

ANNEX – 10

RIVER ENVIRONMENT

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1 Present Condition

The Brantas River waters are used for drinking water, agriculture, fisheries waste disposal and others. Rapid development and increased human activity is causing alarming increase in pollution and is severely limiting availability of clean water. The PROKASIH 2005 Vision have classified the river environment into four functional areas (the Upper Course, Rural Areas, Urban Areas, and the Lower Course), and with modifications they apply to the Brantas river. The supply of Brantas river water for most of the above area was generally decreasing, both in the discharge of flow especially during the dry season and in the quality of water. It was ascertained that the deterioration of water quality cannot be easily restored and had caused varying degrees of destruction to the ecological system in the Brantas basin.

The river environment needs pollution control and river conservation to be on a convergent path for a workable river management plan. PROKASIH 2005 Vision had also reiterated it as "the problem of water supply in broad outline includes the problem of quality and quantity". For the management to succeed, "one river, one plan and one coordination management" will have to be adapted urgently by the PJT.

2 Preservation of Biodiversity

Biological diversity which is often shortened to biodiversity in the Brantas River is important which flows through nine regencies and is rich in plant and animal life. The perceptions about the preservation of fauna and flora have changed all over the world, just 10 years ago it was considered that biotic preservation was only for the future uses of genetic material contained in the animal and plant life. Now rightly the present trend and research sees the value of biodiversity as a source of resilience of ecosystems. This is exactly how the biota of the Brantas river should be treated. In concrete terms, the individual organisms present in the Brantas basin which collectively make up the biota have specific properties that make them of a given value in satisfying the consumption or production needs in East Java.

The present land use in the Brantas river basin is 57% farmland, 26% forests, 14% homesteads, and 3% for other area. In the future, as per "Land Use Plan in East Java Province 2008" the overall farmland area is estimated to decrease. However, the forest and homestead are estimated to increase by 10.2% and 21.8% at an annual rate of 0.54% and 1.1% from 1990 to 2008. Meanwhile, the Forestry Department, Surabaya, has a planned project of plantation of 50 million samplings in the upper Brantas river area. This will be implemented by related agencies. This activity would help in land rehabilitation and the preservation of the existing plant life in the future.

The biota of Brantas river is in all the most important cases a public and an economic good. The keystone species (chanos chanos, gorami etc.) have an insurance value and this insurance value depends on their contribution to economic resilience. A survey of biodiversity for the dry and rainy seasons was designed and carried out, and Attachment-1 provides information about the existing 16 indigenous fish.

3 Results of the Biodiversity Inventory Survey

During the biodiversity inventory survey, it had been found that between 1970 and 1997 there had been a loss of more than 70 species of fish, these may have been due the following factors, (1) change of fish habitat naturally or by other factors; (2) the indigenous fish fail in competition with non indigenous species which come from other habitat; (3) uncontrolled fish catchment. A total of 51 fish were caught and recorded during the dry and rainy season, among these only 16 were identified as indigenous to Brantas river. Details are provided in Attachment-1.

Out of a total of 51 fish caught, the table of Attachment-1 below provides two types of indicator species for clean water, and polluted water species. The clean water indicator fish only thrive in clean environment, whereas the polluted water indicator fish are tolerant to pollution loads water and were generally located in the lower Brantas.

4 River Continuum Concept

A brief introduction is provided about the River Continuum Concept (RCC) which was developed in North America about twenty years ago. This method in the Brantas river context may provide for a better tracking system for the preservation of fauna and flora. It supports the theory of a continuous transition in the functioning and productivity along the main river basin. Although the Brantas river has been dammed and has barrages constructed breaking the river's continuity. For it to become a continuous water body for the fauna fish-ways and passages for animal migration will have to be provided.

In RCC drainage networks form a predictable continuum of increasing channel size and associated biological characteristics. Stream morphology, current velocity, substrate composition, temperature, food sources all interact to influence food availability to invertebrates, and these interactions vary systematically with stream order thereby regulating distribution patterns of invertebrate functioning feeding groups (Hawkins and Sedell 1981). These feeding groups are referred to as scrapers, collector-filterers, collector-gatherers, predators and shredders. Under unperurbed conditions, headwater or source areas are normally dominated by shredders and collectors.

Features of the 3 Reaches of an Idealized River System from the Perspective of RCC

	Brantas Upper Reaches	Brantas Middle Reaches	Brantas Lower Reaches
Temperature	Cool, low amplitude	High amplitude	Moderate amplitude
P/R*	< 1.0	> 1.0	< 1.0
Energy Source	Terrestrial detritus	In situ PP**	Transport detritus
Bottom light	Low	High	Low
Nutrient availability	Low	High	Low
Attached Algae	Sparse	Abundant	Sparse
Submerged angiosperms	Absent	Abundant	Sparse
Plankton	Absent	Absent	Present
Leaf litter	Abundant	Sparse	Negligible
Invertebrates			
Shredders	Co-dominant	Rare	Absent
Collectors	Co-dominant	Co-dominant	Dominant
Grazers	Sparse	Co-dominant	Absent
Predators	Low	Low	Low
Fish fauna	Cool-water invertivores	Piscivores & invertivores	Planktivores & bottom feeders
Environmental diversity	Low		Low
Biodiversity	Low	High	Low

*P/R= Production/Nutrient Regeneration Flux; **PP=Primary Production

Source: The Rivers Handbook, Volume 1, Ed. Peter Callow & Geoffrey Petts

To a greater extent the above general pattern appears to hold worldwide the exact nature and rate of change does vary from river to river depending on catchment characteristics and water chemistry origin (Omerod and Edwards 1987) and on the efficiency of retention of sediments and organic matter (Cummins 1988). As the RCC was developed in North America under prevailing conditions there, the Brantas river in East Java may show divergence from the

original model. The value of RCC is in the adaptability of useful methodology for biodiversity preservation in the Brantas basin.

In the RCC scheme, at unperturbed sites, densities of scrapers exceeded those of collector-filterers and collector-gatherers combined, reflecting the normal autotrophic nature. As water quality degrades, the functional groups respond in a manner predicted by the RCC (e.g. the percentage density of scrapers decreased from a high of 45% to less than 1% at the most polluted sites) and the system became heterotrophic. This change had occurred in the absence of any longitudinal gradient, this suggests that organic pollution can reset the normal sequence of feeding group shifts and convert from one state to another which would normally be found farther downstream in much larger river. When the water quality improved due to pollution abatement, the ratio of collector-filterers and scrapers to collector-gatherers increased, indicating that the river was returning to its normal condition.

The same process was described by Vannote (1980) and Minshall (1985) as depicting the change in relative abundance of invertebrate functional groups along a river from head water to mouth. The RCC can be divided into three types of channel litter dominated, usually source / headwater, river basin characterized by shredders and collectors. The middle portion which is generally relatively wide and shallow where light and nutrients favor benthic algae production, characterized by scrapers; and lower reaches/delta where high levels of fine particulate organic matter from upstream inputs favor collectors.

5 Regulations Relevant to the Brantas River Environment

5.1 River Area

"The Ecology of Java and Bali" by T. Whitten et. al., 1996, in the Ecology of Indonesia Series, Volume II, describes the Brantas river as follows: "The Brantas is a peculiarly-shaped river draining water from an area of over 11,000 km² from the southern slope of Mt. Kawi-Kelud-Butak, Mt. Willis, and the northern slopes of Mt. Liman-Limas, Mt. Welirang, and Mt. Anjasmoro. At Mojokerto the river starts to divide between the R. Porong to the south and the R. Surabaya to the north. Between the two is an alluvial area comprising some tens of metres of alluvial deposits sitting on mid-Pleistocene marine deposits. Indeed Mojokerto, now 30 km from the sea, was a port in a major estuary and was used by sea-going vessels from at least the tenth century until the end of the fourteenth century. The change was due to the increase in river-borne silt, and since 1880 the delta at the mouth of the Porong has been actively forming (Hoekstra 1987; Erfteemeijer and Djuharsa 1988). Eighty years ago the serious condition of the Brantas watershed as a result of deforestation had already been noted (Altona 1913). In the dry season water was not always available for irrigation, and siltation made rivers more susceptible to flooding and obstructed shipping around Surabaya. The situation had been aggravated by the large quantities of ash spewed out from Mt. Kelud near Blitar, and the mud flows or lahars which plagued the country around the volcano. Considerable land management has been and is being effected to control erosion and sedimentation, and an integrated resource and land use plan for the Brantas watershed has recently been completed (Taylor and Soetarto 1993)" This passage provides an appropriate introduction and setting to the river area and its environment.

There are many factors which determine the physical processes in rivers and their area. According to Church, 1992 (Channel Morphology and Typology, The Rivers Handbook, Vol.1), the primary factors responsible are the volume and time distribution from upstream; the volume, timing and character of sediment; the nature of materials through which the river flows; the local geological history of the riverine landscape. The river area is affected also by local climate, the nature of plant biodiversity, and land use in the drainage basin. In addition, geological history and physiographic setting are constraints for the Brantas river area. The Brantas river has a distinct upper, middle and downstream area, which circles around most of East Java. In addition many human activities alter river areas.

5.1.1 Definition of River Area

The definition as provided by the Ministry of Public Works (Himpunan Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat) states that rivers are spaces and containing areas, as well as discharging networks from their source/spring to the delta/estuary. The left and right sides are limited by border line along its discharge path. Also, the river border line is the outside border line of river pacification. The border area is the area along the river sides including man-made river, which has vital benefit to maintain the preservation of the lake / reservoir's function. The lake / reservoir border area is the specified area surrounding lake / reservoir which has vital benefit to maintain the preservation of the river's function. The river benefit area is the spring, riverbed and border area which have been exempted. The river authority area is the flood

land, retention area, flood plain or border area which is not exempted.

The Government of Indonesia, Ministry of Public Works **Regulation No. 63/PRT/1993** on River Border Line, River Benefit Area, River Authority Area and Ex. River provide the following definitions:

Article 6

- (1) The border line of the river with embankment is stipulated as follows:
 - A. Border line of the river with embankment outside urban area is at least 5 meters outside along the embankment base.
 - B. Border line of the river with embankment within urban areas is at least 3 meters outside along the embankment base.
- (2) Considering the function improvement, the embankment as stated in clause (1) could be strengthened, widened, which could result in shifting the river border line position.
- (3) Excepting the state-owned land, the required land for new embankment base due to the implementation of clause (2) should be exempted.

Article 7

- (1) The establishment of river border line without embankment outside the urban areas:
 - A. Large river is the river having a river basin of 500 sq. km. or more.
 - B. Small river is the river having a river basin of less than 500 sq. km.
- (2) The establishment of river border line without embankment outside the urban areas on the large river is conducted per river section considering the extent of river basin in related river section.
- (3) The river border line without embankment outside urban areas on the large river is at least 100 meters, while on the small river is at least 50 meters, measured from the river

Article 8

The establishment of the river borderline without embankment within urban area is based upon the following criteria:

- A. The river with a depth of not more than 3 meters, the borderline is at least 10 meters from the river edge in the specified time.
- B. The river with the depth of not more than 3 meters and up to 20 meters, the border line is at least 15 meters from the river edge in the specified time.

- C. The river with the maximum depth of more than 20 meters, the border line is at least 30 meters from the river edge in the specified time.

Article 9

- (1) The river border line without embankment bordering on the road is the edge of the related road under the condition that construction and road use should ensure the preservation and the safety of river with its structures.
- (2) In case, the stipulation stated on clause (1) is not fulfilled, all improvement upon the damage of the river and its structures is on the road organizer's responsibility.

Article 10

The establishment of the border line of lake, reservoir, spring and river which are influenced by the rise and fall of the tides of sea water follows the criteria stipulated by Presidential Decree No. 32 Year 1990 on the Management of Protected Area, as follows:

- A. For the lake and reservoir, the border line is at least 50 meters from the highest tides point to the direction of land.
- B. For the spring the border line is at least 200 meters surrounding it.
- C. For the river influenced by the rise and fall of the tides of sea water, the border line is at least 100 meters from the river edge and functions as the green lane.

The Regional Regulations of East Java Province (Establishment of Protection Area Within East Java Province, 1991) has the following definitions:

Article 12

River border as stated in Article 5, point b, in this regulation is stipulated under the following criteria:

- a. At large rivers outside of the settlement area the border is at least 100 meters;
- b. At tributaries outside of settlement area the border is at least 50 meters;
- c. At large rivers and their tributaries inside the settlement area the border is 15 meters.

Article 13

Protection and river border determined based on the criteria stated on Article 12 in this regulation:

- a. For the river with an embankment the border is measured from the left and right sides of the embankment outside part along the embankment.
- b. For river without embankment it is measured from the highest flood point to the

direction of the main land.

Article 14

Area surrounding the lake / reservoir as stated in Article 5, point c stipulates under the criteria that along the edge of lake / reservoir has a proportional width and the physical condition and the shape of the lake / reservoir is between 50 to 100 meters measured from the highest tide in the direction of the main land.

5.1.2 National & Provincial Regulations & Rules to Maintain the River Area

The primary regulation is the Government of the Republic of Indonesia Regulation No. 35, 1991 which considers:

- (a) that rivers as a water source has the most important function in fulfilling the people's requirement and in grading up the national development;
- (b) that in this connection and as realization of the Regulation No. 11, 1974 on Waters in frame of utilization and preservation it is considered necessary to conclude a regulation on rivers covering river protection, development, utilization and control under a Government Regulation.

The Regulation No. 35 refers to:

1. Article 5 section (2) of the Constitution 1945;
2. Order No. 5, 1974 on the Regional Authority Basics;
3. Order No. 4, Year 1982 on the Basic Regulation on Environmental Management
4. Government Regulation No. 22, 1982 on the Water Management Method

Furthermore, to keep the preservation and continuity of function of the river as a water source, in frame of the executing the river authority, it is necessary to decide a river area lines along the river.

At the land which is bordered by such river area line, limitations shall be regulated on the land utilization either at the river utilization or authority area. The additional regulations for

Article 1 (General Condition)

1. Rivers are places of storage including networks of watersheds starting from a water spring to a river mouth with borders at both right and left sides and along a river length by river area lines.
2. Lake is a part of a river which is wide with a depth which is naturally deeper than other section of the river concerned.

3. Reservoir is a water storage which is created as the result of a construction of river structure in this relation a dam, in form of a river body / channel / bed.
4. River basin is a waters management area unit as a result of development of one or more of river stretches.
5. River bank is a land along each side of a riverbed measured from the edge to the inner side of the river embankment foot.
6. River structures are constructions having a function related with river protection, extension, utilization and control.
7. River area lines are outer lines of river area protection.

The meaning of riverbed is a basin which is formed naturally by water flow, or excavation to flow a certain amount of water.

Article 2 (Scope of Regulation)

The scope of river regulation based on this Government Regulation shall cover the protection, development, utilization and control of river including lake and reservoir.

The meaning of river protection is the effort to protect river from damages caused by human and natural treatments. River development is the effort carried out to improve the maximum utilization of river function without damaging the river and environmental balance. River control is the effort to make a firmer all year long river flow, to get the maximum river benefit, and to reduce / eliminate the water damaging power to the river and environment.

Article 4

1. River area lines of embanked rivers shall be decided at width limit of at least five (5) meters outer side along the embankment foot.
2. River area lines of non-embarked rivers decided based on technical and socio-economic considerations by the authorized official.
3. River area lines of both embanked and non-embanked rivers at the city area and along the road shall be separately decided by the authorized official.

The above are included in the river utilization area are the water spring, riverbed, and the unacquainted river lines area. Included in the river authority area is the flood ground, retention area, river bank or the unacquainted river lines area.

Article 6

1. Operation of land at the river utility area shall be executed by the Minister.
2. Land utilization at the river utility area and the river authority shall be executed based on regulations concluded by the Minister.
3. Land utilization at the extinct river shall be further arranged by the Minister.

Article 7 (River Function)

2. The river as referred in section (1) shall be protected for preservation, upgrading of function and utilization, and kept from damaging the environment.

Article 9

1. Authority and responsibility for river development as referred in Article 8 can be authorized to a State owned corporation.

The said State owned corporation has a main duty to develop and to use water and/or water source for the public welfare and to preserve the environmental condition. Such State owned corporation under the control of the Minister.

Article 11 (River Planning)

2. Planning as referred shall cover the activities of:

(c) observation and evaluation of flood, water balance, and water quality.

Article 13

1. Exploitation and maintenance of river and river structures covering design, construction, supervision, and evaluation.
2. Exploitation and maintenance as referred in Section (1) which construction performed by a legal body, social, or private body as referred in Article 12 section (2), shall be executed by the concerned.
3. Exploitation and maintenance as referred in Section (1) which is aimed for public welfare and safety in frame of river development executed by the Government or State owned corporation.

Article 16

1. Management of reservoir which shall be an activity consisting of exploitation and maintenance of reservoir.
2. Exploitation and maintenance of reservoir shall be an activity which is performed to keep the continuity of reservoir function in accordance with the objective of the related construction.
3. Exploitation and maintenance of reservoir shall cover the activities of:
 - a. reservoir water level monitoring;
 - b. management of dam maintenance;
 - c. management or reporting, evaluation and flood warning report.

Article 22 (River Protection)

1. The authorized official together with other parties concerned, respectively in conformity with their authority and responsibility, shall carry out the river protection and surrounding area covering:
 - a. Management of the river basin area;
 - b. Control of water damaging power;
 - c. Control of river flow.

The control of river flow as referred in sub-section c. of this section shall include also the exploitation and maintenance activity of the river structure.

Article 27 (Obligation and Prohibition)

It is prohibited to throw any waste/material either solid and/or liquid or in a form of sewage into or surrounding the river which is estimated or predicted to cause pollution or decrease water quality, which might endanger and/or inflict a loss to the other water utilization and environment.

The meaning of estimated or predictable to cause a pollution or reducing the water quality as stated in this article, if the quantity and quality of the related sewage exceeding a certain limit.

Such limit shall be decided by the authorized official based on some special considerations on hydrological characteristic of the related river also the situation of water utilization.

Article 31 (Costs)

1. The cost of exploitation and maintenance of river and river structure for the purpose of public welfare and/or safety shall be borne by the Government or State owned corporation according to the respective authority and responsibility.
2. The cost of exploitation and maintenance of river and/or river structure as referred in Article 13 Section (3) shall be borne by the legal body, social or private body concerned.
3. The people who directly obtain the advantage from the river structure as referred in section (1), can be included in financing the said exploitation and maintenance in conformity with the importance and capability of the people concerned.

In addition, there are many East Java Provincial regulations which were implemented between 1989 and 1996 which are relevant for the River Environment.

- (1) Provincial Regulation No. 8, 1989 for Water Pollution Control in E. Java.
- (2) E. Java Provincial Governor's Decree No. 35, 1993 for E. Java Provincial Commission of Environmental Pollution Control and Prevention.
- (3) E. Java Provincial Governor's Decree No. 15, 1993 for the Implementation of Pollution Control and Prevention.
- (4) E. Java Provincial Governor's Decree No. 135, 1994 for Implementation Guideline of Provincial Control and Prevention.
- (5) E. Java Provincial Governor's Instruction No. 22, 1994 on Intensified Monitoring of Potential Polluter Industries within the Framework of Environmental Pollution Control.
- (6) E. Java Provincial Governor's Decree No. 136, 1994 for Quality Standard of Industrial Liquid Waste and Other Business Activities.
- (7) E. Java Provincial Governor's Decree No. 42 of 1995 of Delegation of Authority and License Approval for Liquid Waste Disposal to Water Resources in River Areas.
- (8) E. Java Provincial Governor's Decree No. 188/291/SK/014/1994 on Laboratory Appointment in the Framework of Monitoring and Supervising River Water and Industrial Wastewater Qualities Within and Out of PROKASIH Areas.
- (9) E. Java Provincial Governor's Decrees No. 40 and 41 of 1996 on Standard System of Wastewater Liquid Water Sampling.

Proposed & Existing Regulating Authorities in Maintaining the River Environment

No	Activity	Dept. P. W.	Governor	Proposed for PJT	Legal Basis
1	Pollution Control	- DGWRD approves of river water use. - Minister of Public Work / Environment designates river water use.	- Issues the license or rejects waste disposal. - Can Cancel the license. - Head of Regency applies admin. sanction	- Input to Min. of PW on water use and quality standard . - To provide tech. recomm. for licensing of liq. waste disposal to rivers. - To conduct routine monitoring in rivers	- PP No. 20, 1990 - PerMen PU 45 /PRT/1990 Art. 5,6 - 56/PRT/1991 Art. 6, 9, 11 - KepMen PU 614 /KPTS/1991 - KepGub 135, '94
2	Sand Mining Control		- The Governor designates the mining location - Gov. & Head of Regency issues or rejects licenses for mining - They also cancel the mining license	- Input to Gov. in mining control of C group material in rivers. - Provide Tech. Recomm. in licensing C group mining. - Supervise the mining execution. Give order for temporary termination.	- PerMen Pu 56/PRT/'91 Art. 6,9,11 - KepMen PU 458/KPTS/1986
3	Water Resource Conservation Management of Critical Area	DGWRD & DG of Reforestation and Land Rehab. approve proposals		- Propose activities on land and water conservation & WR Construction for critical land & sediment control. - Monitor land and water conservation activities & infrastructure.	- Coop. Ag. between DG & Reforestation. & Land Rehabilitation & DGRWD 23/KPTS/V/'92 - PerMen PU 56/PRT/'91 Art. 6,9,11
4	Arrangement of land use		- designates the land use areas & river authority areas - issues license or rejects land use in river banks & authority areas - Cancels license of land use.	- Input to arrangement of land use & designation of land use in river bank and other areas. - Tech. recomm. in licensing land use in all river areas. - Supervise land utilization & order temp. termination.	- PerMen PU 56/PRT/'91, Art. 6,9,11 - PerMen PU 63/ PRT/'93 Art. 13, 14, & 18 - KepMen PU 614/ KPTS '91
5	Land Utilization Service			- Designate amount of contribution for land utilization - Prepare & sign contract with land users.	- PP 35 '91, Art. 14 - PerMen 56, 63 /PRT 91,93 Art. 8,9,11,13,14
6	Tourism			- Carry out construction	PP 35, '91 Art. 14 para. 14

Legend and Notes:

- | | |
|-------------------------|--|
| 1. PP | Government Regulation |
| 2. PerMen PU | The Minister of Public Works Regulation |
| 3. KepMen PU | The Minister of Public Works Decree |
| 4. KepGub | The Governor's Decree |
| 5. DGWRD | The Director General of Water Resources Development |
| 6. River Bank Area | The area along the river side which is important for maintaining the river function. |
| 7. River Use Area | The spring, the river bed, and the river bank area which has been compensated. |
| 8. River Authority Area | Flood area, retention area, river bank or river bank area which is not compensated. |

5.2 Relevant National and Provincial Regulations

The Republic of Indonesia Law Number 23 of 1997 Regarding Environmental Management states in the Chapter I, iGeneral Provisionsf and Chapter IV, iEnvironmental Management Authorityf, the relevant regulations and definitions:

Article 1

1. The environment is a spatial unity of all materials, forces, situations, and living creatures, including humans and their behavior, which influences the continuance of life and welfare of humans and other living creatures.
2. Environmental management is an integrated effort to preserve environmental functions which covers planning policy, exploitation, development, maintenance, reparation, supervision and control of the environment.
3. Environmentally sustainable development is a conscious and planned effort, which integrates the environment, including resources, into the development process to ensure capability, welfare, and quality of life of present and future generations.
4. An ecosystem is an ordering of an element of the environment which constitutes a whole and complete unit which interacts to produce environmental balance, stability and productivity.
5. Preservation of environmental functions is a set of efforts to maintain the continued supportive and carrying capacities of the environment.
6. Environmental supportive capacity is the capacity of the environment to support humans and other living creatures.
7. Preservation of environmental supportive capacity is a set of effort to protect because of an activity, so that it can continue to support the life of humans and other living creatures.
8. Environmental carrying capacity is the capability of the environment to absorb substances, energy, and/or other components that enter or are discharged into it.
9. Preservation of environmental carrying capacity is a set of efforts to protect the capability of the environment to absorb substances, energy, and/or other components which are discharged into it.
10. Resources are environmental elements that consist of human resources, natural resources, biological as well as non biological, and artificial resources.
11. Environmental quality standards are threshold limits or level of living creatures, substances, energy, or components that exists or must exist and/or polluting elements the existence of which in a certain resource as an element of the environment is set at a certain level.

12. Environmental pollution is the entry or the entering into of living creatures, substances, energy and/or other components into the environment by human activities with the result that its quality decreases to a certain level which causes the environmental degradation.

Article 8

- (1) Natural resources are controlled by the state and are utilized for the greatest possible public welfare, and the arrangements there of are determined by the Government.
- (2) To implement the stipulation provided for in (1) above the Government:
- A. regulates and develops policy in the scheme of environmental management;
 - B. regulates the supply, allocation, use, (and) management of the environment, and the reuse of natural resources, including genetic resources;
 - C. regulates legal actions and legal relations between persons and/or other legal subjects as well as legal actions regarding natural resources and artificial resources, including genetic resources.

Article 9

- (1) The Government determines national policies on environmental management and spatial management whilst always taking into account religious values, culture and traditions and the living norms of the community.
- (3) Environmental management must be performed in an integrated manner with spatial management protection of non-biological natural resources protection of artificial resources, conservation of biological natural resources and their ecosystems, cultural preservation, bio-diversity and climate change.

5.3 Regulation of Recreation

There is a law dealing with the environment, in the field of tourism it is Law No. 9, Year 1990. It stipulates that the condition of nature, flora and fauna, archeological remains, historical heritage as well as art and culture possessed by the people of Indonesia become the significant resources and capital for corporate development and tourism improvement. It is also put forward that due to the tourism improvement and development, the arrangement steps which integrate the tourism activities as well as maintain the preservation and give support to the quality of environment and other tourism interests shall be developed. The Article 6 of the Tourism Law states that the development of tourism interests is conducted by considering:

- A. capability to support the improvement of the economy and social life of people;
- B. values of religion, customs, and traditions, as well as point of view and the existing values in community;

- C. preservation of culture and quality of environment; and
- D. performance of tourism corporation itself.

ATTACHMENT - 1 BIODIVERSITY SURVEY DATA

(I) Fish Species Caught and Identified (Rainy & Dry) in 1997 the Brantas River

No	Latin Name	Local Name	Brantas River Sites		
			Upper	Middle	Lower
1	<i>Clarias batrachus*</i>	Lele lokal	x	x	x
2	<i>Clarius gariepinus</i>	Lele dumbo	x	x	
3	<i>Cyclocheilichthys eneplos*</i>	Wader	x	x	x
4	<i>Rasbora argyrotaenia</i>	Wader pari	x	x	
5	<i>Cyprinus carpio(L)</i>	Tombro	x	x	
6	<i>Tilapia mossambica</i>	Mujair	x		x
7	<i>Puntius javanicus (Bl)</i>	Tawes	x	x	x
8	<i>Puntius bromides</i>	Bader bang	x	x	x
9	<i>Fluta alba</i>	Welud	x	x	x
10	<i>Channa striata</i>	Kutuk	x	x	x
11	<i>Pangasius pangasius</i>	Jendil		x	
12	<i>Nemachilus saravensis*</i>	Uceng		x	
13	<i>Labeobarbus siamensis</i>	Sengkaring		x	
14		Putian		x	
15	<i>Upeneus sulphureus</i>	Kuniran		x	
16	<i>Osteochilus hascltii*</i>	Milem		x	
17	<i>Osphronemus goramy</i>	Gurame		x	
18	<i>Ichtiocampus carce</i>	Sogoprono		x	x
19	<i>Wallago attu</i>	Jambal		x	x
20	<i>Pangasius nasutus</i>	Mengkreng		x	
21	<i>Tilapia nilotica</i>	Nila		x	
22	<i>Macrones pogulia</i>	Berot		x	x
23	Suchermouth cuffishes	Suckermud		x	x
24	<i>Helostoma temmincki</i>	Keprek		x	
25	<i>Tricogaster trichopterus</i>	Sepat		x	x
26	<i>Macrognaathus aculeatus*</i>	Siti		x	x
27	<i>Makrones gulio*</i>	Keting		x	x
28	<i>Panchax panchax</i>	Kepala timah			x
29	<i>Cyclocheilichthys enoplos</i>	Cakul	x	x	x
30	<i>Chanos chanos*</i>	Bandeng			x
31	<i>Anabas testudinius</i>	Betik			x
32	<i>Anabas sp.</i>	Seren	x	x	
33	<i>Cyclocheilichthys sp.</i>	Lawak		x	
34	<i>Brochyanus sp.</i>	Udang	x	x	x
35		Blancer		x	x
36		Pengkih		x	x
37		Areng-areng			
38		Lenger			x
39		Tapel watu		x	
40		Bekepek	x		
41	<i>Hampala macrolepidota*</i>	Palung	x	x	x
42		Bekel		x	
43	<i>Macrones nemurus</i>	Baug		x	
44		Bekes	x		
45		Garingan		x	
46		Kebogerang		x	
47		Pengkih		x	
48	<i>Puntius Lawak*</i>	Lawak		x	
49	<i>Monopterus albus*</i>			x	
50	<i>Macrones microcanthus*</i>			x	

* Indigenous species of 1962

(2) Entire Brantas Site Description During the Dry Season Survey

No	Site	Width m.	Depth m.	Land Use	Substrate Type	Current Velocity m/sec.	Temp. (o C)
1	Brantas Source	0.7	0.1	semi natural forest	gravel sandy		16
2	Junggo	2	0.15	semi natural forest	stone gravel	0.20	22
3	Sengkaling	2	0.1	rice field	stone gravel	0.23	24
4	Malang	4	0.2	settle- ment	gravel	0.30	23
5	Sengguruh	100	1.5	village	muddy	stagnant	26
6	Karangkates Reservoir	lake	6	village	mud	stagnant	29
7	Kademangan	100	0.5	settle- ment	stone gravel	0.34	28
8	Ngunut	75	0.2	village	gravel		
9	Papar	75	2.3	village	gravel	2.25	35
10	Ploso	100	0.2	road	muddy	42.0	
11	Padangan	150	1.0	road	sandy	stagnant	29
12	Hulu Porong	50	1.5	road	fine sandy muddy	stagnant	31
13	Porong	50	0.5	village	muddy	stagnant	30
14	Porong Estuary	50	5	mangrove	muddy	stagnant	30
15	Gisik River	40	1.5	mangrove	gravel	stagnant	29.5
16	Canggu	15	1.0	road	black muddy	1.50	29
17	Gunungsari	100	4.5	city	black muddy	0.11	29.5
18	Petekan	50	1.5	city	coarse sandy	1.33	29
19	Hulu Wonokromo	60	5	city	black muddy	stagnant	29
20	Wonokromo Estuary	60	10	mangrove	black muddy	stagnant	29

The cultivated fish include, common carp, puntius, tilapias, giant goramy, cat fish, shrimp and others.

1995 Data of Freshwater Fish Culture, East Java Province

Freshwater Culture	Production in Tons	Value in Rp.1,000
Pond Culture	940,034	18,646,270
Sawah Tambak Culture	3568,570	74,978,782
Rice Field Culture	48,180	869,295
Cage Culture	61,700	1,300,946
Total	4,618,484	95,795,292

Source: "East Java Figures of Fisheries: 1995" East Java Fishery Service, Surabaya

(3) Historical Data of Fish Caught in the Brantas River

The tables below provide a historical perspective on the loss of fish species in the Brantas river. This data provides ample evidence of unchecked development activities have led to the loss of the indigenous species. As it has been mentioned in this report the guiding maximum ideal is to revert the river back to as much as possible its natural state. The examples below have documented that there has been a tangible loss of fish species in the Brantas river.

The completion of the Brantas river dams have reportedly had negative impact on the catfish *Pangasius djambal* which migrates upstream to breed and was formerly of economic importance and has now become entirely rare (The Ecology of Java and Bali).

The loss through drainage of Campurdarat and Tulungagung swamps near Blitar where local informants claim 7 species have disappeared (The Ecology of Java and Bali).

Indigenous Fishes Caught in 1962 in the Brantas River

No	Species	Family
1	<i>Acanthopsis choiromynchus</i> (Blkr)	Combitidae
2	<i>Acentrogobius chlorostigmiodes</i> (Blkr)	Gobiidae
3	<i>Acentrogobius caninus</i>	Gobiidae
4	<i>Acentrogobius cyanonus</i>	Gobiidae
5	<i>Albula pulpes</i> (L)	Albulidae
6	<i>Anguilla elphinstoned</i>	Anguillidae
7	<i>Apocryptodon madurensis</i>	Gobiidae
8	<i>Arius maculatus</i> (CV)	Ariidae
9	<i>Arius maculatus</i> (Thumb)	Bagaridae
10	<i>Barbichthys laevis</i>	Cyprinidae
11	<i>Batrachocephalus mino</i> (Ham, Buch)	Bagridae
12	<i>Boleophthalmus boddarti</i> (Pall)	Gobiidae
13	<i>Borobodes bramoides</i> (CV)	Cyprinidae
14	<i>Borobodes brevis</i> (Blkr)	Cyprinidae
15	<i>Borobodes javanicus</i> (Blkr)	Cyprinidae
16	<i>Borobodes lawak</i>	Cyprinidae
17	<i>Borobodes platysoma</i>	Cyprinidae
18	<i>Bostrichbhis sinensis</i> (Lac)	Eleotridae
19	<i>Botia grey</i>	Combitidae
20	<i>Branchygobius nunus</i>	Gobiidae
21	<i>Branchygobius xanthozona</i> (Blkr)	Gobiidae
22	<i>Butin melanostigma</i> (Blkr)	Eleotridae
23	<i>Chanos chanos</i>	Chanidae
24	<i>Chela oxygaster</i> (CV)	Cyprinidae
25	<i>Chela oxygastroides</i>	Cyprinidae
26	<i>Clarias batrachus</i> (L)	Clariidae
27	<i>Clarius melanoderma</i> (Blkr)	Clariidae
28	<i>Coilia dussumieri</i> (CV)	Clupeidae
29	<i>Crossochilus cobitis</i> (Blkr)	Cyprinidae
30	<i>Crossochilus oblongus</i> (CV)	Cyprinidae
31	<i>Cryptopterus bicirrhis</i> (CV)	Siluridae
32	<i>Cyclocheilichthys armatus</i> (CV)	Cyprinidae
33	<i>Cyclocheilichthys eneplos</i> (Blkr)	Cyprinidae
34	<i>Dangila cuvieri</i> (CV)	Cyprinidae
35	<i>Engraulis kammalensis</i> (Blkr)	Clupeidae

No	Species	Family
36	<i>Engraulis mystax</i> (Bl Schn)	Clupeidae
37	<i>Engraulis setirostis</i> (Brouss)	Clupeidae
38	<i>Hampala macrolepidota</i>	Cyprinidae
39	<i>Harpodon neherus</i> (Ham Buck)	Stomiidae
40	<i>Hemigobius</i> (Blkr)	Gobiidae
41	<i>Homaloptera ocellata</i>	Homalopteridae
42	<i>Homaloptera pavonina</i>	Homalopteridae
43	<i>Homaloptera wassinki</i> (Blkr)	Homalopteridae
44	<i>Homaloptera erythrorhina</i>	Homalopteridae
45	<i>Ketengus typus</i> (Blkr)	Ariidae
46	<i>Kurtus indicus</i> (BL)	Kurtidae
47	<i>Labeo chrysophekadion</i> (Blkr)	Cyprinidae
48	<i>Labeo ery</i>	Cyprinidae
49	<i>Lepidocheilus</i> (Blkr)	Combitidae
50	<i>Luciosoma setigerum</i> (CV)	Cyprinidae
51	<i>Macrochirichthys macrochirus</i>	Cyprinidae
52	<i>Macrogathus aculeatus</i> (BL)	Maastacembelidae
53	<i>Mystus gulio</i>	Bagridae
54	<i>Mystus micracanthus</i> (Blkr)	Bagridae
55	<i>Mystus nemurus</i> (CV)	Bagridae
56	<i>Mastacembelus unicolor</i> (CV)	Mastacembelidae
57	<i>Megalops cyprinoides</i> Brouss	Elopsidae
58	<i>Monopterus albus</i> (Zuiew)	Synbranchidae
59	<i>Muraenesox talaban</i>	Congridae
60	<i>Nemachilus fasciatus</i>	Combitidae
61	<i>Oligolepis acutipennis</i>	Gobiidae
62	<i>Ophiocana porocephala</i> (CV)	Eleotridae
63	<i>Osteochilus hasselti</i> (CV)	Cyprinidae
64	<i>Osteogobius militaris</i> (L)	Ariidae
65	<i>Pangasius micronemus</i>	Pangasidae
66	<i>Pellona dissumieri</i> (CV)	Clupeidae
67	<i>Pellona elongata</i> (Benn)	Clupeidae
68	<i>Periophthalmodon schlosseri</i>	Gobiidae
69	<i>Platycephalus oligolepis</i> Regan	Platycephalidae
70	<i>Platycephalus scaber</i> (L)	Platycephalidae
71	<i>Prionobutis koilomatodon</i>	Eleotridae
72	<i>Puntius aphy</i> (Gthr)	Cyprinidae
73	<i>Puntius binotatus</i>	Cyprinidae
74	<i>Rasbora argyrotaenia</i>	Cyprinidae
75	<i>Rasbora lateristriata</i>	Cyprinidae
76	<i>Septipinna melanocheir</i> (Blkr)	Clupeidae
77	<i>Septipinna taty</i> (CV)	Clupeidae
78	<i>Sicyopterus mastrotholepsis</i>	Gobiidae
79	<i>Siganus javuc</i> (L)	Siganidae
80	<i>Stigmatogobius sadanundio</i>	Gobiidae
81	<i>Taenioides cirratus</i> (Blyth)	Taenioididae
82	<i>Taenioides eruptionis</i>	Taenioididae
83	<i>Tetraodon fluviatilius</i> (HB)	Tetraodontidae
84	<i>Trichiurus glossodon</i> (Blkr)	Trichiuridae
85	<i>Trichiurus haumela</i> (Forsk)	Trichiuridae
86	<i>Trypauchen vagina</i> (Bl. Schn)	Taenioididae
87	<i>Wallago attu</i> (Bl. Schn)	Siluridae

Source: Weber & De Beaufort, 1962 reported in Susilo et. al., 1993

Indigenous Fishes Caught in 1970 in the Brantas River (Selorejo Area Mostly)

No	Species	Local Name
1	<i>Clarias batrachus</i> Linn.*	Lele
2	<i>Crossochilus oblongus</i> (C.V.)*	Bejing
3	<i>Cyprinus carpio</i> Linn.	Tombro
4	<i>Glyptothorax platypogon</i> (C.V.)	Tapal watu
5	<i>Hemaloptera erythrorhina</i> (C.V.)*	Kadalan
6	Hemirhamphidae	Julung-julung
7	<i>Labeobarbus tambra</i> (C.V.)	Sengkaring
8	<i>Lebistes reticulatus</i> Peters	Gatuk
9	<i>Monopterus albus</i> Zuiew*	Welut
10	<i>Nemachilus fasciatus</i> (C.V.)*	Uceng
11	<i>Channa gachua</i> (H.B.)	Kotes
12	<i>Panchax panchax</i>	Kepala Timah
13	<i>Panchax panchax</i> (H.B.)	Wader gatul
14	<i>Puntius binotatus</i> (C.V.)*	Wader cakul
15	<i>Puntius javanicus</i> (Blkr)*	Tawes
16	<i>Rasbora</i> sp.*	Wader pari
17	<i>Tilapia mossambica</i> (Peters)	Mujair
18	<i>Tylognatus falcifer</i> (C.V.)	Lehat
19	Fresh water shrimp	Udang air tawar
20	Fresh water bivalve	Kerang air tawar

* Indigenous species of 1962.; Source: Wardoyo & Sukimin, 1971

Attachment-2 River Continuum Concept

A brief introduction is provided about the River Continuum Concept (RCC) which was developed in North America about twenty years ago. This method in the Brantas river context may provide for a better tracking system for the preservation of fauna and flora. It supports the theory of a continuous transition in the functioning and productivity along the main river basin. Although the Brantas river has been dammed and has barrages constructed breaking the river's continuity. For it to become a continuous water body for the fauna fish-ways and passages for animal migration will have to be provided.

In RCC drainage networks form a predictable continuum of increasing channel size and associated biological characteristics. Stream morphology, current velocity, substrate composition, temperature, food sources all interact to influence food availability to invertebrates, and these interactions vary systematically with stream order thereby regulating distribution patterns of invertebrate functioning feeding groups (Hawkins and Sedell 1981). These feeding groups are referred to as scrapers, collector-filterers, collector-gatherers, predators and shredders. Under unperterbed conditions, headwater or source areas are normally dominated by shredders and collectors.

Features of the 3 Reaches of an Idealized River System from the Perspective of RCC

	River Reaches		
	Upper	Middle	Lower
Temperature	Cool, low amplitude	High amplitude	Moderate amplitude
P/R*	< 1.0	> 1.0	< 1.0
Energy Source	Terrestrial detritus	In situ PP**	Transport detritus
Bottom light	Low	High	Low
Nutrient availability	Low	High	Low
Attached Algae	Sparse	Abundant	Sparse
Submerged angiosperms	Absent	Abundant	Sparse
Plankton	Absent	Absent	Present
Leaf litter	Abundant	Sparse	Negligible
Invertebrates	Co-dominant	Rare	Absent
Shredders	Co-dominant	Co-dominant	Dominant
Collectors	Sparse	Co-dominant	Absent
Grazers	Low	Low	Low
Predators	Cool-water	Piscivores	Planktivores
Fish fauna	invertivores	invertivores	& bottom feeders &
Environmental diversity	Low	High	Low
Biodiversity	Low	High	Low

*P/R= Production/Nutrient Regeneration Flux; **PP=Primary Production

Source: The Rivers Handbook, Volume 1, Ed. Peter Calow & Geoffrey Petts

To a greater extent the above general pattern appears to hold worldwide the exact nature and rate of change does vary from river to river depending on catchment characteristics and water chemistry origin (Omerod and Edwards 1987) and on the efficiency of retention of sediments and organic matter (Cummins 1988). As the RCC was developed in North America under prevailing conditions there, the Brantas river in East Java may show divergence from the original model. The value of RCC is in the adaptability of useful methodology for biodiversity preservation in the Brantas basin.

In the RCC scheme, at unperturbed sites, densities of scrapers exceeded those of collector-filterers and collector-gatherers combined, reflecting the normal autotrophic nature. As water quality degrades, the functional groups respond in a manner predicted by the RCC (e.g. the percentage density of scrapers decreased from a high of 45% to less than 1% at the most polluted sites) and the system became heterotrophic. This change had occurred in the absence of any longitudinal gradient, this suggests that organic pollution can 'reset' the normal sequence of feeding group shifts and convert from one state to another which would normally be found farther downstream in much larger river. When the water quality improved due to pollution abatement, the ratio of collector-filterers and scrapers to collector-gatherers increased, indicating that the river was returning to its normal condition.

The same process was described by Vannote (1980) and Minshall (1985) as depicting the change in relative abundance of invertebrate functional groups along a river from head water to mouth. The RCC can be divided into three types of channel litter dominated, usually source / headwater, river basin characterized by shredders and collectors. The middle portion which is generally relatively wide and shallow where light and nutrients favor benthic algae production, characterized by scrapers; and lower reaches/delta where high levels of fine particulate organic matter from upstream inputs favor collectors.

Attachment-3 Regulations Relevant to the Brantas River Environment

1 River Area

"The Ecology of Java and Bali" by T. Whitten et. al., 1996, in the Ecology of Indonesia Series, Volume II, describes the Brantas river as follows: "The Brantas is a peculiarly-shaped river draining water from an area of over 11,000 km² from the southern slope of Mt. Kawi-Kelud-Butak, Mt. Willis, and the northern slopes of Mt. Liman-Limas, Mt. Welirang, and Mt. Anjasmoro. At Mojokerto the river starts to divide between the R. Porong to the south and the R. Surabaya to the north. Between the two is an alluvial area

comprising some tens of metres of alluvial deposits sitting on mid-Pleistocene marine deposits. Indeed Mojokerto, now 30 km from the sea, was a port in a major estuary and was used by sea-going vessels from at least the tenth century until the end of the fourteenth century. The change was due to the increase in river-borne silt, and since 1880 the delta at the mouth of the Porong has been actively forming (Hoekstra 1987; Erflemeijer and Djuharsa 1988). Eighty years ago the serious condition of the Brantas watershed as a result of deforestation had already been noted (Altona 1913). In the dry season water was not always available for irrigation, and siltation made rivers more susceptible to flooding and obstructed shipping around Surabaya. The situation had been aggravated by the large quantities of ash spewed out from Mt. Kelud near Blitar, and the mud flows or lahars which plagued the country around the volcano. Considerable land management has been and is being effected to control erosion and sedimentation, and an integrated resource and land use plan for the Brantas watershed has recently been completed (Taylor and Soetarto 1993)." This passage provides an appropriate introduction and setting to the river area and its environment.

There are many factors which determine the physical processes in rivers and their area. According to Church, 1992 ("Channel Morphology and Typology", The Rivers Handbook, Vol.1), "the primary factors responsible are the volume and time distribution from upstream; the volume, timing and character of sediment; the nature of materials through which the river flows; the local geological history of the riverine landscape. The river area is affected also by local climate, the nature of plant biodiversity, and land use in the drainage basin". In addition, geological history and physiographic setting are constraints for the Brantas river area. The Brantas river has a distinct upper, middle and downstream area, which circles around most of East Java. In addition many human activities alter river areas.

1.1 Definition of River Area

The definition as provided by the Ministry of Public Works (Himpunan Peraturan Menteri Pu Di Bidang Pengairan) states that rivers are spaces and containing areas, as well as discharging networks from their source/spring to the delta/estuary. The left and right sides are limited by border line along its discharge path.

Also, the river border line is the outside border line of river pacification.

The border area is the area along the river sides including man-made river, which has vital benefit to maintain the preservation of the lake / reservoir's function. The lake / reservoir

border area is the specified area surrounding lake / reservoir which has vital benefit to maintain the preservation of the river's function.

The river benefit area is the spring , riverbed and border area which have been exempted.

The river authority area is the flood land, retention area, flood plain or border area which is not exempted.

The Government of Indonesia, Ministry of Public Works **Regulation No. 63/PRT/1993** on River Border Line, River Benefit Area, River Authority Area and Ex. River provide the following definitions:

Article 6

- (1) The border line of the river with embankment is stipulated as follows:
 - A. Border line of the river with embankment outside urban area is at least 5 meters outside along the embankment base.
 - B. Border line of the river with embankment within urban areas is at least 3 meters outside along the embankment base.
- (2) Considering the function improvement, the embankment as stated in clause (1) could be strengthened, widened, which could result in shifting the river border line position.
- (3) Excepting the state-owned land, the required land for new embankment base due to the implementation of clause (2) should be exempted.

Article 7

- (1) The establishment of river border line without embankment outside the urban areas:
 - A. Large river is the river having a river basin of 500 sq. km. or more.
 - B. Small river is the river having a river basin of less than 500 sq. km.
- (2) The establishment of river border line without embankment outside the urban areas on the large river is conducted per river section considering the extent of river basin in related river section.
- (3) The river border line without embankment outside urban areas on the large river is at least 100 meters, while on the small river is at least 50 meters, measured from the river

Article 8

The establishment of the river borderline without embankment within urban area is based upon the following criteria:

- A. The river with a depth of not more than 3 meters, the borderline is at least 10 meters from the river edge in the specified time.
- B. The river with the depth of not more than 3 meters and up to 20 meters, the border line is at least 15 meters from the river edge in the specified time.
- C. The river with the maximum depth of more than 20 meters, the border line is at least 30 meters from the river edge in the specified time.

Article 9

- (1) The river border line without embankment bordering on the road is the edge of the related road under the condition that construction and road use should ensure the preservation and the safety of river with its structures.
- (2) In case, the stipulation stated on clause (1) is not fulfilled, all improvement upon the damage of the river and its structures is on the road organizer's responsibility.

Article 10

The establishment of the border line of lake, reservoir, spring and river which are influenced by the rise and fall of the tides of sea water follows the criteria stipulated by Presidential Decree No. 32 Year 1990 on the Management of Protected Area, as follows:

- A. For the lake and reservoir, the border line is at least 50 meters from the highest tides point to the direction of land.
- B. For the spring the border line is at least 200 meters surrounding it.
- C. For the river influenced by the rise and fall of the tides of sea water, the border line is at least 100 meters from the river edge and functions as the green lane.

The Regional Regulations of East Java Province (Establishment of Protection Area Within East Java Province, 1991) has the following definitions:

Article 12

River border as stated in Article 5, point b, in this regulation is stipulated under the following criteria:

- a. At large rivers outside of the settlement area the border is at least 100 meters;
- b. At tributaries outside of settlement area the border is at least 50 meters;

- c. At large rivers and their tributaries inside the settlement area the border is 15 meters.

Article 13

Protection and river border determined based on the criteria stated on Article 12 in this regulation:

- a. For the river with an embankment the border is measured from the left and right sides of the embankment outside part along the embankment.
- b. For river without embankment it is measured from the highest flood point to the direction of the main land.

Article 14

Area surrounding the lake / reservoir as stated in Article 5, point c stipulates under the criteria that along the edge of lake / reservoir has a proportional width and the physical condition and the shape of the lake / reservoir is between 50 to 100 meters measured from the highest tide in the direction of the main land.

1.2 National & Provincial Regulations & Rules to Maintain the River Area

The primary regulation is the Government of the Republic of Indonesia Regulation No. 35, 1991 which considers:

- (a) that rivers as a water source has the most important function in fulfilling the people's requirement and in grading up the national development;
- (b) that in this connection and as realization of the Regulation No. 11, 1974 on Waters in frame of utilization and preservation it is considered necessary to conclude a regulation on rivers covering river protection, development, utilization and control under a Government Regulation.

The Regulation No. 35 refers to:

1. Article 5 section (2) of the Constitution 1945;
2. Order No. 5, 1974 on the Regional Authority Basics;
3. Order No. 4, Year 1982 on the Basic Regulation on Environmental Management
4. Government Regulation No. 22, 1982 on the Water Management Method

Furthermore, to keep the preservation and continuity of function of the river as a water source, in frame of the executing the river authority, it is necessary to decide a river area lines along the river.

At the land which is bordered by such river area line, limitations shall be regulated on the land

utilization either at the river utilization or authority area. The additional regulations for

Article 1 (General Condition)

1. Rivers are places of storage including networks of watersheds starting from a water spring to a river mouth with borders at both right and left sides and along a river length by river area lines.
2. Lake is a part of a river which is wide with a depth which is naturally deeper than other section of the river concerned.
3. Reservoir is a water storage which is created as the result of a construction of river structure in this relation a dam, in form of a river body / channel / bed.
4. River basin is a waters management area unit as a result of development of one or more of river stretches.
5. River bank is a land along each side of a riverbed measured from the edge to the inner side of the river embankment foot.
6. River structures are constructions having a function related with river protection, extension, utilization and control.
7. River area lines are outer lines of river area protection.

The meaning of riverbed is a basin which is formed naturally by water flow, or excavation to flow a certain amount of water.

Article 2 (Scope of Regulation)

The scope of river regulation based on this Government Regulation shall cover the protection, development, utilization and control of river including lake and reservoir.

The meaning of river protection is the effort to protect river from damages caused by human and natural treatments. River development is the effort carried out to improve the maximum utilization of river function without damaging the river and environmental balance. River control is the effort to make a firmer all year long river flow, to get the maximum river benefit, and to reduce / eliminate the water damaging power to the river and environment.

Article 4

1. River area lines of embanked rivers shall be decided at width limit of at least five (5) meters outer side along the embankment foot.
2. River area lines of non-embarked rivers decided based on technical and socio-economic considerations by the authorized official.

3. River area lines of both embanked and non-embanked rivers at the city area and along the road shall be separately decided by the authorized official.

The above are included in the river utilization area are the water spring, riverbed, and the unacquainted river lines area. Included in the river authority area is the flood ground, retention area, river bank or the unacquainted river lines area.

Article 6

1. Operation of land at the river utility area shall be executed by the Minister.
2. Land utilization at the river utility area and the river authority shall be executed based on regulations concluded by the Minister.
3. Land utilization at the extinct river shall be further arranged by the Minister.

Article 7 (River Function)

2. The river as referred in section (1) shall be protected for preservation, upgrading of function and utilization, and kept from damaging the environment.

Article 9

1. Authority and responsibility for river development as referred in Article 8 can be authorized to a State owned corporation.

The said State owned corporation has a main duty to develop and to use water and/or water source for the public welfare and to preserve the environmental condition. Such State owned corporation under the control of the Minister.

Article 11 (River Planning)

2. Planning as referred shall cover the activities of:

(c) observation and evaluation of flood, water balance, and water quality.

Article 13

1. Exploitation and maintenance of river and river structures covering design, construction, supervision, and evaluation.
2. Exploitation and maintenance as referred in Section (1) which construction performed by a legal body, social, or private body as referred in Article 12 section (2), shall be executed by the concerned.
3. Exploitation and maintenance as referred in Section (1) which is aimed for public welfare and safety in frame of river development executed by the Government or State owned corporation.

Article 16

1. Management of reservoir which shall be an activity consisting of exploitation and maintenance of reservoir.
2. Exploitation and maintenance of reservoir shall be an activity which is performed to keep the continuity of reservoir function in accordance with the objective of the related construction.
3. Exploitation and maintenance of reservoir shall cover the activities of:
 - a. reservoir water level monitoring;
 - b. management of dam maintenance;
 - c. management or reporting, evaluation and flood warning report.

Article 22 (River Protection)

1. The authorized official together with other parties concerned, respectively in conformity with their authority and responsibility, shall carry out the river protection and surrounding area covering:
 - a. Management of the river basin area;
 - b. Control of water damaging power;
 - c. Control of river flow.

The control of river flow as referred in sub-section c. of this section shall include also the exploitation and maintenance activity of the river structure.

Article 27 (Obligation and Prohibition)

It is prohibited to throw any waste/material either solid and/or liquid or in a form of sewage into or surrounding the river which is estimated or predicted to cause pollution or decrease water quality, which might endanger and/or inflict a loss to the other water utilization and environment.

The meaning of estimated or predictable to cause a pollution or reducing the water quality as stated in this article, if the quantity and quality of the related sewage exceeding a certain limit.

Such limit shall be decided by the authorized official based on some special considerations on hydrological characteristic of the related river also the situation of water utilization.

Article 31 (Costs)

1. The cost of exploitation and maintenance of river and river structure for the purpose of public welfare and/or safety shall be borne by the Government or State owned corporation according to the respective authority and responsibility.
2. The cost of exploitation and maintenance of river and/or river structure as referred in Article 13 Section (3) shall be borne by the legal body, social or private body concerned.
3. The people who directly obtain the advantage from the river structure as referred in section (1), can be included in financing the said exploitation and maintenance in conformity with the importance and capability of the people concerned.

In addition, there are many East Java Provincial regulations which were implemented between 1989 and 1996 which are relevant for the River Environment.

- (1) Provincial Regulation No. 8, 1989 for Water Pollution Control in E. Java.
- (2) E. Java Provincial Governor's Decree No. 35, 1993 for E. Java Provincial Commission of Environmental Pollution Control and Prevention.
- (3) E. Java Provincial Governor's Decree No. 15, 1993 for the Implementation of Pollution Control and Prevention.
- (4) E. Java Provincial Governor's Decree No. 135, 1994 for Implementation Guideline of Provincial Control and Prevention.
- (5) E. Java Provincial Governor's Instruction No. 22, 1994 on Intensified Monitoring of Potential Polluter Industries within the Framework of Environmental Pollution Control.
- (6) E. Java Provincial Governor's Decree No. 136, 1994 for Quality Standard of Industrial Liquid Waste and Other Business Activities.
- (7) E. Java Provincial Governor's Decree No. 42 of 1995 of Delegation of Authority and License Approval for Liquid Waste Disposal to Water Resources in River Areas.
- (8) E. Java Provincial Governor's Decree No. 188/291/SK/014/1994 on Laboratory Appointment in the Framework of Monitoring and Supervising River Water and Industrial Wastewater Qualities Within and Out of PROKASIH Areas.
- (9) E. Java Provincial Governor's Decrees No. 40 and 41 of 1996 on Standard System of Wastewater Liquid Water Sampling.

Proposed & Existing Regulating Authorities in Maintaining the River Environment

No	Activity	Dept. P. W.	Governor	Proposed for PJT	Legal Basis
1	Pollution Control	- DGWRD approves of river water use. - Minister of Public Work / Environment designates river water use.	-Issues the license or rejects waste disposal. - Can Cancel the license. - Head of Regency applies admin. sanction	-Input to Min. of PW on water use and quality standard . - To provide tech. recomm. for licensing of liq. waste disposal to rivers. -To conduct routine monitoring in-rivers	-PP No. 20, 1990 -PerMen PU 45 /PRT/1990 Art. 5,6 -56/PRT/1991 Art. 6, 9, 11 -KepMen PU 614 /KPTS/1991 -KepGub 135, '94
2	Sand Mining Control		-The Governor designates the mining location - Gov. & Head of Regency issues or rejects licenses for mining - They also cancel the mining license	-Input to Gov. in mining control of C group material in rivers. -Provide Tech. Recomm. in licensing C group mining. - Supervise the mining execution. Give order for temporary termination.	-PerMen Pu 56/PRT/'91 Art. 6,9,11 - KepMen PU 458/KPTS/1986
3	Water Resource Conservation Management of Critical Area	DGWRD & DG of Reforestation and Land Rehab. approve proposals		- Propose activities on land and water conservation & W R Construction for critical land & sediment control. - Monitor land and water conservation activities & infrastructure.	- Coop. Ag. between DG & Reforestation. & Land Rehabilitation & DGRWD 23/KPTS/V/'92 - PerMen PU 56/PRT/'91 Art. 6,9,11
4	Arrangement of land use		- designates the land use areas & river authority areas -issues license or rejects land use in river banks & authority areas - Cancels license of land use.	- Input to arrangement of land use & designation of land use in river bank and other areas. - Tech. recomm. in licensing land use in all river areas. - Supervise land utilization & order temp. termination.	- PerMen PU 56/PRT/'91, Art. 6,9,11 -PerMen PU 63/ PRT/'93 Art. 13, 14, & 18 - KepMen PU 614/ KPTS '91
5	Land Utilization Service			- Designate amount of contribution for land utilization - Prepare & sign contract with land users. - Carry out construction	-PP 35 '91, Art. 14 -PerMen 56, 63 /PRT 91,93 Art. 8,9,11,13,14 PP 35, '91 Art. 14 para. 14
6	Tourism				

Legend and Notes:

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|-------------------------|--|
| 1. PP | Government Regulation |
| 2. PerMen PU | The Minister of Public Works' Regulation |
| 3. KepMen PU | The Minister of Public Works' Decree |
| 4. KepGub | The Governor's Decree |
| 5. DGWRD | The Director General of Water Resources Development |
| 6. River Bank Area | The area along the river side which is important for maintaining the river function. |
| 7. River Use Area | The spring, the river bed, and the river bank area which has been compensated. |
| 8. River Authority Area | Flood area, retention area, river bank or river bank area high is not compensated. |

2 Relevant National and Provincial Regulations

The Republic of Indonesia Law Number 23 of 1997 Regarding Environmental Management states in the Chapter I, "General Provisions" and Chapter IV, "Environmental Management Authority", the relevant regulations and definitions:

Article 1

1. The environment is a spatial unity of all materials, forces, situations, and living creatures, including humans and their behaviour, which influences the continuance of life and welfare of humans and other living creatures.
2. Environmental management is an integrated effort to preserve environmental functions which covers planning policy, exploitation, development, maintenance, reparation, supervision and control of the environment.
3. Environmentally sustainable development is a conscious and planned effort, which integrates the environment, including resources, into the development process to ensure capability, welfare, and quality of life of present and future generations.
4. An ecosystem is an ordering of an element of the environment which constitutes a whole and complete unit which interacts to produce environmental balance, stability and productivity.
5. Preservation of environmental functions is a set of efforts to maintain the continued supportive and carrying capacities of the environment.
6. Environmental supportive capacity is the capacity of the environment to support humans and other living creatures.
7. Preservation of environmental supportive capacity is a set of effort to protect because of an activity, so that it can continue to support the life of humans and other living creatures.
8. Environmental carrying capacity is the capability of the environment to absorb substances, energy, and/or other components that enter or are discharged into it.
9. Preservation of environmental carrying capacity is a set of efforts to protect the capability of the environment to absorb substances, energy, and/or other components which are discharged into it.
10. Resources are environmental elements that consist of human resources, natural resources, biological as well as non biological, and artificial resources.
11. Environmental quality standards are threshold limits or level of living creatures, substances, energy, or components that exists or must exist and/or polluting elements the existence of which in a certain resource as an element of the environment is set at a certain level.

12. Environmental pollution is the entry or the entering into of living creatures, substances, energy and/or other components into the environment by human activities with the result that its quality decreases to a certain level which causes the environmental degradation.

Article 8

- (1) Natural resources are controlled by the state and are utilized for the greatest possible public welfare, and the arrangements there of are determined by the Government.
- (2) To implement the stipulation provided for in (1) above the Government:
- A. regulates and develops policy in the scheme of environmental management;
 - B. regulates the supply, allocation, use, (and) management of the environment, and the reuse of natural resources, including genetic resources;
 - C. regulates legal actions and legal relations between persons and/or other legal subjects as well as legal actions regarding natural resources and artificial resources, including genetic resources.

Article 9

- (1) The Government determines national policies on environmental management and spatial management whilst always taking into account religious values, culture and traditions and the living norms of the community.
- (3) Environmental management must be performed in an integrated manner with spatial management protection of non-biological natural resources protection of artificial resources, conservation of biological natural resources and their ecosystems, cultural preservation, bio-diversity and climate change.

Regulation of Recreation

There is a law dealing with the environment, in the field of tourism it is Law No. 9, Year 1990. It stipulates that the condition of nature, flora and fauna, archeological remains, historical heritage as well as art and culture possessed by the people of Indonesia become the significant resources and capital for corporate development and tourism improvement. It is also put forward that due to the tourism improvement and development, the arrangement steps which integrate the tourism activities as well as maintain the preservation and give support to the quality of environment and other tourism interests shall be developed. The Article 6 of the Tourism Law states that the development of tourism interests is conducted by considering:

- A. capability to support the improvement of the economy and social life of people;
- B. values of religion, customs, and traditions, as well as point of view and the existing values in community;

C. preservation of culture and quality of environment; and

D. performance of tourism corporation itself.





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