TERMS OF REFERENCE

FOR

POLA INDUK CITARUM BERGETAR

AN INTEGRATED MASTER PLAN
ON SUSTAINABLE CITARUM RIVER BASIN MANAGEMENT

(*Conservation, Pollution Prevention & Rehabilitation toward Water Sustainable*)

THE PROVINCIAL GOVERNMENT OF WEST JAVA

24 November 2002

Terms of Reference (Draft)

for

An Integrated Master Plan on Sustainable Citarum River Basin Management

1. Project Title

Pola Induk Citarum Bergetar, An Integrated Master Plan on Sustainable Citarum River Basin Management (*Conservation, Pollution Prevention and Rehabilitation toward Water Sustainable*)

2. Executing Agency/ *Implementing Agency*

West Java Province

3. Project Area

Citarum River basin/Watershed in West Java Province, Indonesia

4. Background and Necessity of the Study

4.1 Background

The Citarum River is located in western side of Java island in the Republic of Indonesia. It originates in the Bandung Plain and flows into the Java sea with its extension length of approximately 300 km and with a catchment area of approximately 6,600 km^2. It is one of main water supply sources of Metropolitan City of Jakarta. Over recent years the demand for water and the quantity of discharged water in Citarum Watershed/river basin have changed and increased very rapidly in parallel with the socio-economic growth of Indonesia as a whole.

Water quality of the Citarum River has been seriously polluted. The direct causes of deterioration of water quality are; i) inflow of domestic and industrial wastewater from Bandung areas which include third largest city in Indonesia, ii) excessive fish farming in dam reservoirs, iii) soil erosion mainly due to forest excision.

So far, although several studies about water resource development in the Citarum River basin have been implemented, measures to improve the water quality of the whole Citarum River is not sufficient. The water quality monitoring has been implemented by West Java Province (BPHLD) and PJT-II, but the results of their monitoring has not been used for improving water quality of the river mainly because of the lack of coordination and law enforcement.

The present approach to manage water quality is mainly focused on industrial pollution sources. The way of control is through investigation of factory effluent for evaluating contravention of regulatory standards. The PROKASIH program involved this monitoring is only a part of what is necessary for water quality management. Water quality is more effectively protected by managing all the activities with in the basin, and by having management plan for these activities based on the study targeting environmental management of the whole the Citarum watershed as the Governor policies outlined ***" one river basin, one plan, one integrated management "*** combined with ***self-sufficiency*** and ***environmental sustainability.***

In the Citarum watershed, the organization and the institution, and an economic and social infrastructure dealing with environment problems has not fulfilled requirements for

measures against the recent rapid increase in population and industrialization, development of catchment. Consequently, environment problems in the Citarum river, mainly water pollution resulting from household and industrial effluent have been aggravating. Since it is expected that these situations would continue in the future, implementation of the various measures for improving environment is needed as an integrated manner.

In view of these situations, the Provincial Government of West Java has launched the government policy paper called *" Citarum Bergetar "* *(clean, beautiful and sustainable)* on August 14, 2001 to conduct the study that analysis and evaluates the present conditions about environment in the Citarum River, especially on policies and infrastructure of conservation, pollution prevention and rehabilitation toward environment sustainable management.

4.2 Present Environmental Conditions and Issues

Because of the rapid increase in population and poor environment management, there are many environmental problems which reflect in all aspects of water pollution such as sewer, industrial wastewater, and river environment. These problems are not mutually exclusive, and in fact, combine to intensify their overall negative impacts on the environment in the Citarum River. The following are major water environment problems and constraints in the Citarum River basin which should be solved.

(1) Water Pollution

There are three large dams in the Citarum River system, i.e. Saguling, Cirata, and Jatiluhur dams. It is recognized that the waters of the three Citarum reservoirs have been eutroficated mainly due to the pollution loads from the catchment. It has been afraid that deterioration of water quality have negative impacts on operation of the hydropower stations in addition to other productive usage of the reservoirs for fish farming and recreation.

This situation is serious in the Saguling reservoir which is located about 40 km from Bandung city, and about 90 km at the upstream of the Jatiluhur reservoir. The surrounding areas of Saguling are hilly, while the river has many tributaries at this location. This makes the shape of the reservoir very irregular, with many extended bays. There are many industries (particularly textile) situated around Bandung City and Bandung regency, and its wastewater flows into the Citarum River and then Saguling reservoir. Many of the industrial wastewater is poorly treated. There is only one centralized industrial wastewater treatment facility in Bandung regency, in addition to domestic sewage treatment facility in Bandung City.

Table below shows the results of water quality monitoring in the Citarum River. This result explain that two of organic contamination parameters, BOD and COD.

Water Quality of Citarum River (Dec. 1996)

No	Locations	BOD (mg/L)	COD (mg/L)
1	Downstream of Bandung city	29.70	55.70
2	Inflow to Saguling reservoir	34.50	59.80
3	Outlet of Saguling reservoir	18.70	39.80
4	Cirata reservoir	17.50	36.70
5	Jatiluhur reservoir	13.50	37.30
6	Inflow to West Tarum Canal	26.70	55.30

Source: Report on monitoring water quality at Citarum, Ciliwung, Bekasi, Cisadane and Ciujung River in the PROKASIH frame work of West Java, 1997, Balai Pengujian Dan Peralatan

(2) Degradation of the Catchment

Land use in the upper Citarum River catchment is dominated by rice fields, planted dry land, grassland, estates, and open spaces. The catchment of the Citarum River has been subject to severe soil erosion by forest excision by these development activities and illegal logging. There are four major sub-cathcments of the Saguling reservoir, i.e. Cijambu, Cihaur, Cilanang, and Ciminyak, with erosion rates from 0.56 to 2.55 mm/year (ILEC). The erosion has resulted in the loss of fertile top soil, the formation of rills and even gullies in some parts of the catchment as well as the impacts (sedimentation) on the reservoir of the Saguling dam.

(3) Aquaculture

Aquaculture (particularly floating net fisheries) has been developed in the reservoirs to accommodate the inhabitants displaced by the inundation of land due to the reservoir development. However, due to the water quality deterioration, fish production of aquaculture at three reservoirs has decreased.

(4) Solid Waste

In due course of time, significant change in the both volume and character of the wastes generated led to haphazard disposal and dumping in nearby open spaces. This practice is on the city areas in the Citarum river basin. Collected garbage in Bandung City has been dumped at the designated disposal site but as open dumping. In the event of the storms, the littered garbage in nearby open spaces and dumped garbage in the dumping site has been washed out into the river, and they have impacts on the water environment of the Citarum River.

(5) Environmental Administration

For tackling the above problems, the Government of Indonesia has started the integration of water environment aspects through policy initiatives. The Ministry of Environment (MOE) has initiated a number of activities including the development of environmental tools to address these problems. One of such recent initiatives is the PROKASIH (Clean River Campaign). The Citarum river system is one of rivers, which are involved in this program. Under this program, countermeasures against pollution form the industrial effluent has been promoted. PROKASIH program is going to new stage, i.e. PROKASIH 2005 which deals with not only industrial effluent but also domestic effluent.

After the decentralization since 2001, the Government of West Java Province has responsibilities of manage of the environment of the rivers flowing through several cities and regencies such as the Citarum River as a coordinator and facilitator. However, three are fewer people as compared with the necessary scope of works assigned to West Java province. Human resource development such as capacity building, strengthening of the environmental management capability of Government of West Java Province is indispensable as a supervising government organization against environmental problems in the Citarum River.

4.3 Necessity of the Study

Degradation of Citarum watershed environment has eventually impacted to water environment that engenders numerous negative impacts on the residents on health hazards such as skin disease, electric generation, fish farming in the reservoirs which have been developed for the re-settled people by the dams, ecosystem, source of water supply and tourism as mentioned above.

Although support on mainly on water resources management has been implemented by several donors, there have been accumulating the issues regarding water pollution to be

tackled in the Citarum River, such as the increase amount of wastewater with increase of population, etc. Capacity development for implementation of overall water environment management, development of policies/strategies of the whole basin, etc. are not included in the above support. The roles of the relevant organizations in water environment management in the catchment need to be clarified to tackle these problems, considering the decentralization of environmental management power to province of municipality (kota)/ regency (kabupaten), the roles of PJT II, and the framework of water resource management proposed in WATSAL. As new approaches by PROKASIH 2005 have just started in Indonesia, a model project of PROKASIH 2005 is to be implemented.

It is therefore necessary that development of a framework of the environment management of the Citarum River, mainly focusing on water pollution, is required urgently. For this, further capacity development and institutional strengthening concerning environment management of the relevant governmental organizations which have responsibility in planning and implementation of measures as well as law enforcement. If concrete measures are not implemented, these situations are considered to continue. Therefore, supports on environment management in the Citarum River are required.

5. Objectives of the Study

(1) Establishment of Master Plan (M/P) for Sustainable Citarum Watershed Management mainly consists of conservation, water pollution control and rehabilitation in the Citarum river basin/watershed.
(2) Implementation of Feasibility Study for Priority Project(s) selected in the M/P

6. Study Area

The target area of the Study (Study area) is the Citarum Watershed/River basin in West Java Province, Indonesia.

7. Contents of Study

The Study consists of two phases; the management plan of conservation, water pollution control and rehabilitation in the Citarum river basin/watershed shall be established in Phase I (Master Plan (M/P) Phase), and preliminary implementation plan for the priority project(s) selected in the Phase I shall be prepared in Phase II (Feasibility Study (F/S) Phase). The components of the Study are explained as follows.

7.1 Phase I (M/P Phase)

(1) Field Reconnaissance

A series of field reconnaissance shall be conducted to obtain further information on watershed environment conditions of the Study area.

(2) Collection and Analysis of Existing Data and Information

Existing information necessary to conduct the Study shall be collected and analyzed. Such information includes following items:

a) Natural environmental data of the Study area such as climate, meteorology, hydrology, nature of soil, geology and topography
b) Socioeconomic data such as population, GDP, industry
c) Land use and tendency of land use change

d) Plans on regional and urban development, industrial development, tourism development, land use, and other relevant development
e) Past, on-going, and planned relevant projects, assistance by donors
f) Environmental monitoring data and status of the monitoring activities
g) Status of water catchment's area, water quality, source of pollution etc.
h) Status and conditions of domestic wastewater and its treatment system (sewerage system)
i) Status and conditions of industrial wastewater and its treatment system
j) Status of solid waste management
k) Status of aqua-culture and fishery
l) Status of forest and agriculture in the catchment
m) Financial and investment situations on environmental sector
o) Environmental organizations and institutions in central and local governments
p) Status of environmental awareness, education, and institutional and individual capacity building on water environmental management
q) Status of environmental activities by NGOs and CBOs

(3) Field Survey

By conducting a series of field survey, existing data shown as above shall be supplemented and updated. The field surveys shall be sub-contracted to suitable organizations in Indonesia

a) Survey on existing land use change & land property

b) Survey on critical land & forest

c) Survey on source of pollution incl. water and sediment quality in the river, and industrial wastewater

d) Questionnaire survey to the industries on environmental measures and future plan
e) Questionnaire survey to the residents on river environment, and awareness of environmental conservation, willingness to pay to environmental related services
f) etc.

(4) Examination of Current Environmental Conditions (Problems and Constraints)

Based on the above survey, data on following environmental conditions in the Citarum river basin shall be examined, and any problems and issues on water environment conditions shall be identified.

a) Climate, topography, soil and geology, hydrology
b) Population, number of households, economic activities
c) Problem and constraints on conservation area, water environmental management:
- Policy, law, and regulation on environmental management and conservation
- Organization and institution, financial situation
- Effect of water pollution
- Wastewater and solid wastes treatment system and facilities (sources and generated volume, status of and operation of facilities, expenditure and revenue)
- Environment awareness, education, and capacity building
- Environmental monitoring, and environmental information management
- etc.

(5) Review of Past, Ongoing and Planned Projects

The status of existing and planned projects/studies conducted shall be reviewed. Discussions with the responsible organizations shall be coordinated to the study as effective as possible.

a) Policy and direction of central and local governments on river basin environment management and conservation
b) Related plans such as urban plan, land use plan, industrial development plan, and tourism development plan
c) Present situation of river basin environment management projects financed by own budget and international donors

(6) Establishment of Geographic Information System (GIS) and Data Base

GIS shall be constructed and be used to analyze environmental degradation mechanisms, and to develop land use plan. The GIS and database are meant for the continuous use by the Indonesian counterparts in the future.

(7) Establishment of Future Socioeconomic Frame

Socio-economic frame defines the fundamental conditions of river basin environment management plan, and is needed to forecast future environment. Thus, the socio-economic frame in target year shall be set up for the following aspects:

a) Social aspects (population, land use, infrastructure)
b) Economic aspects (GDP, inflation rate, and others)
c) Development aspects (manufacturing, industry, tourism, agriculture, forest, and others)

(8) Projection of Future Volume of Pollution Loads and Water Quality in the River

Based on the socio-economic frame set, scenario on water environment management and conservation shall be set up. Then, future pollution loads generation in target year are estimated. Based on the estimated future pollution loads, future water environment conditions shall be forecasted (by means of a numerical simulation), and future problems shall be identified.

(9) Development of River basin Environment Management Plan (REMP) *based on watershed approach*

1) Setting Vision and Goals of REMP

General orientation of REMP shall be confirmed as vision through a series of discussions with relevant organizations. The opinions of stakeholders such as resident groups and representatives from different sectors and NGOs shall be sought. This is a process of setting a realistic and desirable water environment conditions in the future. Based on the vision, quantitative goals of management shall be set to allow realistic planning of the REMP.

2) Deliberation of Environmental Measures

Necessary environment improvement and conservation measures shall be deliberated. The measures shall consist of not only structural measures but also non-structural measures. The environmental measures consist of the following components.

a) Organization and Institution Development
- demarcation of responsibility

- Capacity development of reverent organizations for environment management
- land use control in the catchment
- aqua-culture control in the reservoirs

b) Waster pollution control
- sewerage system
- Industrial wastewater treatment system
- night soil and sludge management system
- river environment improvement

3) Comparison of Alternatives and Selection of Optimum Measures

Detailed analysis of environment improvement measures developed shall be conducted comparing alternatives in terms of technical, financial, social and environmental economic viewpoints. Based on these analyses, an environment management package from various alternatives shall be selected as an optimal one (project).

4) Development of incentives and disincentives system on upstream *(conservation area)* and downstream *(user area)*, analyzing water tariff.

5) Development of Guidelines on Water Environment Management *(watershed approach)*

Guidelines on water environment management for each city in the Citarum river basin shall be developed. These guidelines shall include directions of measures, and involvement of NGOs.

6) Development of Environmental Monitoring Program *(Water Quality)*

Environmental monitoring program on ambient water quality, surveillance program on industrial wastewater shall be developed. This approach allows gradual adoption of the program with development of technical and financial capacities. The following issues shall be considered in the program.

a) Items, points or/and areas, and frequency of monitoring *including establishment of permanent monitoring station.*
b) Monitoring methods including necessary equipment and facilities
c) Institutional aspects and human resources development
d) Data and information management

7) Examination of Organization, and Institutional and Regulatory Aspects

The organizational, institutional and regulatory factors shall be analyzed and the organization and institutional and regulatory system for environment management shall be examined.

A series of programs of institutional and individual capacity building for water environment management (water pollution control) shall be developed.*such as community institution*

8) Development of Programs on Environmental Education, Promotion of Environmental Awareness and Community Based Development (CBD).

CBD and Environmental education programs to promote environmental awareness to interests such as residents shall be development. Directions of involvement of NGOs and CBOs for river basin environment management shall be examined.

Information dissemination methods including utilization mass-media and establishment of a web-site shall be developed, and a series of demonstration program and campaign shall be conducted.

9) Development of Implementation Schedule and Cost Estimate

The implementation schedule of the Master Plan shall be developed considering urgency, possibility to start early, and necessary preparation period to solve problems. The yearly investment costs consisting of design, construction, equipment procurement, operation and maintenance costs shall be calculated for each project in the Master Plan.

10) Development of Financial Plan

Base on the cost estimate for each project, appropriate financing and cost recovering measures shall be examined and summarized as a financial plan. The taxation system shall be studied, and other potential financial sources shall be identified.

11) Formulation of River basin Environment Management Plan *(REMP)*

Based on the above studies, *River basin Environment Management Plan (REMP)* of the Citarum River shall be formulated. Proposed projects shall be listed in the Master Plan.

(10) Evaluation of REMP

The developed EMP shall be evaluated in terms of technical, social, and economic propriety. The economic effectiveness of the REMP shall be assessed as quantitatively as possible by comparing the environmental benefit and the cost of the EMP.

(11) Selection of Priority Project(s)

Selection of priority project(s) shall be conducted comparing urgency, effectiveness and location of each project listed.

(12) Implementation of Initial Environmental Examination (IEE) for Priority Project(s)

IEE shall be conducted for selected priority project(s).

7.2 Phase II (F/S Phase)

(1) Supplemental Studies for Taking Shape the Selected Priority Project(s)

a) Study for conditions of location for the project sites
b) Study for setting design conditions
c) Field survey (measurement, soil and geological survey)

(2) Implementation of Feasibility Study

a) Project scale and contents
b) Project area
c) Preliminary design
e) Implementation organization
f) Implementation schedule

g) Cost estimate
h) Financial plan

(3) Implementation of Environmental Impact Assessment (EIA) for the Priority Project(s)

(4) Evaluation of the Priority Project(s)

a) Technical aspect
b) Social aspect
c) Financial and economical aspects

(5) Preparation of Manuals

The manuals for selected measures are prepared for the batter operation and maintenance of the Priority Project(s)

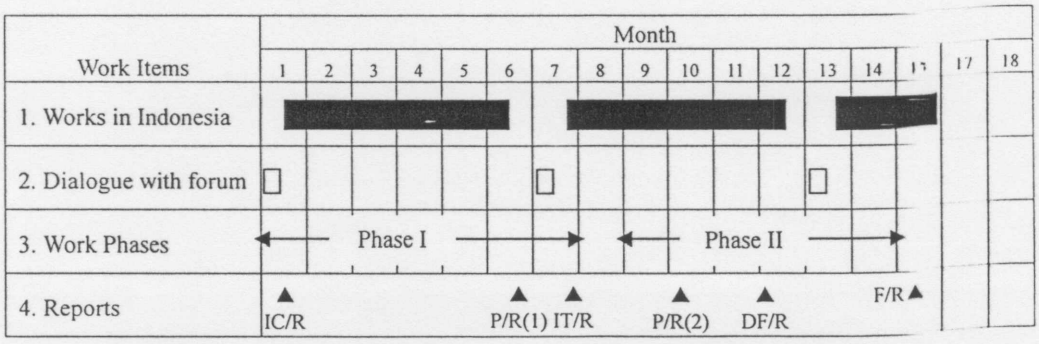
8. Technology Transfer

Capacity building and technology transfer are conducted through the Study.

a) Technology transfer to counterpart personnel through the study works
b) Preparations of guidelines on water quality management
c) Training programs for personnel in charge of water quality management works
d) Seminar and mini-workshops for personnel from related sectors

9. Project Period and Reports

Project Period 15 months



IC/R: Inception Report P/R: Progress Report IT/R: Interim Report
DF/R: Draft Final Report F/R: Final Report

Based on the above work schedule, following reports are prepared and submitted to related agencies of Indonesia.

1) Inception Report	: 30 sets
2) Progress Report (1)	: 30 sets
3) Interim Report	: 30 sets
4) Progress Report (2)	: 30 sets
5) Draft Final Report	: 30 sets
6) Final Report	: 50 sets

10. Members of Experts

The Study consists of 13 sector experts, and requires 93 M/M in total.

(Unit: M/M)

Experts	Total
1) Team Leader/watershed environment management expert	15.0
2) Water pollution mechanism/water quality expert	8.0
3) Environmental monitoring/Data base/Information network	6.0
4) Industrial wastewater control	10.0
5) Sewerage system development	10.0
6) Solid waste management	4.0
7) Catchment management (soil and forest management)	6.0
8) Fishery and aqua-culture management	4.0
9) Land use/GIS	5.0
10) Social aspects/ environmental education/public participation	5.0
11) Organization and institution/capacity building	8.0
12) Facility design and cost estimation	5.0
13) Economic and financial analysis	5.0
Total	93.0

11. Study Coordination

A steering committee which consists of representatives of the following [illegible] is organized to coordinate the Study. The committee will be chaired by West Java [illegible]

1) MOE
2) KIMPRASWIL
3) MOF
4) MOIT
5) MOH
6) MOST
7) West Java Province
8) Bandung City
9) Cimahi City
10) Bandung Regency
11) Cianjur Regency
12) Purwakarta Regency
13) Karawang Regency
14) PDAM Bandung City
15) PDAM Bandung Regency
16) Perum Jasa Tirta (PJT) II
16) PJB Electric Power Company
17) Indonesia Power Company
18) Research Institute of Water Resource