	
Per Lot Area Water Consumption (liter/day/m^2)	from MCWD	0.0	0.2	1.0	-	4.3	7.0	-	
	from Other Source	8.4	4.8	0.3	-	4.0	5.3	-	
	Total	8.4	5.0	1.3	-	8.3	12.3	-	

Table I-18 LIST OF DAMS

Number	Name of Dams	& Protected Area #. Mining Deposite	Latitude & Longitude	Region	Province	River	
						River System	Tributary
1-1	Cura		N18-09'10", E120-50'57"	WRR I	Ilocos Norte, Laoag City	Laoag	
1-2	Tina		N18-06'45", E120-50'23"	WRR I	Ilocos Norte, Laoag City	Laoag	
1-3	Gasgas	#	N18-04'55", E120-49'04"	WRR I	Ilocos Norte, Laoag City	Laoag	
2-1	Pafsiguan		N17-49'45", E120-43'47"	WRR I	Abra	Tineg	Pafsiguan
2-2	Nueva Era	#	-	WRR I	Ilocos Norte	Laoag	
3-1	Binongan	#	N17-45'00", E120-52'00"	WRR I	Abra	Abra	Binongan
3-2	*Tineg Weir*	#	-	*WRR I*	*Abra*	Abra	
4	Supo		N17-12', E120-40'	WRR I	Ilocos Sur/ Abra	Abra	Abra
5	Agbulu	#	N18-03', E121-07'	WRR II	Kalinga-Apayao	Abulug	Apayao
6	Gined	#	N18-05'18", E121-15'36"	WRR II	Kalinga-Apayao	Abulug	Apayao
7	Bantay		N17-54'52", E121-49'39"	WRR II	Cagayan	Cagayan	Paret
8	Chico IV	&, #	N17-23'18", E121-13'37"	WRR II	Kalinga-Apayao	Chico-Cagayan	Chico
9	Abuan	#	N17-05'05", E122-03'03"	WRR II	Kalinga-Apayao	Cagayan	Ilagan
10	*Mallig #2*	&	-	*WRR II*	*Kalinga-Apayao/Mountain*	Cagayan	Mallig
11	Siffu #1	&	-	WRR II	Mountain	Cagayan	Siffu
13	Maturo	&, #	N16-24'40", E121-03'20"	WRR II	Nueva Viscaya	Cagayan/ Magat	Maturo
14	Didu Yon	#	N16-15'57", E121-26'47"	WRR II	Quirino	Cagayan	Didu Yon
15	Maikong Dam	#	N16-37, E120-43'	WRR III	Benguet	Amburayan	Maikong
16	Amburayan Dam	#	N16-36', E120-40'	WRR III	Benguet	Amburayan	Amburayan
17	Boloc Dam II	&, #	N16-34', E120-49'	WRR III	Benguet	Agno	Agno
18	Mount Cons Dam	#	N16-32', E120-47'	WRR III	Benguet	Agno	Agno
21	Tebbo Dam	&, #	N16-15'20", E120-43'	WRR III	Benguet	Agno	Agno
22	San Roque	&, #	N16-07'54", E120-41'00"	WRR III	Pangasinan	Agno	Agno
23	Balog-Balog	#	N15-25'51", E120-21'18"	*WRR III*	*Tarlac*	*Agno*	*Tarlac/ Bulsa*
25	Abaca	&, #	-	WRR III	Nueva Viscaya	Cagayan	Casecnan-Abaca
26	Conwap	#	-	WRR III	Quirino	Cagayan	Casecnan
28	Umiray	#	-	WRR III	Quezon	Umiray	
29	Bayabas	#	N14-57, E121-07'	WRR III	Bulacan	Pampanga	Bayabas
30	Maasim	#	N15-00'02", E121-02'	WRR III	Bulacan	Pampanga	Maasim
31	Laiban	#	-	WRR III	Rizal/ Quezon	Agos	Kaliwa
32	*Kanan*	&, #	*N14-48'40", E121-30'42"*	*WRR IV*	*Quezon*	Agos	Kanan
34	Sipocot	&, #	N13-47', E122-57'	WRR V	Camarines Sur	Bicol	Sipcot
35	Talisay	#	N13-13', E123-28'	WRR V	Albay	Bicol	Talisay
36	Panai	&	N11-12'58", E122-27'09"	WRR VI	Capiz	Panay	Panay
37	Bago	&	N10-33'05", E123-00'18"	WRR VI	Negros Occ	Bago	Bago
38	Ilog No 1	&	N9-52', E122-51'	WRR VI	Negros Occ	Ilog-Hilabangan	Ilog
40	Maludog	#	-	WRR VII	Cebu	-	-
41	Mananga II	&, #	N10-09'39", E123-47'57"	WRR VII	Cebu	Mananga	Mananga
42	Lusaran	#	-	WRR VII	Cebu	Balamban	Balamban
43	Cebu Fo	#	-	WRR VII	Cebu		
44	Tupolo Dam Project		-	WRR VII	Bohol	Inabanga	Waig
45	Tumaga	&	-	WRR IX	Zamboanga Der Sur	Tumaga	Tumaga
46	Bulanog-Batang		-	WRR X	Bukidnon	Cagayan	Cagayan
47	Davao I		N7-35'30", E125-21'00"	WRR XI	Davao der Sur	Davao	Davao
48	Davao II		-	WRR XI	Davao der Sur	Davao	Davao
49	Davao IIR		N7-16'30",E125-18'50"	WRR XI	Davao der Sur	Davao	Suwawan
50	Dimulec		N6-20'20", E125-24'	WRR XI	Davao der Sur	Buayan-Malungun	
51	*Pulangi III*	#	*N7-57'00", E125-16'00"*	*WRR XII*	*Bukidnon*	*Pulangi*	*Pulangi*
52	Maganoy Multi		N6-30', E124-30'	WRR XII	Sultan Kudarat	Cabilanan	Cabilanan

Table I-19 STRATEGY OF ECO-DAM

ECO-DAM: Wonderland Meshed with Forest and Lake

BIO-TORP FORMATION

Strategy 1	Action
Environmental Assessment	■Environmental Assessment ■Follow Up Monitoring

Strategy 2	Action
Setting the Route and Site of the Related Facilities	■Related Road ■Production Site of Dam Material

Maximum possible consideration are taken when the route and the site of the related facilities are set

Strategy 3	Action
Minimizing the Area of the Environmental Change	■Related Road ■Remaining Soil ■Test Water Storage ■Temporary Road

Employ the plan, structure and method of construction that minimize the change of the living and growing environment of the animals and plants.

Strategy 4	Action
Prompt Recovery of the Temporary Change	■Denuded Land ■Land after the Temporary Facilities Removal

Promote the prompt recovery of the ecosystem when temporary change is incurred

Strategy 5	Action
Reducing the Adverse Effect When Permanent Environmental Change is Conducted	■Lost of the Living and Gerning Site ■Cutting off the Living Site ■Construction Conducted ■Operational Facility ■Catch the Invader

Reduce the each advance effects when permanent environmental change is conducted

Strategy 6	Action
Formation of New Environment that Presents Living Spaces for Various	■Paradise for Various Living Creatures ■Related Facilities

Form the new environment and device the related facilities that present living spaces for various living creatures

Strategy 7	Action
Reduce the Soil Erosion and Soil Precipitation Rate in the Reservoir	■Soil Protection and Watershed Management ■Sabo Dam at the Mouth of the Influent River ■Forest Protection ■Reforestation in the Watershed

Reduce the soil erosion in the watershed of the reservoir, and also reduce the soil precipitation rate in the reservoir

ECO-SCHOOL EDUCATION

Strategy 1	Action
Experience and Study the Nature System	■Eco Museum ■Nature Observation Meeting ■Pamphlet

Furnish the site for visitors to experience and study the nature system

Strategy 2	Action
Base Site for Eco Tour	■Base Site Facilities ■Service for the visiting tourist groups

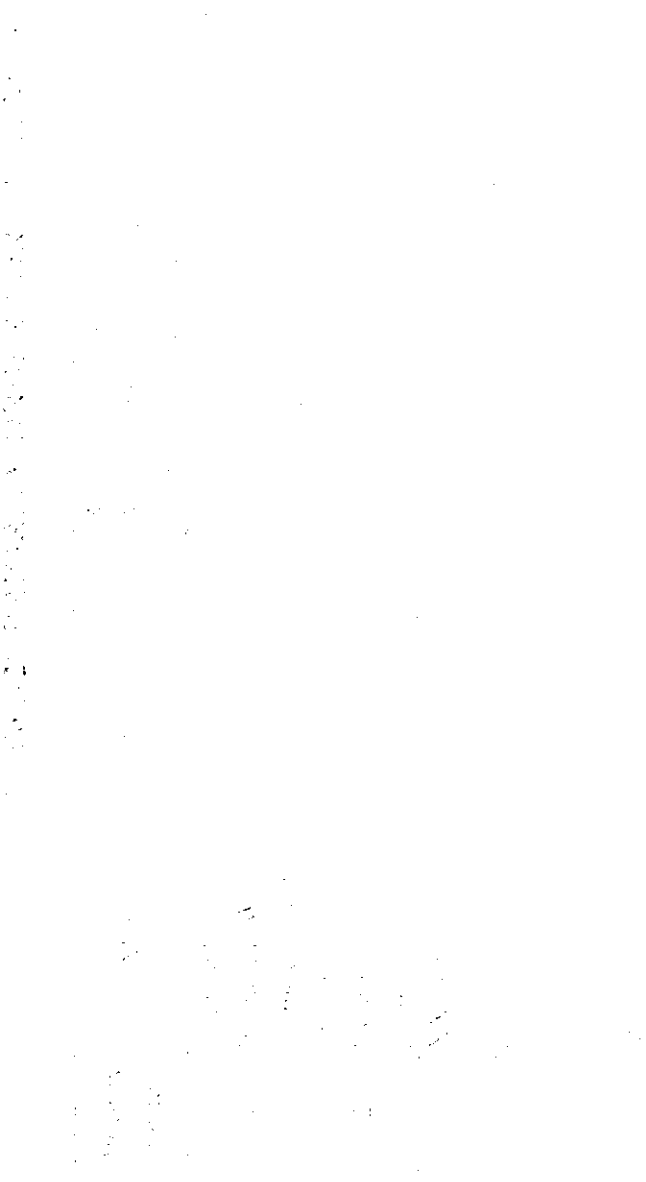
Base site setting for Eco Tour into the surrounding forests

Strategy 3	Action
Checkpoit for Forest Entrance	■Eco Museum ■Sightseeing Route ■Reservoir

Dam and reservoir can function as the check point for forest entrance of visitors

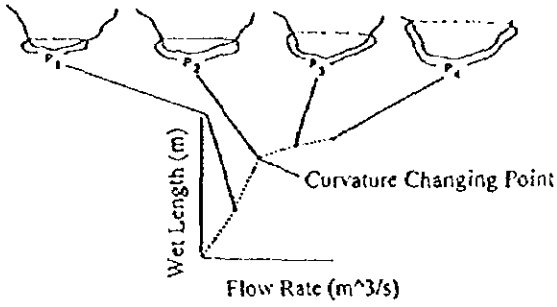
Table I-20 PRIORITY ORDER FOR EACH MENU

Priority Order	Menu	Its Possibility	Total Cost	Redemption Amount Per Year	Expected Developmental Water Volume	Cost-Benefit Analysis	Environmental and Social Restriction	Secondary Benefit
1	Change the Irrigation Water to Domestic Water						Social Restriction	
2	Improve the Existing Distribution Line							Sanitation Improvement
3	XX Dam Project						In the NIPAS Protected Area	
4	Usage of the Reclaimed Water							Water Quality Improvement
5	QQ Dam Project						Existence of the Minority Group, and the Endangered Species	
6	Recharge of the Groundwater	Limited Water Source						



Part – I

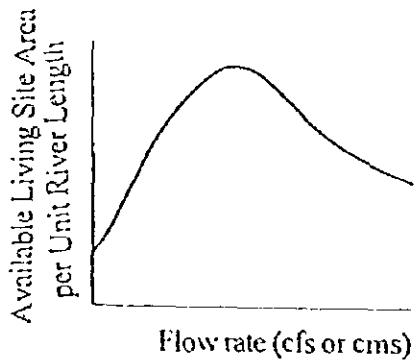
Figures



Riverfront Information No.16 (1997-1)

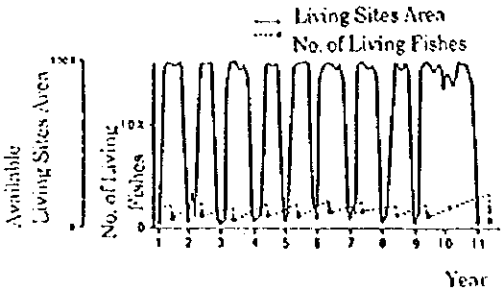
Figure I-1 WET LENGTH METHOD

(in a river, at a site, for a species of fish, on a living step)



Riverfront Information No.17 (1997-2)

Figure I-2 AN EXAMPLE OF THE FLOW-LIVING SITES QUANTITY RELATIONSHIP OBTAINED BY PHABSIM



Solid Line: Time Series of the Living Sites Area (Calculated)

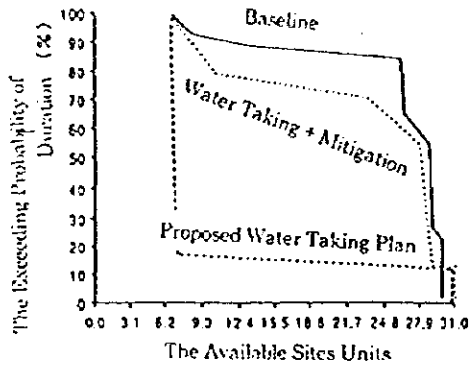
Circle: Each Minimum Flow

Square: Observed Number of Living Fishes

Interrupted Line: Estimation of the Trend of the Living Fishes

Riverfront Information No.18 (1997-3)

Figure I-3 AN EXAMPLE OF A TIME SERIES OF THE AVAILABLE LIVING SITES AREA OBTAINED WITH IFIM METHOD



Riverfront Information No.18 (1997-3)

Figure I-4 THE EXCEEDING PROBABILITY OF DURATION FOR THE AVAILABLE LIVING SITES UNITS (AN EXAMPLE)

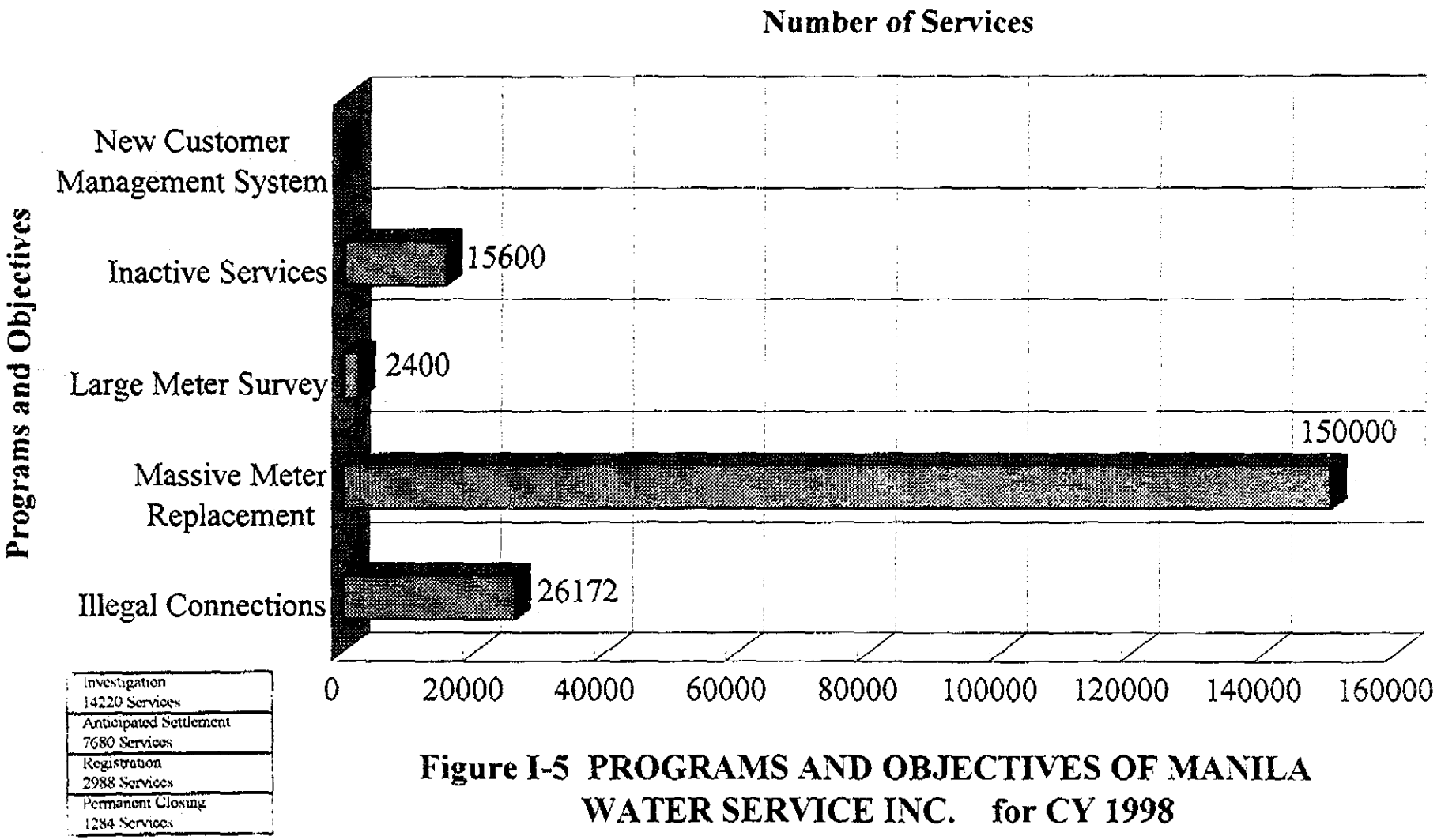


Figure I-5 PROGRAMS AND OBJECTIVES OF MANILA WATER SERVICE INC. for CY 1998

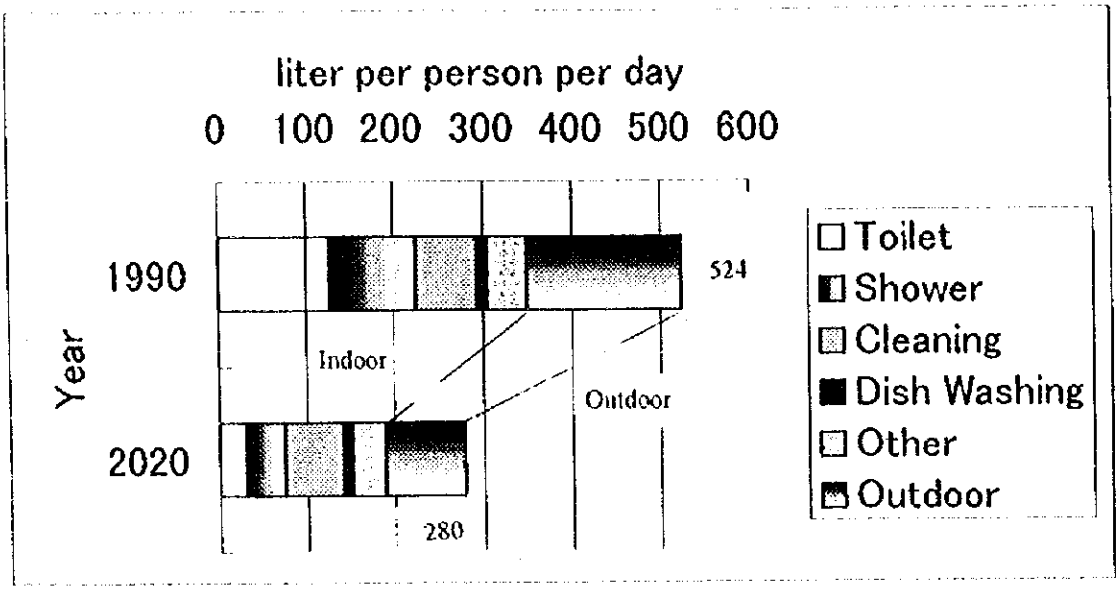


Figure I-6 WATER USAGE FOR EACH PURPOSE (CALIFORNIA WATER 2020) CY1990(RESULTS) AND CY2020 (WATER ENVIRONMENTAL VISION)

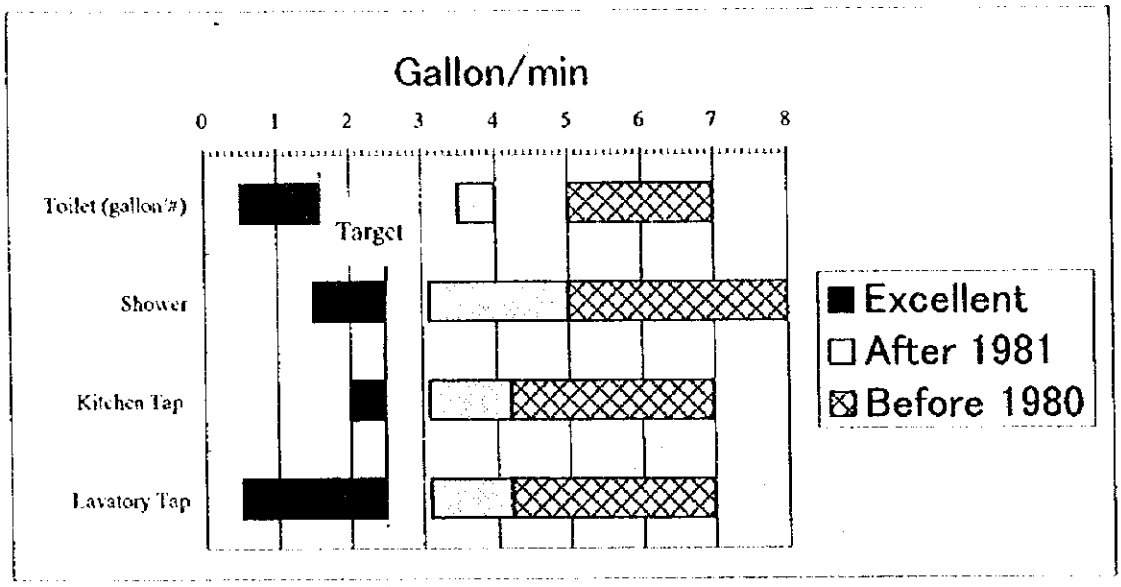


Figure I-7 SAVE WATER EXTENT OF EACH EQUIPMENT COMPARISON BETWEEN OLD AND EXCELLENT ONE

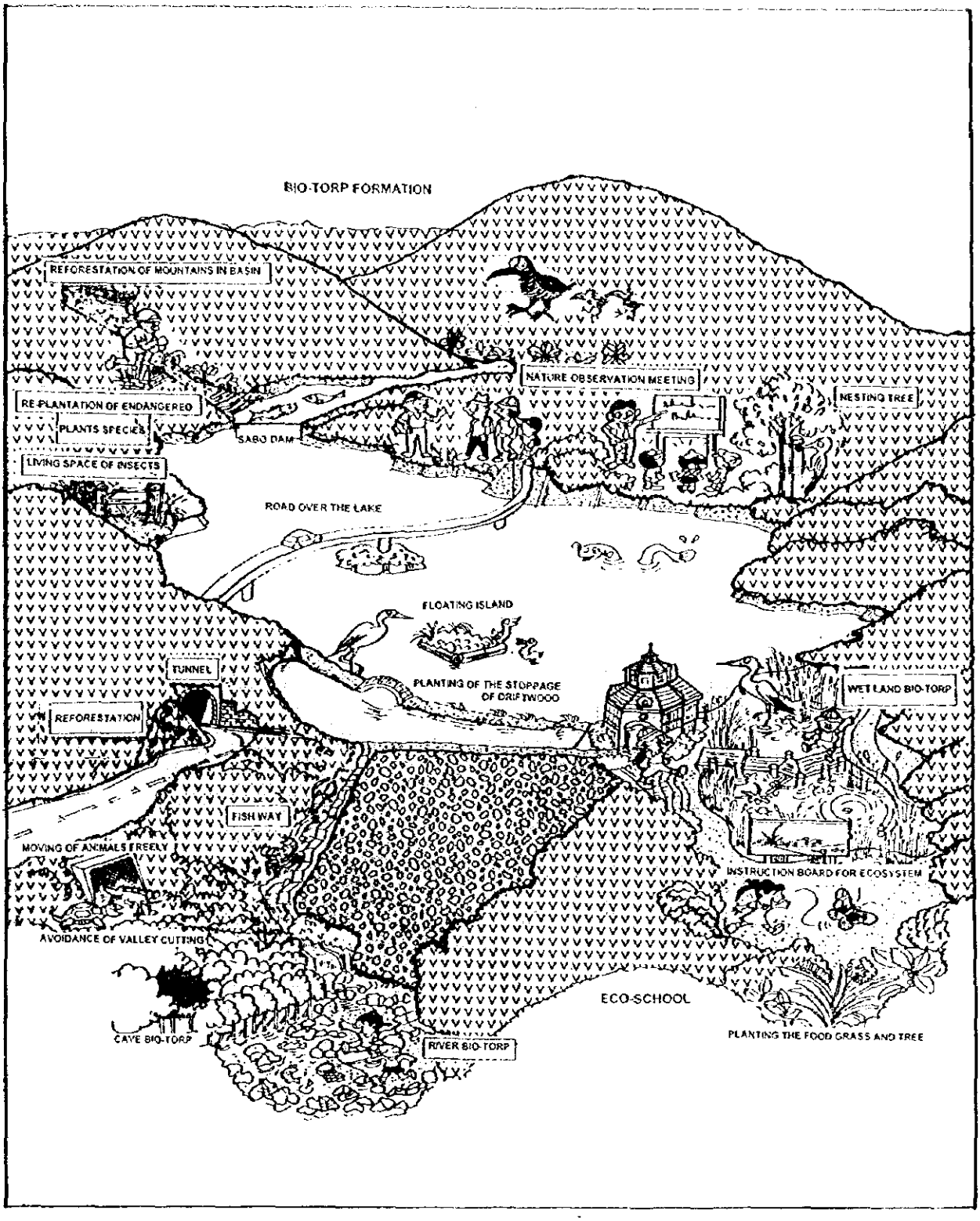


Figure I-8 IMAGE OF ECO-DAM

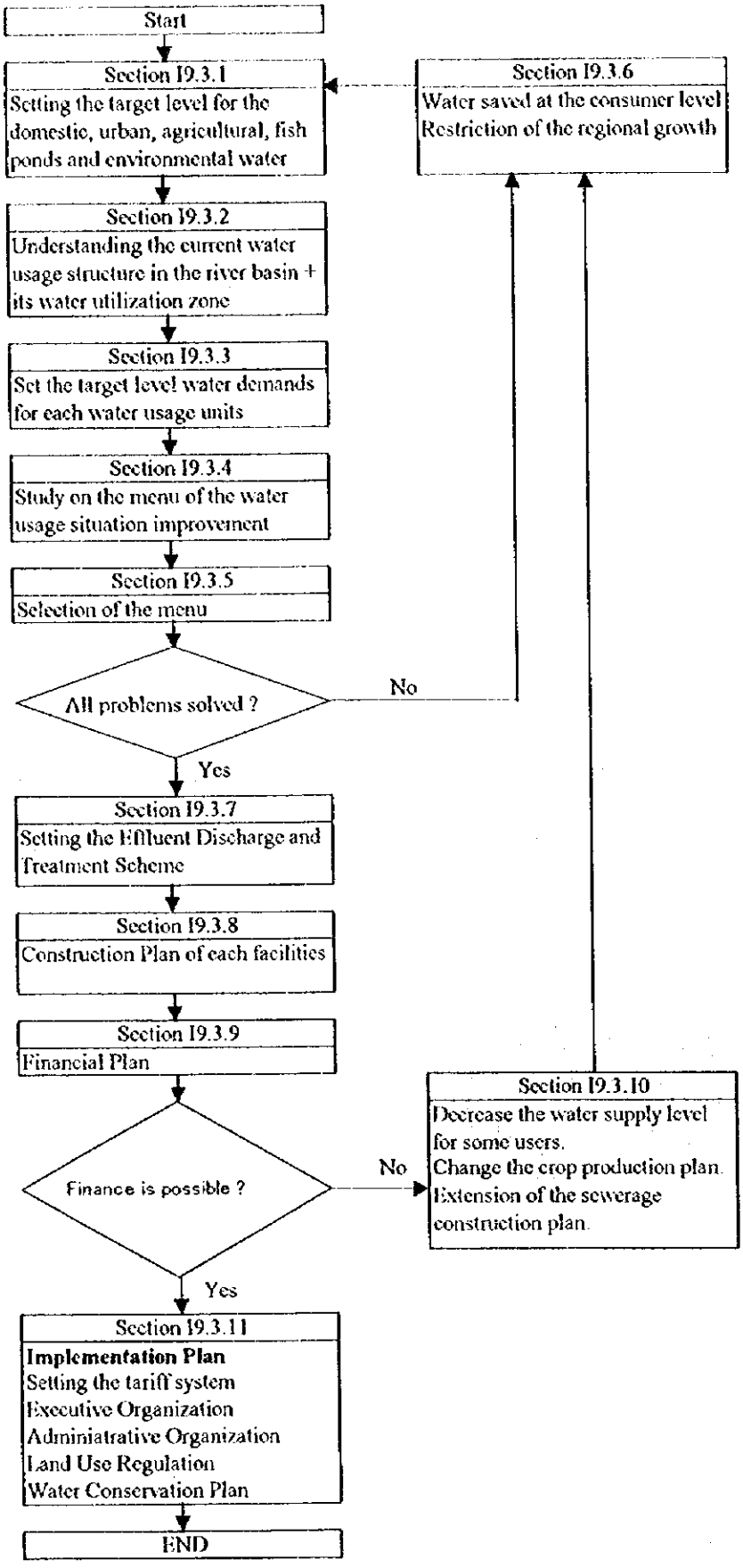


Figure I-9 WATER RESOURCES MANAGEMENT - MAIN PLAN, FLOWCHART

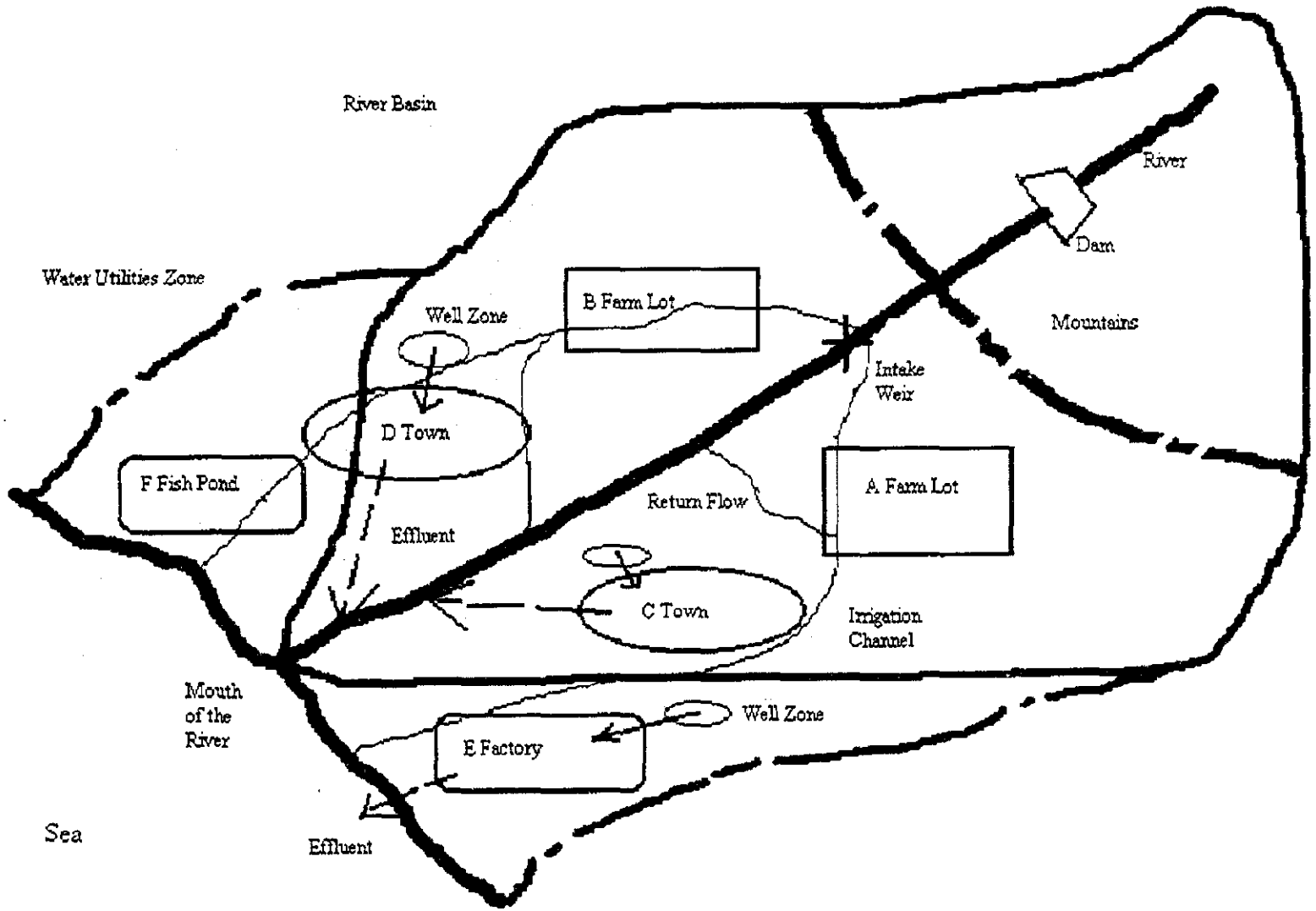


Figure I-10 CURRENT WATER STAGE

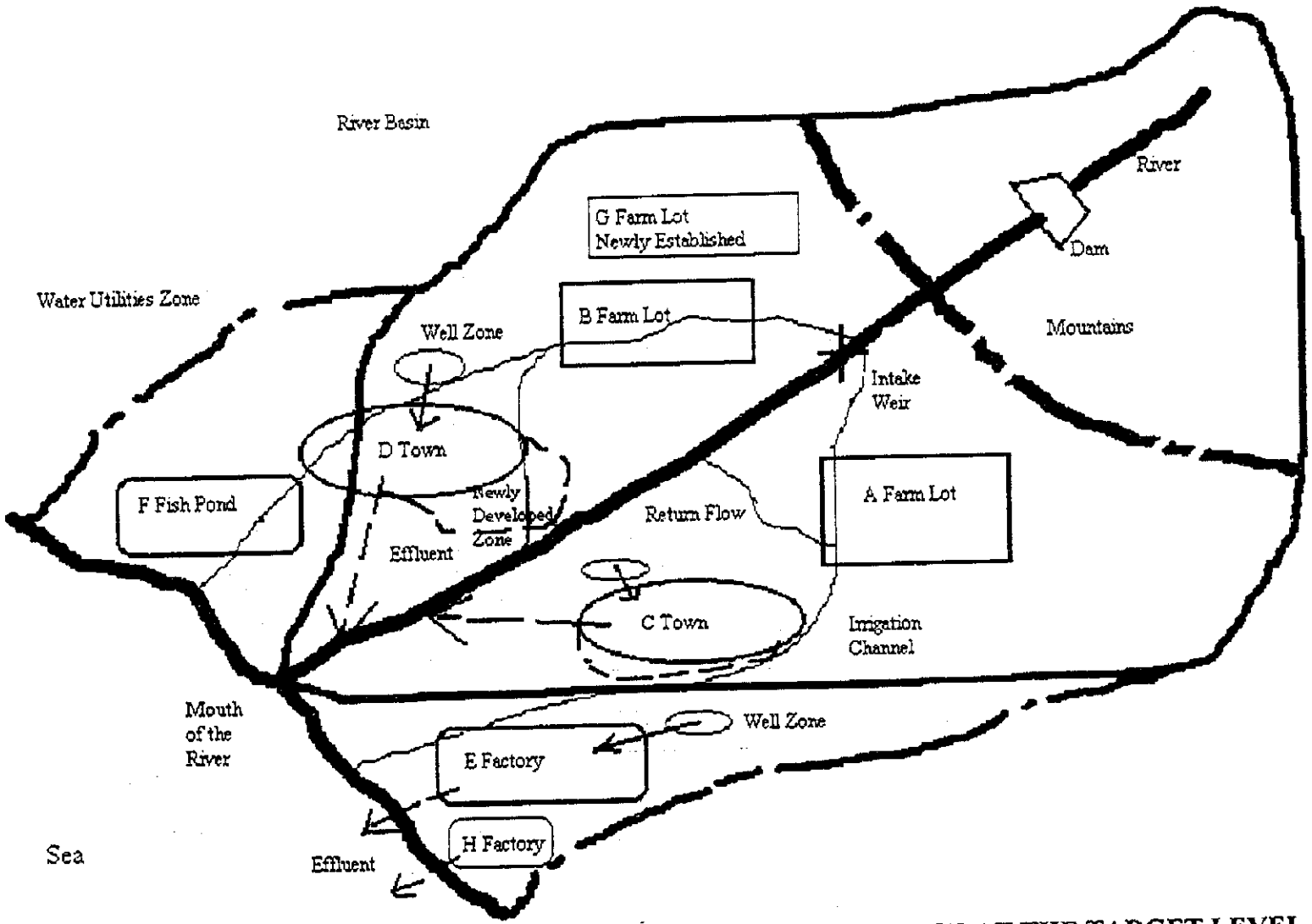


Figure I-11 WATER USAGE AT THE TARGET LEVEL

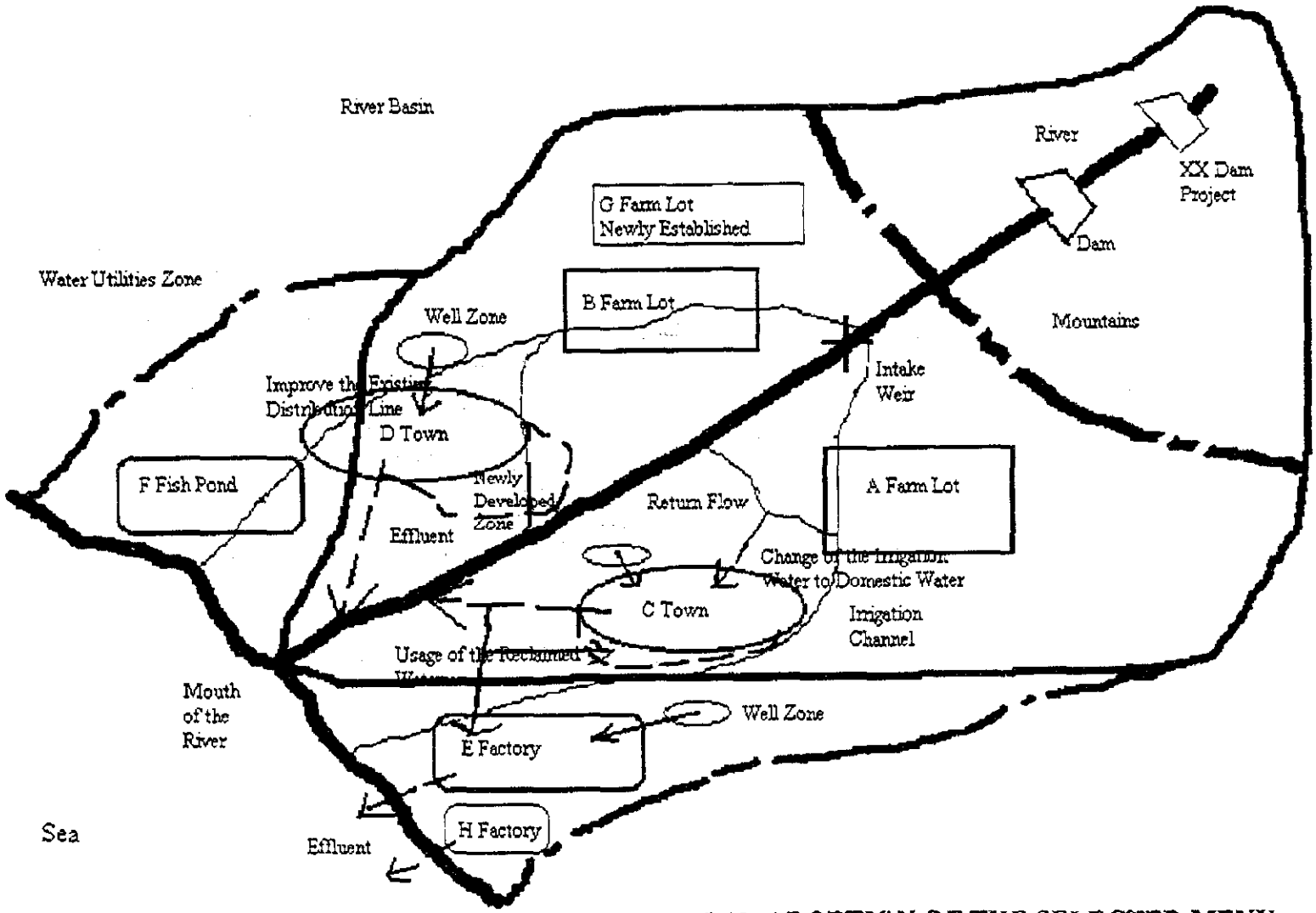


Figure I-12 ADOPTION OF THE SELECTED MENU

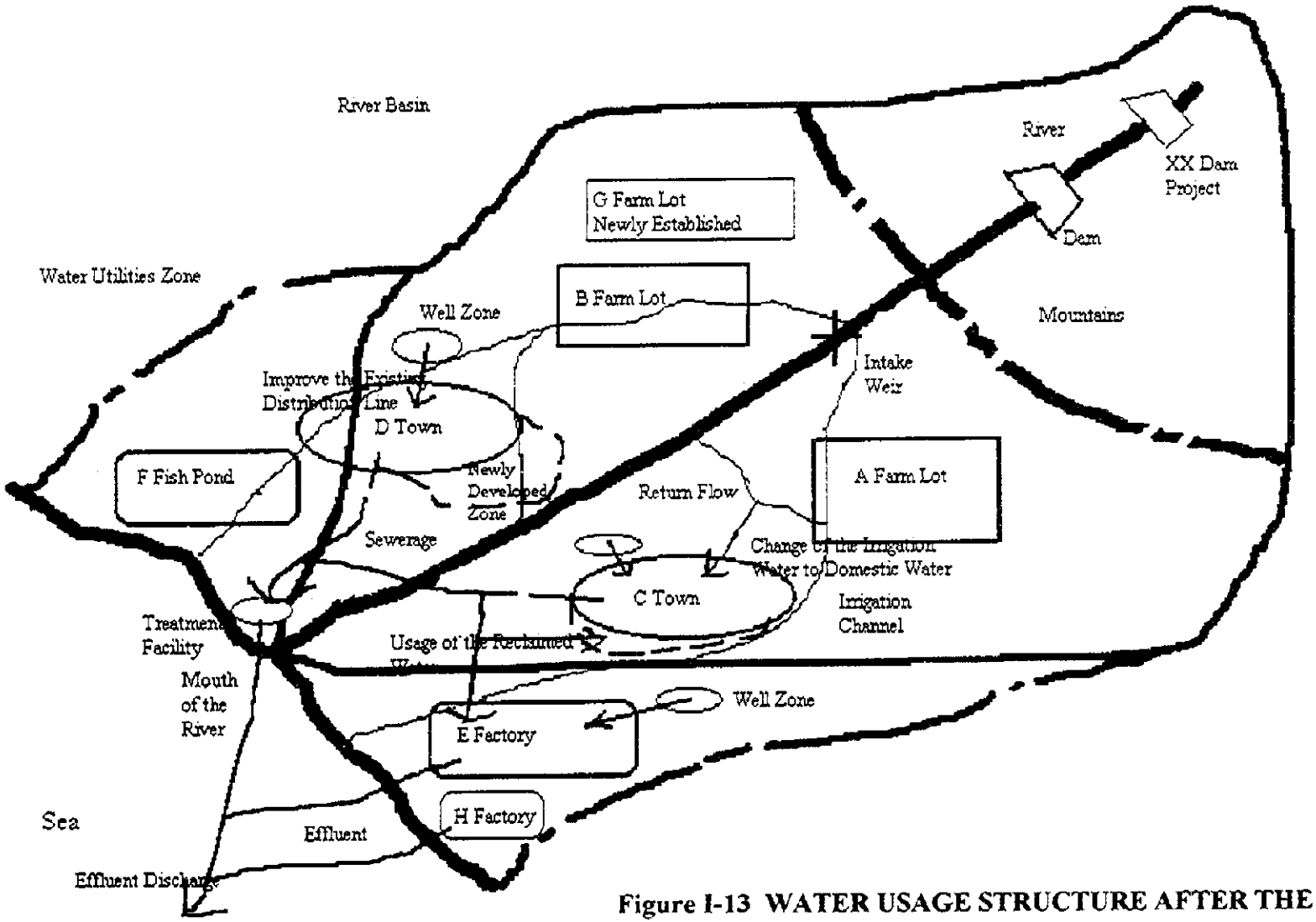


Figure I-13 WATER USAGE STRUCTURE AFTER THE ADOPTION OF THE EFFLUENT DISCHARGE AND TREATMENT SCHEME