

CHAPTER III-3 ENVIRONMENT

III-3.1 Laws and Regulations on EIA

GOI controls the quality of environment, regarding health and safety, sensitive areas, endangered species, sedimentation, land use, etc., at national, regional, and local levels by the laws and regulations.

AMDAL (Jenis Usaha atau Kegiatan Yang Wajib Dilengkapi Dengan Analisis Mengenai Dampak Lingkungan) is the law on the environmental impact assessment (EIA), which was enacted on 26 August 1996 by GOI. *AMDAL* demands environmental impact assessment for the development activities. Table III-3.1.1 shows the activities concerning forest rehabilitation and watershed conservation indicated in *AMDAL*.

III-3.2 Existing Environment Assessment for the Intensive Area

The report on 'North Sulawesi Water Resources Management Plan' by PU contained an initial environmental screening of each proposed component of the plan.

The report mentioned that many of the original natural habitats on the alluvial plains and in middle watersheds in North Sulawesi have already been converted to agricultural use, urban area, or logged over, due to population pressure around the important and accessible resources. Recent exploitation and encroachment to the forest areas worsen environment in upper watersheds. The study indicates important environment and social aspects on Lake Tondano as shown in below table.

Important Environment and Social Aspects on Lake Tondano

Lake Tondano:	The biggest lake in the province; a mid-elevation lake with many water demands (agriculture and domestic water supply, hydropower potential, intensive fisheries, and a tourism destination); suffering from sedimentation problems due to adjacent land use; susceptible to increasing population pressure around the lake and competing water demands
The communities living around important water resources and on the coast (Moat, Limboto, Tondano, Manado, Gorontalo in particular):	With the exception of Lake Moat, all show fairly high population density and strong dependence on the water resources to which they are adjacent; competing demands on space and water resources in their areas, and development projects which involve water resources, will increase the level of social disruption and conflict, making these important social components to deal with

III-3.3 Initial Environmental Examination

Before conducting EIA, the Initial Environmental Examination (IEE) was executed for the preliminary study on the anticipated environmental impact, aiming to focus on the major issues in EIA.

Before conducting IEE, the JICA Study Team identified eight activities to be proposed for the management and conservation of the Tondano watershed as below, which were subjected to IEE:

- Set-up of monitoring institution for watershed management
- Establishing community forest
- Extension of agroforestry
- Extension of erosion control farming
- Reforestation in protection Forest
- Green belt along the lake and rivers
- Regulation of fishery in the lake
- Construction of erosion control structures

The result of IEE showed that the possible impacts, including both positive and negative, are anticipated mostly in social aspects and river and lake issues. Tables III-3.3.1 and III-3.3.2 show the result of IEE.

III-3.4 Environmental Impact Assessment

III-3.4.1 Description of Environment

(1) Abiotic and Biotic

Environmental description on 'Land Use', 'Meteorology and Hydrology', 'Forest Ecosystem', 'Agro-ecosystem' and 'Aquatic ecology' is given in Section III-1.10.

(2) Social, Economic and Cultural Environments

Social, economic and cultural environments are mentioned in Section III-1.10.

III-3.4.2 Significant Environmental Impacts

(1) Soil and Land

In term of soil and land in the watershed, the positive impacts will take form of detachment of soil particles from soil mass and transportation of soil particles by running water. The negative impacts of the proposed activities on those components are minor and likely to occur only or at most during initial phase of the activities.

Anticipated impacts including both positive and negative, which are denoted by D scores in Table III-3.4.1. Thus, for soil and land components, impacts of the proposed activities will be more on the positive side, such as reducing soil loss by water, increasing infiltration and ground water storage, and improving soil fertility.

(2) Hydrology

Considering the planned activities and the results of assessment on hydrology and water quality components, the predicted significant impacts are minor as shown in Table III-3.4.2. Instead, the positive impacts will be very strong and predominant. Agroforestry extension, reforestation of the protection forest, establishment of green belt improve the hydrological status and water quality. This also indicates that mitigation measures for the negative impacts on the hydrology and water quality will be minimal. However, the monitoring on hydrological process of the watershed and the lake is important, and monitoring plan shall be established accordingly.

(3) Terrestrial, Agro-ecosystem and Aquatic Ecology

Predicted impacts by the activities on biotic aspect are scored mostly D (no negative impact) as shown in Table III-3.4.3.

Two anticipated negative impacts would:

- Problems when some new species are introduced into the green belt, and
- Increases in plant intensity that leads to increased use of fertilizer by extension of agroforestry.

Positive impacts would:

- Improve biodiversity, especially those that have commercial value by establishing community forest and extension of agroforestry,
- Stop the people to expand their activities into the protection forest by establishing community forest and extension of agroforestry,
- Improve the availability of food for the wild life, which will help improving their population growth and distribution by reforestation in protection forest,
- Halt the process of genetics erosion in the area, especially indigenous, specific and protected flora by reforestation in protection forest,
- Improve vegetation stand and structure up to the tree levels by reforestation in protection forest,
- Create additional space for the species, area to find food, and for the nursery by establishment of green belt area,
- Construct green belt works as a bridge (corridor) between areas, so that the flora and fauna could easily move around, and

- Improve vegetation structure and system stability brought by combination of forest vegetation and cultured crops by extension of agroforestry.

For the aquatic life, the planned activities would certainly give negative impacts on aquatic life. Most impacts, however, are more minor.

(4) Socio-Cultural

Impacts by the proposed activities on socio-economy and cultural component area as following, and Table III-3.4.4 shows the detailed anticipated impacts:

- Set-up of monitoring institution for watershed management would impact on local community. This, however, would be minor negative impact. Establishment of strong organization will create more positive impact to the community.
- Establishment of community forest in the state owned land would create negative impacts to the community, because they have used the land to generate income. Impacts would occur at the initial stage of the project only.
- Extension of agroforestry would create positive perception on the community when properly executed. Impacts would be more positive if the activities include local species with high economic value.
- Extension of erosion control farming practices would create fundamental change to the traditional farming practice in the Intensive Area.
- Expansion of woodland, prevention of deforestation and green belt along the lake and rivers would produce both negative and positive impacts. Negative impacts, however, would be minor compared to the positive impacts, since it would occur in the initial stage of the activities.

III-3.4.3 Mitigation Management Plan

All the proposed activities would produce impacts, but mostly on the positive side. Thus there would be little need for mitigation measures.

(1) Soil, Land, Hydrology, and Water Quality

Soil conservation farming practices for reducing soil erosion are recommended to minimize erosion. For hydrological aspect, no mitigation plan is required since the activities themselves improve hydrological regime. Regarding water quality, it is proposed to provide training to the farmers and inhabitants.

(2) Forest Ecosystem, Agroforestry, and Aquatic Ecology

- To design them as corridors, which will allow high genetics of the flora and

fauna transfer between their habitats in the Intensive Area, in order to establish community forest, agroforestry and green belt.

- Select the species to be used in establishing the planned activities from the existing species in the area, since they have already naturally adapted to the ecosystem in the area.
- To socialize the activities to the local people.
- To set up a good institutional system which will be responsible for implementing, monitoring, and maintaining these activities.
- To move the fish net off the shore of the lake using floating nets, since the declined non-cultured fish production has been caused excessive use of the habitat of non-cultured fish near the shore of the lake that provides good habitat, shelter, and natural food.

(3) Socio-Economy

In order to increase and maximize positive impacts and to minimize negative impacts, it is necessary to consider the following aspects:

- To consider the socio-cultural aspects of the local people in setting up of the monitoring institution for watershed conservation.
- To consider the alternative income source for the local people who receive negative impact produced by the activities of establishing community forest.
- To carry out the extension, training and workshop for farmers and local stake holders in order to create positive perceptions, and to increase their capacity. The training should include practical fieldwork in order to provide real experience to the participants.
- To organize a multi-sectoral committee like Tondano Watershed Authority Board that is responsible to establish integrated planning and to manage the watershed.

III-3.4.4 Monitoring Plan on Environmental Impact

(1) Soil and Water

The plan of monitoring for soil and water is mentioned in Sub-Section III-2.7.2.

(2) Flora and Fauna

Fauna and flora diversity needs to be monitored. This can be done using transect method at several location within the community forest, protection forest, agroforestry, and green belt area, at least once a year. The organizations to be responsible for this include *BRKLT*. Monitoring shall also be made in the agricultural area through direct

observation on production and plant pest and disease. This activity could be carried out at every planting season for perennial crops and once a year for annual crops, under support by the institutions such as the Minahasa District Food Crops and the Estate Crops Services Offices.

(3) Socio-Economy and Culture

Monitoring activity on socio-economy and cultural components can be implemented for the issues on a) consulting and socialization of the project to the local people, b) production and development of productive plants, c) providing compensation in the relocation program, d) people participation in each stage of the process, and e) establishment of monitoring institution

Environmental components that need to be monitored are a) potential conflict within the local people, b) loss of sources of income, c) level and income distribution, and d) people perception.

The monitoring activities can be conducted through data collection (primary and secondary) at least once every six months.

CHAPTER III-4

PROJECT IMPLEMENTATION PLAN AND COST ESTIMATE

III-4.1 Implementation Plan

III-4.1.1 Proposed Project Works

The Project consists of the following 4 major components and 5 sub-components, and details of each component are given in Table III-4.1.1:

- 1) Physical watershed conservation measures
 - a) Forestry management and rehabilitation
 - b) Agriculture/agroforestry improvement
 - c) Erosion control facility development
- 2) Institutional development
- 3) Community empowerment
- 4) Monitoring and evaluation system development
 - a) Engineering items
 - b) Socio-economic items

III-4.1.2 Implementation Plan

(1) Overall Schedule

Figure III-4.1.1 presents the detailed implementation schedule. The above-mentioned components/sub-components will be implemented in the following schedule:

Project Implementation Schedule

Component	Year1	Year2	Year3	Year4	Year5	Year6	Year7	Year8	Year9	Year10	Year11	Year12	Year13	Year14
1 Physical Watershed Conservation Measures														
1.1 Forestry Management and Rehabilitation														
(1) Boundary survey for protection forests														
(2) Community forestry plan														
(3) Reforestation plan														
(4) Strengthening plan of forest patrol														
(5) Research plan for non-wood forest products														
(6) Fuel wood planting plan														
(7) Timber tree planting plan														
(8) Strengthening of extension services														
1.2 Agriculture and Agroforestry Improvement Plan														
(1) Agriculture														
(2) Agroforestry														
1.3 Erosion Control Facilities														
2 Institutional Development Plan														
(1) Community institutional development														
(2) Technical institutional development														
(3) Institutional development of forestry services														
(4) Accurate village boundary mapping														
(5) Institutional integration and strengthening of legal and regulatory framework														
(6) Strengthening of watershed conservation capacity at University of Manado														
(7) Strengthening of local NGO														
3 Community Empowerment Plan														
(1) Micro planning of sustainable land use														
(2) Awareness raising and environmental education														
(3) Organizing of local people and reorienting of officials														
(4) Strengthening of social safety network														
(5) Gender and conservation														
4 Monitoring and Evaluation System Development Plan														
(1) Engineering items														
(2) Socio-economic items														
5 Operation and Maintenance														

The proposed watershed conservation plan will be implemented for 14 years. The

required running cost will occur at the 1st year when vehicles and other materials are procured, and will last by 60th year of the project life.

Out of 6 components, the institutional development plan, community empowerment plan and monitoring and evaluation system development plan, which are supporting plans for the physical watershed conservation measures, will be preferentially started at the 1st year. The institutional development plan will start for implementation immediately and be fulfilled using 5 years. The community empowerment will be completed for the first 4 years since it is important for sustainable watershed conservation. As for the monitoring and evaluation system development plan, its engineering items monitoring will be started immediately and completed for 10 years in this plan. The socio-economic items monitoring will be executed in parallel to the community empowerment activity for 4 years.

Most of the forestry management and rehabilitation plan will be set out immediately after completion of community empowerment, and require the longest period of 10 years. However, the boundary survey for protection forests and the strengthening of forest extension services, which are not directly related to the community empowerment, will be started at the 1st year. The community forestry plan will be commenced at the 2nd year since the corresponding village is included in the community empowerment plan.

The agroforestry improvement plan will start from the strengthening of extension services at the 1st year, and improvement of cultural practice including the strengthening of agriculture extension services, will be commenced after community empowerment plan and be completed for 5 years.

The erosion control facilities development plan including survey, design and construction, will be started from the 4th year after collection of check data through monitoring and evaluation system, and be implemented for 2 years.

More detailed information on implementation for respective components are given below:

(2) Physical Watershed Conservation Measures

1) Forestry Management and Rehabilitation

Eight major activities are proposed in the plan. Out of 8 activities, boundary survey for 6 protection forests will be started urgently and be completed within 2

years. The strengthening plan of forest patrol will be started at 5th year. At first, location of forest patrol stations will be determined, and then their construction will be set out. In parallel, forest patrol will be commenced, and be in full swing after construction of forest patrol stations. Total period for forest patrol will be 10 years.

The community forestry activities for 30 ha, will be started one year after commencement of community empowerment. Firstly, the Forestry Services Office will make a boundary survey for protection forest and land arrangement. In parallel, a community will be organized by all encroachers under the guidance of the Forestry Services Offices along with the necessary administrative procedures. After establishment of community, the community will commence the required activities such as planting of trees/tree crops using seeds and other materials supplied by the Forestry Services Office in close cooperation with the other relevant agency especially for socio-economy. The complete community forest will require 20 years although the initial works such as organization of community forestry and plan preparation would require 2 years. The initial investment cost will cover the 10 years from its commencement, and the remaining 10 years will be treated at the running activities.

The tree plantation for the 6 protection forests will be executed in accordance with the reforestation program. It will start for a field survey to prepare a planting plan, which will require a year. Based on the survey result, 5 nurseries will be constructed, and then planting and tending of trees will be conducted by village people as paid labor. This tree plantation work will be made for 4 years from the 6th year to 9th year, and monitored periodically thereafter.

Research on no-wood forest products promotion will be conducted by the Forestry Services Offices in the 3 years from the 5th year to 7th year. The 7 delivery stations for the fuel wood plantation will be constructed within 3 years and plantation works will be executed after the construction and be completed at 14th year. Timber tree planting will be continued by 14th year after the completion of construction of 9 nurseries for 3 years.

The extension services will be strengthened for forestry conservation, especially in connection with timber tree plantation and fuel wood plantation. The required period will be the first 5 years.

2) Agriculture and Agroforestry Improvement

Agriculture and Agroforestry improvement plan covers 2 major activities. One

is the strengthening of extension services, and the other is the improvement work in the field.

The strengthening of agricultural extension services in this plan, is to supply transportation facility only in the 5th year. On the other hand, the agroforestry extension services will be strengthened for 5 years because it should be set out from training of trainers should be trained. In the strengthening of agroforestry extension services, its plan will be finalized at first, and then the staff of the agroforestry extension service will be recruited in the 1st year. The required mobilization facility such as pick-up truck and motorcycle will be procured in the 1st year and 5th year. The training will be repeated during the training program for 5 years.

In parallel to the strengthening of agroforestry extension services, agriculture and agroforestry improvement will be executed for 5 years. Out of 3 areas in the Intensive Area, attention should be paid to the East Area because of high possibility of potential critical land. Therefore, the extension service should be provided for the East Area at the early stage, and followed by the West and the South Areas.

3) Erosion Control Facility Development

The erosion control facility will be set out at the 4th year after collection of check data through operation of monitoring and evaluation system , and be implemented over for 2 years. The detailed design works and other preparatory works will be completed within 6 months. The construction works will last 18 months after the completion of detailed design and preparatory works. Basically, erosion control facilities for the critical land will be constructed in the 1st year and the erosion control facilities for the potential critical land will be provided later, though it would be necessary to make some adjustment in time due to the construction work volume.

The construction works will be executed on a contract basis. For the construction, local materials will be used as much as possible. Moreover, manual construction will be applied as much as possible, taking the job opportunity creation of the local people into account.

(3) Institutional Development

Eight activities are proposed in the institutional development, which will be implemented for 5 years. At first the community institutional development will be

conducted for the selected 6 villages, to establish the methodology and procedure of institutional development. With these established methodology and procedure, the community institutional development will be conducted for other communities for 4 years. Technical institutional development will be made in 3 stages; a) orientation, b) basic program, and c) advanced program for 4 years in total. Institutional development of forestry offices will be mainly done within the first 3 years and converted to on-the-job training program. Accurate village boundary mapping will be completed by the Sub-district Forestry Services Office within the first one and half years. Institutional integration and legal and regulatory framework program will be held intensively in the 1st year and held discontinuously for another 4 years. University of Manado development program will be made in the first 3 years and the sub-programs will be repeatedly conducted from the 2nd year to the 5th year. Strengthening of NGOs will be conducted for the latter 2 years.

(4) Community Empowerment

The community empowerment will need 4 years. At first, the 6 villages will be selected for pilot sites for the implementation. The community empowerment plan will be implemented for these pilot sites. At the initial stage, micro planning program will be held for half a year. After the completion of micro planning program, awareness raising and environmental education will be carried out for 4 years in total, half year for the first 2 years, and 1.5 years for the latter 2 years. Two activities a) strengthening of social safety net, and b) gender and conservation program will be started and continued for 2 years. In parallel with these programs, organizing of local people and reorientation of officials program will last for 4.5 years from the beginning of the implementation. After completion of community empowerment for pilot sites, the same empowerment activities for the remaining villages will be made by the District Forestry Services Office and other government agencies based on the results of pilot ones.

(5) Monitoring and Evaluation System Development

1) Engineering Items

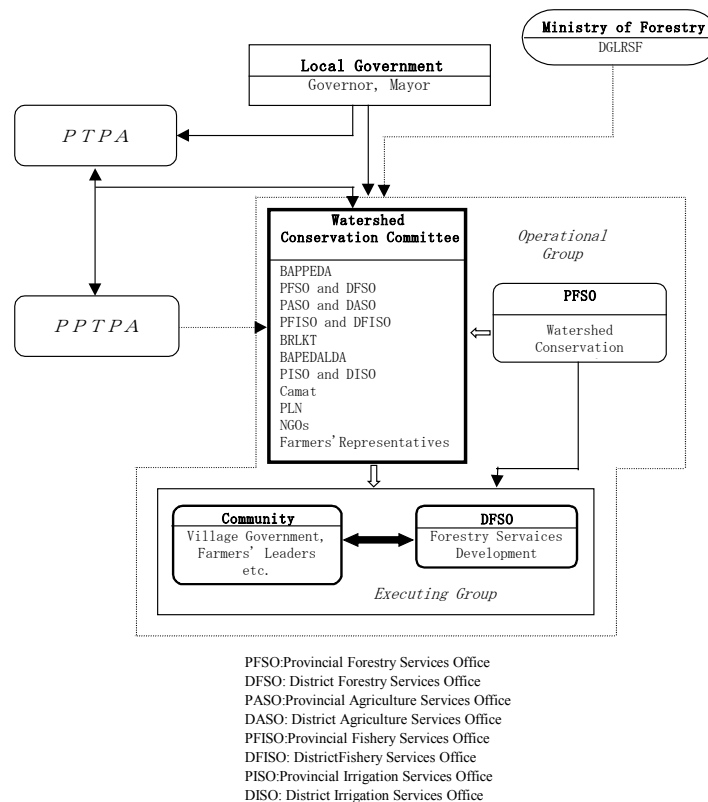
In the 1st year, necessary facilities and equipment for the engineering items will be procured and installed. After the installment, required data such as a) erosion and sedimentation, b) water quality, c) water balance, and d) torrent and slope erosion will be collected periodically for 10 years. The employed experts will conduct the monitoring and analysis works together with the government staffs from relevant agencies for the purpose of technology transfer.

2) Socio-Economic Items

Socio-economic items monitoring will be held discontinuously for 4 years. At the initial stage, preparatory works of the monitoring will be made. Actual monitoring and evaluation works will be made from the 2nd year to the 4th year.

III-4.2 Executing Agency

The watershed conservation plan will be implemented by the District Forestry Services Office in cooperation with community under coordination of the Provincial Forestry Services Office. In order to implement the plan steadily, it is proposed to establish the executing group consisting of the District Forestry Services Office and community, and the operation group consisting of the Provincial Forestry Services Office, the Watershed Conservation Committee and the executing group. In addition, the Watershed Conservation Board will be established at the Provincial Forestry Services Office, to follow the decisions made by the Watershed Conservation Committee.



Executing Group and Operational Group

On the other hand, monitoring and evaluation system, *BRLKT* should be actually managed under coordination support by the Provincial Forestry Services Office and the local universities.

III-4.3 Cost Estimate

III-4.3.1 Basic Consideration and Assumption

The following basic consideration and assumption are made for the project cost estimation.

- 1) The exchange rate used in the cost estimate is:
US\$ 1.00 = Rp. 9,100 = ¥ 115 as of December 2000.
- 2) The unit rates of the works are estimated at the December 2000 price on the basis of the current price prevailing in North Sulawesi and standard price list obtained from several government agencies and similar projects.
- 3) The unit rates of the works are divided into the foreign and local currency portions. Respective currency portions include the following costs:

Demarcation of Local and Foreign Currency

Currency	Item
Local currency portion:	Local labor cost, Cost of local material, Inland transportation cost, etc.
Foreign currency portion:	Foreign labor cost, Cost of imported materials, etc.

- 4) It is assumed that the implementation will be commenced in the fiscal year 2002, considering the required period of project preparatory works.
- 5) Price contingency is calculated at 2.0% for the foreign currency portion and 10.0% for the local currency portion on the basis of annual escalation rate.
- 6) The project running cost to be financed by GOI and communities after the completion of the project activities, are not included in the project cost.

III-4.3.2 Project Cost

Total project cost was estimated at Rp.76,661 million as given below.

Summary of Project Cost

		Unit: Rp. Million		
Component		F.C.	L.C.	Total
1	Physical Watershed Conservation Measures			
1.1	Forestry Management and Rehabilitation	425	9,284	9,710
1.2	Agriculture/Agroforestry Improvement	1,990	2,604	4,594
1.3	Erosion Control Facility Development	4,962	2,980	7,942
2	Institutional Development	9,762	2,101	11,863
3	Community Empowerment	8,503	1,248	9,752
4	Monitoring and Evaluation System Development			
4.1	Engineering Items	985	1,992	2,977
4.2	Socio-Economic Items	773	110	883
5	Administration of the Project	685	508	1,193
6	Physical Contingency*	383	213	597
7	Price Contingency	2,510	24,642	27,152
GRAND TOTAL		30,978	45,683	76,661

Note : * 10% of direct construction cost of 1.3

III-4.3.3 Annual Disbursement Schedule

The annual disbursement schedule was worked out on the basis of implementation plan. Following table shows the summarized disbursement schedule.

Annual Disbursement Schedule

Component		Fiscal Year													
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Physical Watershed Conservation Measures														
1.1	Forestry Management and Rehabilitation	109	156	117	111	1,051	1,110	1,016	99.3	993	872	872	770	770	770
1.2	Agriculture / Agroforestry Improvement	0	0	0	0	2,093	597	597	597	597	0	0	0	0	0
1.3	Erosion Control Facility Development	0	0	0	2,867	5,075	0	0	0	0	0	0	0	0	0
2	Institutional Development	5,177	1,821	1,641	1,611	1,611	0	0	0	0	0	0	0	0	0
3	Community Empowerment	2,534	2,417	2,406	2,394	0	0	0	0	0	0	0	0	0	0
4	Monitoring and Evaluation System Development														
4.1	Engineering Items	1,182	179	179	179	179	364	179	179	179	179	0	0	0	0
4.2	Socio-Economic Items	219	219	219	225	0	0	0	0	0	0	0	0	0	0
5	Administration of the Project	126	126	126	126	126	63	63	63	63	63	63	63	63	63
6	Physical Contingency*	0	0	0	185	411	0	0	0	0	0	0	0	0	0
7	Price Contingency	727	563	722	1,805	3,814	1,792	1,983	2,334	2,737	1,988	1,930	1,967	2,243	2,546
TOTAL		10,141	5,441	5,376	9,463	14,320	3,948	3,860	4,188	4,591	3,124	2,887	2,823	3,099	3,402

Note : * 10% of direct construction cost of 1.3

III-4.3.4 Running Cost

Running cost is the cost to operate and maintain the development components after the completion of project activities. Consequently, the running cost was estimated separately from the project cost and used for the project evaluation. The running cost is mainly composed of two items, such as (a) operation and maintenance cost, and (b) replacement cost.

(1) Operation and Maintenance Cost

The facilities and hardware provided by the Project should be operated and maintained properly throughout the life time of project activities. The cost for the operation and maintenance activities was estimated based on the handing-over schedule of the Project. The estimated operation and maintenance cost without price contingency is Rp. 6,671 million.

(2) Replacement Cost

Some of the equipment and facilities such as vehicles have a shorter life than the Project and have to be replaced periodically. The replacement cost of such kind of equipment was estimated considering the useful life of the equipment. The estimated operation and maintenance cost without price contingency is Rp. 22,560 million.

CHAPTER III-5 PROJECT EVALUATION

III-5.1 Approach and Methodology of Project Evaluation

III-5.1.1 Scope of Project Evaluation

Technical evaluations of the proposed watershed conservation plan were carried out through formulating necessary actions and countermeasures in the previous Appendices concerned, while an environmental evaluation on WCP was implemented by means of the environmental impact assessment as described in Section III-3. Therefore, the watershed conservation plan is evaluated only from economic, financial and institutional points of view. For the results of technical and environmental evaluations, refer to their respective sections in the Appendices concerned.

III-5.1.2 Analytical Approaches and Methods

The main goal of watershed conservation plan is watershed conservation of the Intensive Area through sustainable land use, so that key components for the economic evaluation are environmental goods or services which have been conventionally ignored in the usual economic evaluation in monetary terms. At the same time, such watershed conservation measures as agroforestry and afforestation generate direct marketable products which are important factors to evaluate the financial validity of projects. Under these innate characteristics of watershed conservation plan, the following analytical approaches and methods are applied in the project evaluation while the conventional cost-benefit analysis with the economic internal rate of return (EIRR) and the financial internal rate of return (FIRR) are utilized:

- 1) To evaluate environmental benefits in monetary terms as much as possible, by reviewing the evaluation methods already developed or proposed by environmental economists,
- 2) To collect and make use of any related data from the existing case studies in economic analysis on the other environmental projects/programs, in order to set out scientific and reasonable assumptions for evaluation in any inevitable cases,
- 3) To utilize the results of the RRA survey and the environmental impact assessment implemented in the Study, to collect reliable baseline information and data useful in applying evaluation methods especially for intangible environmental functions, and
- 4) To focus on how to recover the implementation cost of the proposed watershed conservation measures with the limited marketable products, examining any possibility of financial instruments such as the natural resource taxation and

environmental funding system in association with the foreign financial assistance.

Objective of the financial evaluation is to analyze viability of a proposed financial plan for watershed conservation plan examining whether the central and local executing agencies can procure money to recover the estimated costs for the implementation of watershed conservation plan. Money necessary for the implementation of watershed conservation plan can be largely classified into:

- Money to be input for initial investment (buildings, physical measures, facilities and equipment), and
- Money for running costs (O & M of the measures and staff salary).

Main components of the financial evaluation, under this objective, are consisting of:

- Calculation of FIRR, comparing the incremental costs with potential revenues from watershed conservation plan,
- Formulation of a cost recovery schedule for loan including interests and repayment in accordance with the financial plan, and
- Examination on financial viability and feasibility of the proposed financial plan, by calculating balance based on the cash flow.

III-5.2 Economic Evaluation

III-5.2.1 Conceptual Framework of Cost-Benefit Analysis

The economic analysis is integrated into the evaluation of watershed conservation plan by including not only direct costs of physical works, equipment, operation and maintenance (O & M), but also benefits and “damage costs” avoided in use of forestry resources and environmental functions of the Tondano watershed. This analysis builds on the environmental/resource economic expertise developed so far, aiming at evaluating feasibility of the implementation of watershed conservation plan from the socioeconomic point of view.

For evaluation of socioeconomic feasibility, “Cost-Benefit Analysis” approach, which is internationally common and accepted, is applied with its general conceptual framework of evaluation equation as below:

$$NB = Bd + Be - Cd - Cp - Ce$$

where	NB :	Net benefit generated by implementation of a plan/measures
	Bd :	Tangible productive benefit directly generated
	Be :	Intangible benefit including environmental value
	Cd :	Direct cost necessary for the implementation
	Cp :	Cost for preventive measures for environmental conservation
	Ce :	Cost as environmental damage due to the implementation

In many cases of productive development or infrastructural sector projects, “Be” and

“Ce” have been conventionally ignored as “external economic item” and “external diseconomic item” respectively. The both are usually regarded as unmeasurable in monetary terms.

A major part of the “Bd” of watershed conservation plan is equivalent to “Be”, while “Cd” equals “Cp”. This is because its main target is to conserve a good quality of environmental functions of the watershed or to further improve them through sustainable land use. On the other hand, “Ce” hardly accrues from the watershed conservation plan for the same reason. Therefore, the most proper cost-benefit equation for the watershed conservation plan is as below:

$$NB = Be - Cp$$

If “Be” of watershed conservation plan is still left unmeasured as conventional, any cost-benefit analysis calculating “NB” could be hardly carried out. In this context and nature of the benefits of watershed conservation plan, the JICA Study Team considered the “Be”-calculation as essential.

III-5.2.2 Points of Economic Evaluation

Understanding both the economic and environmental values of the Tondano watershed’s ecosystem, the cost-benefit analysis can serve as a useful tool in analyzing conservation alternatives for the existing natural resources. The evaluation was carried out on various important functions of the watershed, including forestry and agricultural resources, soil erosion control, and purification of the surrounding environment. The followings are key points duly considered for accurate evaluation of these functions in the cost-benefit analysis :

- 1) Use of social cost and benefit,
- 2) Application of EIRR,
- 3) Determination of proper discount rate,
- 4) Appropriate time horizon for analysis, and
- 5) With-project/without-project framework

III-5.2.3 Monetary Evaluation Methods for Environmental Benefits

Environmental functions of the Tondano watershed are major targets for conservation under the current study. The main purpose to apply the monetary evaluation methods is to qualitatively measure the benefits from the implementation of watershed conservation plan, not to measure these environmental values of the watershed as a whole. Envisaged benefits from the implementation of watershed conservation plan could be largely classified into 8 categories as follows:

- 1) Increased water resources,
- 2) Conserved water quality,
- 3) Strengthened erosion and flood control capacity,
- 4) Conserved air quality,
- 5) Conserved aesthetic and recreational amenity,
- 6) Improved forestry resources,
- 7) Conserved fishery resources, and
- 8) Improved agricultural resources

Potential methods for estimating the monetary value of natural resources and environmental benefits, which might result from the implementation of watershed conservation plan, were examined. The next table presents a menu of valuation techniques which have been developed so far in environmental/resource economics, as well as typical examples of the evaluated effects. These are largely divided into two categories (OVA and SVA), based on their extent of objectivity or subjectivity.

Menu of Valuation Methods for Environmental Effects

Valuation Method	Typical Effects Valued
(1) Objective Valuation Approaches (OVA)	
1) Change in Productivity	Productivity
2) Cost of Illness	Health (morbidity)
3) Human Capital	Health (mortality)
4) Replacement (Restoration) Cost	Capital assets, and natural resource assets
(2) Subjective Valuation Approaches (SVA)	
1) Preventive (mitigative) Expenditure	Health, productivity, capital assets, and natural resource assets
2) Hedonic Approaches	
- Property (Land) Value	Environmental quality, and productivity
- Wage Differential	Health
3) Travel Cost (TCM)	Natural resource assets, and touristic assets
4) Contingent Valuation (CVM)	Any effects including biological and aesthetic values

Source: Economic Analysis of Environmental Impacts, ADB/WB, 1994

III-5.2.4 Applicable Evaluation Framework for Benefits of Watershed Conservation Plan

The choice of a particular method of measurement obviously depended on what was being measured. The valuation flowchart to select applicable methods developed by World Bank presents a valuation flowchart that suggests where an analysis might begin. The figure starts with any environmental impact and determines whether or not there is a measurable change in production, or if the primary effect of the impact is change in environmental quality. According to this flowchart and availability of necessary data for monetary calculation, the more applicable evaluation methods for the above-mentioned 8 kinds of benefits brought from watershed conservation could be selected.

III-5.2.5 Results of Benefit Calculation and Cost-Benefit Analysis

In accordance with the theoretical and measurement frameworks, values of the benefits (mostly Be) from the implementation of watershed conservation plan were calculated in monetary terms. Applied evaluation methods and estimated value for each benefit are summarized in the next table.

Annual Economic Benefit of Plan Implementation

Benefit Items	Evaluation Method	Benefit in 14th Year (Rp. million in 2000 price)	Ratio (%)
(1) Increased water resources	Replacement cost	1.0	0.0
(2) Conserved water quality	Preventive expenditure	negligible	---
(3) Strengthened erosion and flood control capacity	(a) Replacement cost	1.3	---
	(b) Change in productivity	1.9	---
	(c) Preventive expenditure	* 426.2	9.5
(4) Conserved air quality	Replacement cost	10.4	0.2
(5) Conserved aesthetic and recreational amanity	Contingent valuation, Travel cost, or Change in productivity	negligible	---
(6) Improved forestry resources	Change in productivity	23.5	0.5
(7) Improved fishery resources	Change in productivity	unmeasurable	---
(8) Improved agricultural resources	Change in productivity	4,025.2	89.7
Total		4,486.3	100

*Note : * For Item (3), the benefit estimated with the Method C is only counted ignoring double counting with the Methods A and B.*

Inputting these economic benefits in addition to economic costs for the proposed measures under the watershed conservation plan, the cost-benefit analysis was carried out. The following conditions or assumptions were applied to the analysis.

- 1) Project life under analysis is 60 years after commencement of watershed conservation plan. The economic benefits are supposed to occur even after the target year in a long term, while effects of discounting are almost nothing without any present values beyond two generations.
- 2) Most of the O & M costs occurring in the target year should be also expended every additional year through the project life, in order to keep the same conservation level as in the target year.
- 3) Intangible environmental benefits commence to occur in the second year of the implementation of watershed conservation plan, in a proportional way toward the target year, and then is constant from the target year to the end of the project life.
- 4) All prices are expressed in 2000 constant prices with an average exchange rate of 2000 (Rp.9,100 / US\$).
- 5) The estimated financial costs are re-calculated as economic costs by multiplying them with the standard conversion factor (SCF) of 0.995.

- 6) The financial unskilled-labor costs are re-calculated as economic cost by multiplying them with the labor conversion factor (LCF).

$$\text{LCF} = \text{SCF} \times (1 - \text{Unemployment rate}) = 0.995 \times (1 - 0.2) = 0.796$$

EIRR and B/C (with 12% discount rate) were calculated as 4.5 % and 0.39, respectively. To assess socioeconomic feasibility of WCP, this EIRR figure has to be compared with “social rate of time preference” which is usually difficult to calculate. Therefore, many donor agencies are using “opportunity cost of capital” as its approximation to evaluate economic feasibility of their aid projects, such as 12 % of World Bank, 10 % of ADB, 8 % of USAID, and 7 % of JBIC.

Referring to these rates, it could be justified that the implementation of watershed conservation plan is economically acceptable from social viewpoint of the Intensive Area, taking account of the following factors :

- 1) The social rate of time preference is theoretically lower than the opportunity cost of capital.
- 2) Intangible benefits of watershed conservation plan such as fishery, scientific, ecological and educational values as well as non-use value were not fully counted in the cost-benefit analysis.

III-5.2.6 Sensitivity Analysis

A sensitivity analysis was carried out to evaluate socioeconomic soundness of the WCP implementation against unexpected adverse changes of the economic costs and benefits in the future, by examining potential effects on EIRR of the following three situations:

- a) In case that the costs of watershed conservation plan run over the estimated prices and physical contingencies by 10 %,
- b) In case that the expected benefits decrease by 10 %, and
- c) In case of combination of the above two situations

The effects of these changes on EIRR are summarized as in the next table. Elasticity on the project feasibility in all these three cases is large, since EIRR ranging from 3 to 4 % is below even the JBIC’s evaluation standard rate.

Results of Sensitivity Analysis

Cases	Estimated	a) Cost + 10 %	b) Benefit – 10 %	c) = a) + b)
EIRR (%)	4.5	3.9	3.9	3.3

III-5.3 Financial Plan

III-5.3.1 Potential Financial Sources for Cost Recovery for Watershed Conservation Plan

The following four types of sources were considered as major and more possible ones to jointly finance the implementation of watershed conservation plan.

(1) Special Forestry Program in Indonesia

There would domestically be some possibility for additional financial support to the watershed conservation plan, especially for training and technical co-operation related to monitoring and institutional activities in the local communities. For example, the following rehabilitation programs for the forestry sector have been established with financial support under the new forestry law (Law No. 41/999):

- Reforestation program (Reboisasi),
- Regreening program (Penghijauan) with Regreening Assistance Fund,
- Tending program (Pemeliharaan),
- Enrichment planting program (Pengayaan tanaman), and
- Soil conservation program through vegetative and mechanical means on critical and non-productive lands.

(2) Grant or Loan from Bilateral or Multilateral Donors

A certain portion of the costs for watershed conservation plan could be financed from foreign grant or borrowing, taking account of the OECD/DAC policy putting emphasis on assistance for environmental sector as well as the past donors' technical and financial cooperation to Indonesia. For example, the Partnership Program of Japan would be a potential technical assistance tool on a grant basis, and also the Project Loan would be possible.

(3) Private or Public Industrial Enterprises as Degraders

These enterprises should control and manage damages to the watershed functions from their economic activities. Although potential industries as degraders include forestry, agriculture, inland fishery and tourism around Lake Tondano, there would be no clearly identified sector or people considerably degrading the watershed at present.

(4) Users and Beneficiaries of Watershed Conservation Plan

The three kinds of users or consumers of natural resources in the Intensive Area could be considered, such as local farmers, tourists and fishermen. There would be potential space for local people to contribute some labor force or money for watershed

conservation plan. A part of beneficiaries might be local fishermen using aquatic resources in Lake Tondano, though their benefits from the implementation of watershed conservation plan are unclear. On the other hand, local farmers involved in the proposed agroforestry program are a large number and could obtain incremental benefits definitely. Some portion of their extra profits could reasonably be sources to fund the Agroforestry program as well as their community development.

III-5.3.2 Establishment of Financial Plan to Implement Watershed Conservation Plan

Considering the potential financial sources and procurement methods to collect and manage money necessary for the measures included in watershed conservation plan, their combination could be proposed.

A large size of the initial investment is to rely on the international donors' soft loan, while the O & M costs are covered by domestic financial programs and by charging to local farmers as users of natural resources in the Tondano watershed. And costs for the proposed institutional measures and software works, such as planning, surveys, training and equipment, are suitable to local governmental budgets or grant assistance from possible donors. The next table shows a summary of the financial plan by watershed conservation plan measure and type of financial arrangement.

Summary of Financial Plan for First 14 Years

Measures under WCP	Project Cost by Financial Arrangement for First 14 Years (Rp.million in 2000 price)				Major Financial Sources of Cost Recovery for Soft-loan and Domestic Financing
	Grant (%)	Soft-loan (%)	Domestic- financing (%)	Total (%)	
(1) Forestry measures and actions	7,123 (73)	0 (0)	2,652 (27)	9,775 (100)	- Reforestation program - Regreening program - Tending program - Enrichment planting program
(2) Agroforestry measures and actions	5,639 (82)	0 (0)	1,268 (18)	6,907 (100)	- Local farmers - Soil conservation program
(3) Physical construction works	0 (0)	6,379 (70)	2,780 (30)	9,159 (100)	- Reforestation program - Regreening program
(4) Community empowermen t measures and actions	9,754 (41)	0 (0)	14,256 (59)	24,010 (100)	-----
(5) Institutional capacity development measures	10,124 (73)	0 (0)	3,657 (27)	13,781 (100)	- Governmental routine budget (APBN/APBD)
(6) Monitoring System Development	1,189 (25)	0 (0)	3,578 (75)	4,767 (100)	- River clean-up program (PROKASIH) - Governmental routine budget (APBN/APBD)
Total	33,829 (49)	6,379 (9)	28,191 (42)	68,399 (100)	-----

Note: Total cost differs from that in the table of P. III-132. It is that the above total includes domestic costs spent routinely, while the price contingency is not taken into account.

III-5.4 Financial Evaluation

III-5.4.1 FIRR Calculation

The breakdown of financial costs and revenues accrued from EMP are tabulated year by year. FIRR and B/C were calculated as 5.4 % and 0.27 respectively, simply comparing the incremental costs with potential revenues, based on the evaluation conditions that the project life for financial evaluation is 60 years and that the future annual inflation rate will be 1.66% (an average rate between 2% in 1999 and 1.32% in 2000). This is because of the long repayment period and necessity of continuous O & M and equipment replacement cost even after the target year to maintain the goals of watershed conservation plan. The sensitivity analysis under the same conditions for EIRR implies that FIRR decreases to 4.2 ~ 4.8%. And another sensitivity analysis for inflation (price escalation) was carried out, since the inflation in Indonesia had drastically increased up to 10% in 2001. Assumption of 10% inflation rate up to the 10th on 20th year resulted in FIRR of 7.4% or 10.8%, respectively.

These FIRR figures are lower than the market interest rates in Indonesia, as tabulated below. Such low FIRR figures do not imply feasibility for usual commercial or productive projects carried out by profit-oriented enterprises so that money should be invested to more profitable projects. However, most of the measures proposed under the watershed conservation plan are for watershed conservation hardly generating internal monetary profits, and implemented mostly by non-profit public agencies. Therefore, from viewpoint of the public implementing agencies, the watershed conservation plan might be regarded as financially acceptable, when its FIRR is over 0 % at least.

Market Interest Rates in Indonesia for 1999/2000

Bank	State banks	Regional government	Private national	Foreign	Commercial	Average
Rp. Time Deposit Interest Rate (%/year)	15.4	14.9	20.3	13.1	15.6	15.9

III-5.4.2 Cost Recovery Schedule for Watershed Conservation Plan

In accordance with the financial plan proposed in Sub-Section III-5.3.2 and the following financial arrangement, the cost recovery schedules for the measures of watershed conservation plan were formulated:

- Interest rate of donor's soft loan : flat rate of 1%
- Maximum repayment period of the donor's soft loan :
40 years (including 10-year grace period)
- Payment during the grace period : only interest payment

- Tax duty : all the costs for the plan free from any taxation obligation
- Duration for cost recovery : 60 years

The schedules include interest, repayment, and domestic expenditure such as O & M costs, all of which amount to the total cash outflow to be recovered. Grant portion is excluded from the cash outflow.

Annual average is about Rp.0.9 billion ranging from Rp. 4.2 billion in the fifth year to about Rp. 280 million for the final period. These cash outflows in the cost recovery schedules are compared with the potential revenues. As the total annual budget for forestry services of the North Sulawesi province in 1998/1999 was more than Rp. 7 billion of which over 80 % was for project implementation, the expected provincial budget for 60 years would be able to adequately cover the cash outflow as a whole. The proposed financial plan is appropriate to realize a sound financial management for the watershed conservation plan.

III-5.4.3 Financial Analysis on Farm Household and Capacity to Pay

The farmers, who would participate in agroforestry activities under the measures of watershed conservation plan, are a major beneficiary group of the Tondano watershed conservation because their agricultural incomes are expected to increase. With such income improvement, there would be a strong incentive for them to participate in agroforestry. While the technical extension costs for agroforestry would be expended by the local executing agencies, these farmers are required to pay for some basic inputs such as saplings and fertilizers and to provide labor force for cultivation.

Aiming at assessment on the future financial situation of the farmer's households as well as on extent of the financial incentive to them, a farm budget analysis was carried out based on the incremental net revenue from the agroforestry activities under the watershed conservation plan. According to the results of the farmers' interview survey for 5 villages, the average farm size is about 1.4 ha per farm household ranging 1.2 to 1.6 ha. Since the agricultural area owned by the local farmers is too similar to examine the financial impact on the farmers' communities of the agroforestry promotion under the watershed conservation plan, the analysis was done by intensive area, not by farm size. The next table summarizes its result.

Average Incremental Financial Balance by Intensive Area

(Unit : Rp. 000/Household/year)

Intensive Area	East Area		South Area		West Area		Total Average	
Financial Item	Without	With	Without	With	Without	With	Without	With
Income	11,404	12,221	9,382	10,205	9,779	10,534	10,188	10,986
Expenditure	10,957	11,254	8,958	9,245	9,409	9,617	9,775	10,039
Balance	447	967	424	960	370	917	413	947
Incremental Balance	520		536		547		534	
Increase Rate (%)	116		126		148		129	

They could generate a considerable increase of balance by nearly 130 % on average, so that they would have a strong incentive enough to be involved in the agroforestry program and be even a financial source for some costs needed for the measures of watershed conservation plan, such as agroforestry activities as well as “Social Safety Network” for community empowerment.

III-5.5 Institutional Evaluation

The institutional development plan will bring significant change to the present method of operation of forestry services offices. Under the former structure the capacity for administration and management of forestry was severely restricted by the number and quality of human resources, inadequate budget allocations, lack of staff mobility and poor information systems. It is therefore important to take the pressure off the government offices by re-allocating a major part of the technical and implementation role to the community, and have the local government offices (Province and District Offices) assume a primarily administrative and supervisory role. The plan will narrow the scope of duties in these offices and thereby boost efficiency while strengthening supporting organizations in watershed conservation. The resulting institutional development will increase inter-institutional coordination, promote community involvement in partnership with forestry offices, improve the quality and quantity of extension services, encourage development of the watershed conservation perspective, increase awareness, and decrease apathy in the community.

III-6.1 Conclusions

The Watershed Conservation Plan has been evaluated from economic, financial and institutional points of view. As a result, the Plan is proved to be acceptable from social viewpoint of the Intensive Area, since the estimated EIRR of 4.5 % is nearly same as the opportunity costs of capital proposed by JBIC. And also, the estimated FIRR of 5.4 % shows that the proposed Plan is recognized to be acceptable from the viewpoint of the public implementing agencies because the most of measures proposed, are for watershed conservation hardly generating internal monetary profits. Furthermore, it is proved from institutional viewpoint that the resulting institutional development will increase inter-institutional coordination, promote community involvement in partnership with forestry offices, improve the quality and quantity of extension services, encourage development of the watershed management perspective, increase awareness, and decrease apathy in the community.

The results of the detailed socio-economic survey related that the Plan was fully accepted by relevant people, and its early implementation was strongly desired by not only them, but also many agencies, NGO, and local universities who attended at the Working Committee Meetings as members.

III-6.2 Recommendations

Judging from the conclusions and watershed conservation demands obtained through the Master Plan Study and Feasibility Study, it is recommended that the Plan be implemented as early as possible.

In particular, in order to realize the early implementation of the Plan and to ensure the its sustainability, the special attention shall be given to the following:

(1) Urgent Establishment of Watershed Conservation Committee

The watershed conservation of Tondano including Lake Tondano is related to the plural agencies. The proper watershed conservation will thus require the multi-sectoral management. At present, there exist PTPA and PPTPA related to the Tondano watershed. But these organizations' responsibility are restricted mainly to water quota allocations, disaster control measures (flooding) and reactionary management measures focusing only on short term economic benefits, and not real integrated "forward looking" management strategies formulated for watershed conservation. Judging from such present situations, it is recommended that a Tondano Watershed

Conservation Committee be established as a sub-committee of PTPA in the short term urgently.

(2) Urgent Application of Community Forestry

At present, the Soputan Protection Forest is illegally encroached by the village people for agricultural activity. Although the encroached area is approximately 30 ha and is still small-scaled, it is necessary to take an urgent action for this encroached area, to avoid its further expansion and to recover the forest function. As the appropriate countermeasure, the introduction of community forestry is recommended considering land rehabilitation and livelihood of encroachers. According to the informal meeting with the encroached farmers, a preliminary idea on the community forestry was basically approved by them. It is therefore recommended that the District Forestry Services Office should play a leading roll on establishment of community forestry urgently.

(3) Arrangement of Huge Existing Data

For the Tondano watershed, many studies on engineering and socio-economy have been conducted by the different government agencies so far. However, these study results are kept by the respective agencies, and could not be effectively used. In connection with the establishment of a Tondano Watershed Conservation Committee and monitoring and evaluation system, it is recommended that one copy of such study results be kept by one agency or secretariat of the Tondano Watershed Conservation Committee.

(4) Urgent Settlement of Local Government under Decentralization Policy

Due to the decentralization policy, authority has been gradually transferred to the district level. However, the district office still uses the previous regulations/decrees because the new ones have not yet been issued so far. Consequently, the activities taken do not meet the decentralization policy presently. It is thus recommended that new regulations/decrees be issued as soon as possible, to realize the proper watershed conservation condition.

(5) Urgent Execution of Community Empowerment

In order to maintain the sustainable watershed conservation, the community members as a driving force, are called for active participation in community-based natural resource management and problem solving. However, there are various constraints faced by the community to become a contributor and executor of watershed

conservation. Therefore, it is recommended that community should be urgently empowered to overcome such constraints and to attain the sustainable watershed conservation.

(6) Urgent Establishment of Monitoring and Evaluation System for Engineering Items

At present, sufficient meteorological and hydrological data are not available for the catchment area centering Lake Tondano. Hence, it is difficult or rather impossible to clarify the accurate soil erosion loss, water balance condition and water quality of the lake water for long term. It is therefore recommended that the monitoring and evaluation system for engineering items should be established urgently, to grasp the watershed condition accurately and on time.

(7) Urgent Socialization of Results of Zoning and Watershed Conservation Plan

The zoning was carried out for the Study Area, and also for the Intensive Area in detail, aiming at the sustainable land use. Since these Areas have a possibility of soil erosion mainly due to improper land use, it is recommended that the results of zoning and the Watershed Conservation Plan proposed in the Report should be urgently socialized.

(8) Application of Proposed Watershed Conservation Plan to Lower Watershed of Tondano

The Feasibility Study was conducted for the Intensive Area situated around Lake Tondano. As the results of the Study, many development/improvement components for the critical land/potential critical land and protection forest were recommended in the watershed conservation plan. In the lower watershed of Tondano, which is out of the Intensive Area, there occur similar problems in the critical land/potential critical land and protection forest. It is thus recommended that the proposed countermeasures in the Feasibility Study be applied for the lower watershed area of Tondano.