

An Analysis of JICA's Questionnaire Survey on Comprehensive Water Resource Management

— A Study of the Brantas River Basin's Comprehensive Water Resource Management in Indonesia —

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Abstract:

This study analyzes the Japan International Cooperation Agency's (JICA) questionnaire survey carried out with a view to understanding the possibility formulating a master plan on comprehensive water resource management in the Brantas river basin in Indonesia. Water is a key driver of economic and social development while it also has a basic function of maintaining the integrity of the natural environment. The Brantas river basin supports around 25 percent of rice production in Indonesia. The Brantas river basin is the second largest river in Java Island. Development of the Brantas river basin began in 1961 and, since then, a series of master plans have been formulated to overcome the problems in the basin. In the past, after completion of those projects, many of them had not reached their goals due to lack of institutional management, qualified staff and budget constraints. The JICA study team's questionnaire survey results showed that in some areas the motivation of farmers to attend the Water Users' Association (HIPPA) meetings was very low, although there is a HIPPA in the Brantas river basin at almost every village level. The study also observed that many farmers in the Brantas river basin were not aware of water resources nor of how to use water efficiently. The survey results pointed out some vital points as major problems in formulating a new master plan in the community and beneficiaries' participation in the comprehensive management plan for the water resources of the Brantas river basin.

1. Present Condition of Community and Beneficiaries' Participation

In Indonesian context, about 85 to 90 percent of water has been used for irrigation purpose. The irrigation situation of East Java is almost same as elsewhere in Indonesia. The irrigation is the single largest water user in the Brantas river basin, because this sector consumes approximately 84 percent of all available water in the basin. Especially in the dry season, when the water demand from different sectors are at the highest level, the irrigation sector consumes the largest percentage of available water in the Brantas river basin. The fish farmers also taking water in dry season from and returning to the irrigation canal and/or drainage. Meanwhile others shares, such as municipal, industry and river maintenance are consume a very small percentage of water.

In Indonesia, the government usually follows the 'top-down' administrative approach in development programs and its natural resources management systems. The view of community and beneficiaries' participation is still narrow

within development programs. However, in recent days, the government of Indonesia has been emphasizing on equity through wider participation in government's development programs for reducing poverty. Non-Governmental Organizations (NGOs) are encouraged to participate in community groups' activities of PROKASIH (Clean Rivers Program). There are many organizations in the Brantas river basin which worked with community and people's participation to improve the socio-economic condition of the vulnerable people. These organizations are working in different areas such as environment, education, health, agriculture, poverty reduction and awareness building of the vulnerable groups through popular education.

1.1 Present Beneficiaries of the Brantas River Basin

At present, there are five main beneficiaries of the Brantas river basin, namely PLN (Electric Power Company), PDAMs (Regional Water Supply Enterprise), industries, farmers and fish farmers. Among these beneficiaries, the PLN, PDAMs (Surabaya & Sidoarjo) and industries currently pay water service fee to the Perum Jasa Tirta (PJT). The farmers and fish farmers do not pay any water service fees for water to the PJT. However, the farmers pay for IPAIR (contribution for irrigation service) to Bupati (Head of Regency) through the HIPPA (Water Users' Associations). Presently, about 15,730 hectares of land is used for fish farming in the Brantas river basin. But there are no reliable statistics on how many fishponds or how much water these fishponds are taking from the irrigation and/or drainage canals. The JICA Study team has estimated a water requirement of 1.29m³/sec. The water resources management authority of the Brantas river basin have contributed not only to the above mentioned beneficiaries, such as hydropower generation, municipal, industrial, irrigation and fishery water service, but also to the community and overall development activities in the basin, as well as, to the nation.

2. Questionnaire Survey on Community and Beneficiaries' Participation

1) Aim of the Questionnaire Survey

A Questionnaire Survey of the water service beneficiaries in the Brantas river basin was conducted by the JICA Study Team. The main aim of the questionnaire survey is to study the possibility of the Community and Beneficiaries' Participation for the Comprehensive Management Plan of the Brantas river basin. For this purpose, this questionnaire survey includes questions such as those on present condition of water supply and management, how could the beneficiaries manage water efficiently and effectively. This survey also collects information on the beneficiaries' socioeconomic conditions, consciousness about water resources management with a focus on the concepts of community and beneficiaries' participation through financial contribution or physical labor in water resources management activities.

2) Methodology of the Survey

The questionnaire survey has been conducted by the local contractor based on direct interviews with the water service beneficiaries of the Brantas river basin. Indonesian language is used for the questionnaire. The Survey was

followed face-to-face interview with water service beneficiaries groups of the basin in some selected areas.

3) Target Groups and Sample Size

The target groups covered in the survey are as follows:

- | | |
|--|-----------------|
| (1) Irrigation water users i.e. farmers: | 500 respondents |
| (2) Fishery water users i.e. fishpond farmers: | 10 respondents |
| (3) Industrial water users i.e. industries: | 30 respondents |

4) Survey Issues

Each of the target groups were interviewed with a specific questionnaire, main issues are as follows:

- (1) Respondent socioeconomic background
- (2) Production activity
- (3) Present condition and issues of water supply for the beneficiaries' production activities
- (4) Beneficiaries involvement in water resources management activities and expectation in participating in water resource management
- (5) Beneficiaries pay-concept
- (6) Consciousness of efficient use of water

5) Survey Area and Sample Size

The questionnaire survey covers the following water service beneficiaries groups in the Brantas river basin such as irrigation farmers, fish farmers and industries. Details of their numbers and geographical locations are as follows:

- | | |
|-----------------------------------|-------------|
| (1) <i>Irrigation water users</i> | Samples 500 |
|-----------------------------------|-------------|

The Survey areas and the distribution of samples size to the respondent is presented below:

- | | |
|---------------------------------------|-----------------|
| a) Brantas Delta Irrigation Area | 100 respondents |
| b) Turi-Tunggorono Irrigation Area | 100 respondents |
| c) Widas Irrigation Area | 100 respondents |
| d) Warujayeng Irrigation Area | 100 respondents |
| e) Lodoyo Tulungagung Irrigation Area | 100 respondents |

A random sampling technique is applied in such a way that respondents taken are those having land along with the tertiary irrigation canal. Tertiary irrigation blocks located in two districts (Kecamatan) in the corresponding irrigation areas are determined as the area of survey. A total of 500 respondents in 10 groups are selected from different tertiary irrigation blocks. Through questionnaire interview also collects information on farmers

production activities, income and socioeconomic conditions, thus, it will reflect any variability in WUA and water use in the corresponding irrigation area.

(2) *Fishery water users*

Samples 10

A total of 10 respondents are determined and they are randomly distributed in 5 pre-determined villages situated in the Brantas delta irrigation area. A similar technique as for the farmers is employed to collect the answers from the fish farmers. Following villages are surveyed for the fishery water users.

(3) *Industrial water users*

Samples 30

Industries that are considered as extensive water users and potentially substantial pollutants to the Brantas river are chosen as respondents. A total of 30 individual industries are surveyed. The first visit to an individual of the above mentioned industries intends to distribute the questionnaire and to explain the details to complete it. In the second visit, upon the collection of the completed questionnaire, discussion is carried out to verify the data filled in the questionnaire.

3. The Findings of the Questionnaire Survey

The survey covered some selected water service beneficiary groups of the Brantas river basin, including irrigation, fishery and industrial water users. The survey focused on the beneficiaries' consciousness about water resources, efficient use and their socioeconomic condition.

1) Irrigation Water Users

The area of the land operated is relatively small, mostly in the order of 0.26-0.50 hectare per family. The cropping pattern practiced varies somewhat depending on the degree of water availability. The river and irrigation canals are the main sources of water for irrigation. The ground water is found as an additional source of water. The farmers' main source of income is from the agricultural sector. It was observed that the farmers in the surveyed areas are inefficient in the use of irrigation water. It is found that there are Water Users Associations almost in every village in the Brantas river basin. However, the members are not active in joining their regular Water Users' Associations meetings. In some areas participation is demonstrated by farmers in the Brantas river basin in the form of involvement in rehabilitation works of the tertiary and quaternary canals. Details are given below.

(1) *Source of water for Irrigation*

Source of water for irrigation in the Brantas river basin is usually taken from irrigation canals. However, when there is a shortage of water supply from the irrigation canals, especially in the dry season, the ground water

seems to be the source of the additional source of water for irrigation. Some farmers in the Warujayeng and Widas irrigation area have to use ground water as an additional water source for irrigation, while those who can not afford to buy the ground water tend to leave the land uncultivated. Details of the water sources are explained in table 1.

Water Source	Table 1 Source of Water for Irrigation in the Surveyed Areas					
	Blobo	Lodoyo	Warujayeng	Widas	T. Tunggorono	B. Delta
Irrigation canals	100%	100%	100%	84%	83%	69%
Irrigation canals + Ground water	-	-	-	2%	10%	31%
Ground water	-	-	-	13%	5%	-
River water	-	-	-	1%	-	-
Rain fall	-	-	-	-	2%	-
Total	100%	100%	100%	100%	100%	100%

(2) Problems in Irrigation Water Supply Systems

The problems of water unavailability and water shortage are observed in most of the Brantas river basin. Water is not available when it is needed and the water is not sufficient are main problems complained by most farmers as shown in table 2, majority of the farmers shares the same problem in the dry season.

Problems	Table 2 Problems in Irrigation Water Supply Systems					
	Blobo	Lodoyo	Warujayeng	Widas	Turi Tunggorono	B. Delta
-	50%	-	-	4%	-	-
1	-	-	4%	33%	16%	6%
2	-	34%	26%	44%	79%	67%
3	4%	-	-	-	-	-
4	-	-	1%	-	-	-
5	4%	-	-	-	-	-
6	-	-	-	1%	-	-
7	-	-	-	-	-	-
	-	-	-	-	-	6%
1+2	2%	26%	63%	18%	5%	-
1+3	4%	-	1%	-	-	-
1+5	-	-	1%	-	-	-
1+7	-	-	-	-	-	3%
2+3	28%	40%	1%	-	-	3%
2+4	4%	-	-	-	-	-
2+5	-	-	2%	-	-	-
2+6	-	-	1%	-	-	-
2+7	-	-	-	-	-	21%
3+6	2%	-	-	-	-	-

1 = No water in time, 2 = No sufficient water, 3 = Erosion in canal, 4 = Problems in check gate, 5 = Low embankment, 6 = No measuring devices, 7 = Silted canal bottom, - = No problems, 8 = Others

(3) *Farmers' Income*

Farmers' family income in the Brantas river basin may be classified into two categories, namely *agricultural sector* and *non-agricultural sector*. The table 3 in the below shows a variation of farmers' income by irrigation areas. The agricultural sector contributes from 59 percent to 86 percent of the total family income of farmers in the surveyed area. The income derived from the agricultural sector is found still to be an important and higher than that of non-agricultural sector. It is found that the contribution of agricultural sector to the total income of the farmers in Warujayeng and Lodoyo irrigation area are the lowest among others, being only about 60 percent while such sector contributes 86 percent of the farmers' income in Widas irrigation area. In Blobo, Turi Tunggorono and Brantas Delta irrigation areas, the agriculture sector contributes about 3/4 of the farmers' total income.

Irrigation Area	Table 3 Farmers' Income from Agriculture & Non-Agriculture Sector	
	Agriculture Sector	Non-Agriculture Sector
Blobo	74%	26%
Lodoyo	60%	40%
Warujayeng	59%	41%
Widas	86%	14%
Turi Tunggorono	77%	23%
Brantas Delta	76%	24%

The average of total farmers' family income from the agriculture and non-agriculture sector varies by irrigation areas in the surveyed area. As shown in table 4, it is calculated that the average farmers' family income from both sectors Rp.22,062,500 family/month. From the agriculture sector farmers' average income Rp.15,575,000 family/month, while from non-agriculture sector only Rp.6,487,500 family/month. This higher contribution indicates the degree of dependency of the farmer's family life to the agriculture sector. Therefore, to expect that the farmers with higher dependency to the agricultural sector pay a greater attention for their own interest, to participate in the comprehensive management plan for the water resources of the Brantas river basin.

Irrigation Area	Table 4 Farmers' Family Income (Unit: Rupiah)		Total Income (Unit: Rupiah)
	Agriculture Sector	Non-Agriculture Sector	
Blobo	18,100,000	6,350,000	24,450,000
Lodoyo	14,200,000	9,400,000	23,600,000
Warujayeng	14,900,000	10,350,000	25,250,000
Widas	9,250,000	1,450,000	10,700,000
Turi unggorono	15,350,000	4,700,000	20,050,000
Brantas Delta	21,650,000	6,675,000	28,325,000

(4) *Farmers' Willingness to Participation*

It was observed that farmers' willingness to participation in the water resources management systems, such as rehabilitation and operation & maintenance of irrigation canals with or without payment depend on the following issues;

- Level of agriculture sector derived income
- Availability of irrigation water in the dry season
- The degree of farmers' involvement at HIPPA activities
- Willingness to participate to overcome the water shortage problem
- Farmers' realization of water service benefits from the Brantas river basin

It was identified that the farmers' participation for rehabilitation works of irrigation canals in the past was respectively high. This indicated in Blobo, Lodoyo, Widas and Brantas Delta irrigation areas, where more than 80 percent of the farmers took part in such works, with some variation in participation frequency. Among them, farmers in Blobo area considered to be the most active one. In Warujayeng and Turi Tunggorono areas, however, farmers' willingness to take in the rehabilitation works of irrigation canal was slightly less than 60 percent of total farmers.

(5) *Willingness to Participate in Rehabilitation and Operation and Maintenance*

Farmers' willingness to be involved in rehabilitation works of irrigation canal without payment varies by irrigation areas. As shown in table 5, the highest participation rate ((80-86 percent) was represented by Blobo, Warujayeng and Brantas delta irrigation areas, and the lowest in Turi Tunggorono (20 percent) as shown in below. The lowest level of intention to participate indicates their less awareness about the good service they received. On the contrary, in the irrigation area where water supply is a problem in the dry season, the farmers showed their high interest to participate in the water resources management activities.

Willing to Participate	BLB	LDY	WRJ	WDS	TURI	BRD	BLB	LDY	WRJ	WDS	TURI	BRD
	Participation in Rehabilitation						Participation in Operation & Maintenance					
Yes	86%	52%	80%	64%	22%	84%	10%	-	46%	83%	17%	16%
No	10%	48%	20%	3%	20%	6%	90%	100%	54%	1%	77%	82%
Cannot reply	4%	-	-	33%	58%	10%	-	-	-	16%	6%	2%
Total	100	100	100	100	100	100	100	100	100	100	100	100

BLB: Blobo, WDS: Widas, LDY: Lodoyo, TURI: Turi Tunggorono, WRJ: Warujayeng, BRD: Brantas Delta

(6) *Willingness to Attend the HIPPA Meeting in the Future*

The degree of farmers' participation in water resources management activities of the Brantas river basin in the future seems to correlate well with the degree of their involvement in the HIPPA meeting. The table 6, may reflect the present role of HIPPA is satisfying the needs of its member. The farmers in the Blobo, Warujayeng and Brantas delta areas showed a consistent attitude towards water resources management activities, in the future, more than 55 percent farmers still willing to attend the HIPPA meeting. On the other hand, the intention of farmers to attend the HIPPA meeting in Lodoyo area seems to decrease sharply, as in the past their attendance to the meeting reached at the level of 92 percent. Similar trends are also observed in the Widas and Turi Tunggorono irrigation areas. The decrease in the interest of farmers to join the HIPPA meeting in the

future reflect the present performance of the HIPPA in the fulfillment of the farmers' needs.

Irrigation Area	Table 6 Willingness to Attend the HIPPA Meeting in the Future			
	Yes	No	Cannot reply	Total
Blobo	56%	22%	22%	100%
Lodoyo	36%	56%	8%	100%
Warujayeng	82%	18%	-	100%
Widas	17%	32%	51%	100%
Turi Tunggorono	27%	23%	50%	100%
B. Delta	64%	11%	25%	100%

(7) Willingness to Join the Management Activities

For the farmers to join the water resources management activities of the Brantas river basin, the HIPPA is an official organization which can make a bridge through an interaction of 'top-down' and 'bottom' approaches between the water resources management agency and irrigation water users. A portion of the farmers have intention to participate in the comprehensive management plan for the water resources of the Brantas river basin with or without payment, although there is a variation by irrigation areas and the socioeconomic conditions of the farmers. Before implement the beneficiaries' participation in the water resources management plan, farmers' motivation is necessary through education as well as increasing awareness. Because most of the farmers level of education at an elementary school, and the farmers are not well informed, not aware of their responsibilities and even they do not know how the management system works.

(8) Beneficiaries- Pay Concept

Beneficiaries' pay-concept has been understood to some extent by farmers in the Brantas river basin. There are three kinds of payment by the farmers in the basin area; i.e. land tax, irrigation service fees (IPAIR) and IURAN (contribution in the form of paddy). It varies by areas of irrigation. It is found that HIPPA membership fee is also applied in some of the irrigation areas.

(9) Payment for Irrigation Service Fees

In the surveyed irrigation areas most of the farmers pay the irrigation service fees through HIPPA. The payment varies by irrigation areas, as shown in table 7.

Pay water Service	Table 7 Payment for the Irrigation Water Service					
	Blobo	Lodoyo	Warujayeng	Widas	Turi Tunggorono	Brantas Delta
Respond						
Yes	94%	72%	97%	92%	92%	100%
No	6%	28%	3%	8%	8%	-
Total	100%	100%	100%	100%	100%	100%

Farmers' willingness is being shown by payment which is made for the irrigation water they use. There is a variation of amount paid for the water service fee is observed in the Lodoyo, Warujayeng and Brantas delta

areas than in the other irrigation areas. The lowest rate seems to be in the Blobo and Brantas delta irrigation areas where farmers mostly pay less than Rp.25,000/ha/season. Some farmers even did not pay any irrigation service fees, as it is observed in all irrigation areas except the Warujayeng. It is shown in table 8, in the Warujayeng and Lodoyo areas, the implementation of beneficiary pay concept seems to be accepted by the farmers.

Amount Paid (Rp./ha/season) (Unit: 1000)	Table 8 Amount of Money Paid for Irrigation Service Fee					
	Blobo	Lodoyo	Warujayeng	Widas	Turi Tunggorono	Brantas Delta
≤25	94%	4%	37%	72%	33%	97%
25-49	-	10%	34%	20%	59%	2%
50-100	-	58%	24%	-	-	1%
≥100	-	-	2%	-	-	-
Total	94%	72%	97%	92%	92%	100%

(10) *Introduce of Beneficiaries pay-concept*

Most farmers in the Brantas river basin area seems to accept the beneficiaries pay-concept the, as 60 percent or more farmers recognized such concept is reasonable in the surveyed areas. However, the number of farmers who do not understand the concept in Blobo, Lodoyo and Turi Tunggorono area is relatively high, as shown in table 9. The failure to understand the beneficiaries' pay-concept may result that, most of the farmers still keep the old perception that the irrigation water service fee is included in the tax they pay and it is the duty of the government to supply the water. Since the concept to some degree is already practiced, an introduction of beneficiaries pay-concept, which is based on the water used, may not be so difficult as long as the service also improved.

Table 9 Perception to Beneficiaries Pay-Concept			
Irrigation area	Reasonable	Not Reasonable	Can not Reply
Blobo	60%	8%	32%
Warujayeng	100%	-	-
Turi Tunggorono	60%	3%	37%
Lodoyo	64%	14%	22%
Widas	94%	-	6%
Delta Brantas	78%	2%	20%

2) Fishery Water Users

Brackish water fishpond aqua culture is presently consuming a considerable amount of water, which is mainly derived from the Brantas river. The most serious problems encountered are associated with water shortage in the dry season. The water problems and issues are dealt individually or discussed in a small group of fishpond farmers. It was observed that there is no organization like HIPPA for fishery water. It is identified that there is need for better water management system for the fishery water. The establishment of association based on "bottom up" mechanism might be fruitful. Improvement of water efficiency, both in quantity and quality, will be the entry point to introduce a beneficiary pay-concept.

(1) *Source of Water for Fishpond*

Water used for fish cultivation varies in origin in the Brantas river basin such as sea, river, irrigation canals, estuarine and rain fall water. However, the fishpond derived water, almost 70 percent from the adjacent river, either directly or indirectly through the irrigation canals. The details of source of water for the fishpond as shown in table 10. The amount of water used, in general, has never been less than 20,000m³/ha/year. Some 50 percent of the farmers employ in the order of 25,000- 30,000m³ of water/ha/year and another uses water more than 30,000m³/ha/year.

Name of Source	Percentage of Water
River water + Sea water	40%
River water + Rain water	10%
Rain fall	10%
From Irrigation canals	20%
Other (Estuarine)	20%

(2) *Income of the Fishpond Farmers*

Almost 80 percent of the surveyed fishpond farmers have been in the fish cultivation for more than 5 years. This indicates that they have a lot of experience in running fish cultivation and are familiar with water issues. Gross incomes of the fishpond farmers vary somewhat depending mainly on the area being operated and the species of fish in cultivation. As shown in table 11, most of them (80 percent) earn between 2 to 8 million Rp./ha/year. One half of them spend less than 1 million Rp./ha/year and only 10 percent of them pay more than 2.8 million Rp./ha/year for the operation and maintenance of the fishpond. However, none of them make any payment for the fishery water they use for fish farming.

Income Range (Million Rp./ha/year)	Table 11 Fishpond Owners' Gross Income and O&M Cost		
	Gross Income	Operational Cost (Million Rp./ha/year)	Operation and Maintenance Cost
2-4.99 Rp./ha/year	40%	0.40-99Rp./ha/year	50%
5-7.99Rp./ha/year	40%	1.00-1.59Rp./ha/year	20%
8-10.99Rp./ha/year	10%	1.60-2.20Rp./ha/year	10%
≥11 Million Rp./ha/year	10%	2.20-2.79Rp./ha/year	10%
-	-	≥2.80Rp./ha/year	10%

(3) *Fishery Water Users' Associations*

Presently, there is no fishery water users' association in the Brantas river basin. However, the fish cultivators discuss problems of water quality and shortage in a small group. Some of the fishpond farmers seems to be less interested in to establishing of an association. Possible explanation is that they are still not sure whether such an association will be helpful since their experience with the existing formal agencies do not function as they are expect them to.

(4) Fish Farmers' Willingness to Participation

All of the surveyed fishpond farmers, expressed that to obtain adequate water for the fish farming is their own responsibility. Most of the fishpond farmers (80 percent) stated that they want to participate in the rehabilitation works of the fishery water canal. However, all fishpond farmers stated that they never paid for the operation and maintenance of the canals. The reasons fishpond farmers want to participate in the water resources management system of the Brantas river basin as shown in table 12.

Table 12 Reasons Fish Farmers Want to Participate		Fish Farmers
1	To overcome water shortage problem	50%
2	To improve water quality	17%
3	To increase production	33%

(5) Beneficiaries Pay-Concept

According to the survey results, almost 80 percent of farmers in the surveyed area are paying irrigation service fees for the rehabilitation, operation and maintenance of the irrigation canals. However, the fishpond owners are not used to paying for the water they use for fish cultivation. For decades, there is a perception among the fishpond owners that since they already pay for the land and income taxes, it is the obligation of the government to supply water for fish cultivation. In order to overcome these problems, it is necessary to introduce a 'beneficiary pay-concept' in relation to water service to the fishpond owners. It is likely that the above mentioned problems, especially water shortage and the decline of water quality, may be an entry point to make a closer contact with the fishpond owners. It is important to improve and encourage their participation with financial contribution in the water resources management activities of the Brantas River.

3) Industrial Water Users

Industries that are considered as extensive water users and that discharge the waste water into the Brantas river are selected to be respondents. A total of 30 individual industries selected for the survey, mostly located in or closed to the Brantas delta irrigation area. A total of three industries do not give any response.

(1) Source of Water for Industries

The following table 13 shows that the majority of industries in the Brantas river basin area use the water from the river for their operation. One third of industries depend solely on the river as the main source of water required for the operation of their industries, while about one fifth rely only on the ground water. Another one fifth use a combined source of water, namely the river and the ground water. The remaining industries employ a single or mixed source of water like PDAM, rain fall and ground water.

Type of Water Source	Industrial Water (Percentages)
PDAM	4.76
Ground Water	23.81
River Water	33.33
Rain Water	-
PDAM + Ground Water	9.52
PDAM + Ground Water + Rain Water	4.76
Ground Water + River Water	23.81

(2) *Industry Associations and Issues Discussed*

The majority (56 percent) of the industries state that they are already participants in the water resources management activities through respective industry association meetings. The problems frequently discussed in those association meetings include the water quality, water tariff, water shortage and wastewater. According to the JICA survey, 24 percent of the industries claim that the quality of water is not as good as expected. Among those who complain about the water quality, 50 percent of them state that it is due to pollutant, and the remaining 16.6 percent express it results from sedimentation. Thus result indicates that a comprehensive actively needs be carried out to improve the environmental conditions of the Brantas river.

(3) *Willingness for Participation of Industries in the Water Resources Management*

When the industrial water users are questioned whether they want to “participate more actively in the water resource management of the Brantas river basin”, 76 percent of industries state they are willing to do so. Among those industries ready to participate more actively, according to the survey results, most of them hope to make closer contacts with government agencies concerned through umbrella organizations. It can be concluded that in general the industrial water users actually are ready to participate in those activities in order to establish the appropriate water resources management systems.

(4) *Beneficiaries Pay-Concept*

All surveyed industries pays for water, although their monthly expenditures on water vary significantly from one industry to another. However, it seems most of them are reluctant to pay higher water tariff. 20 percent of the industries are willing to pay up to 20 percent increase of the current water tariff, while about 4 percent of them mention they do not accept any increment. The remaining 76 percent do not respond to the question. Any attempt to incur a higher water tariff in the future must be followed by the improvement in water supply services of the government. Among those industries experienced in discussing water related issues with government agencies (64 percent of total industries surveyed), a quarter of them are not satisfied with government services. The reasons cited include no solution to problems discussed, and the high water tariff.

4. PJT's Present Activities Related to the Participation

Since 1990s, the PJT has been involved in public campaign activities in cooperation with provincial/local governments, non-government organizations and academic institutions. Most of the activities are periodical and related to increase awareness building of the people on water resources and river environmental issues as shown in table 14 and table 16. To conduct both PJT's and governmental tasks, PJT carries out a coordination with provincial level government/related institutions and performing campaign/training to improve the people's knowledge and awareness. PJT's activities related to the public awareness covered a wide range of individuals, institutions and organizations such as public figures, entrepreneurs, college/university students, high school teachers/students, Islamic education center, farmers, and so on. PJT's activities related to the participation may divided into two major groups (e.g. public campaigns & community improvement). They are explained below.

1) PJT's Public Campaign Activities

- In early 1990s, PJT had started its public campaigns in cooperation with the BBLH (Bureau of Environmental Guidance, East Java) and Cipta karya (Ministry of Public Works, Human Settlements) in public awareness building focused on clean up the river and good quality of water through education.
- In middle of 1990s, PJT had expanded its public campaigns to increase teachers and students' awareness in water resources management of the Brantas river basin. This program was executed in cooperation with the IKIP University (Malang) and other similar academic institutions, to prepare teachers' guidelines and work books for the students.
- The PJT also had its independent public awareness building program which provide training and environmental education especially for the Muslim Boarding School (MBS) teachers and students. This program had focused on training for the trainer of MBS teachers in water resources management.
- In late 1990s, PJT had conducted a training program of water quality monitoring by biological analysis method in cooperation with the Malang local government. The aim of this training program was to make people realize about water resources conservation and its significance for ecology.
- Currently, the PJT has dramatically improved and expanded its wider views and social commitment to increase people's awareness in water resources and environment issues. In 1997, the PJT has signed up with the DPKT to build 10 check dams in Gedangan and Sumbermanjing sub-districts for watershed management. As of 2000, since early 1990s, the PJT spent about Rp. 1.4 billion for public campaigns.

2) PJT's Community Improvement Activities

In addition to the above mentioned people's awareness building activities through public campaigns, the PJT also started a community improvement program since 1993. The intention of this program was poverty alleviation of the poor community and vulnerable groups through lending capital to the cooperative and households for small enterprise development. As of 2000, the PJT has provided loans of Rp. 221.12 million to

the 15 cooperatives and 229 households.

3) Funds for the Public Campaign Activities

The PJT's permissible funds for the executing public campaign activities are as follows;

- food consumption for the campaign activities
- honorarium of the public campaign activities
- documentation of public campaign activities
- stationary of public campaign activities
- campaign tools/equipment such as film making, stickers, posters, brochures, banners, magazines, campaign letterheads, notice boards, prohibition boards, field T-shirts and hats for the campaign activities.
- accommodation of campaigners
- rent of chairs, tents and the equipment of public campaign
- fuels and general material for the campaign
- permission to conduct the public campaigns
- printing of public campaign guidelines books
- printing of public campaigns report
- presents for the public campaigns competition
- procurement of medicines and work safety tools for the public campaign
- honorarium of the media reporters
- and other related activities.

5. Inventory Survey of Community and Beneficiaries' Participation

There are many organizations in the Brantas river basin which worked with community and people's participation at the grassroots level to improve the socioeconomic condition of the poorest of the poor. These organizations are working in different areas such as environment, reforestation, education, health, and agriculture, women in development, poverty alleviation and awareness building of socially backward people through popular education. Some of these organizations are chosen for an inventory survey. The purpose of this survey was to study the possibility of "community and beneficiaries' participation" in the comprehensive management plan for the water resources of the Brantas river basin. The inventory survey focused on community and beneficiaries' participation issues, some of the main items are as follows;

- Category of organizations
- Purpose of program/project
- Activities in details
- Number of people participating in the program/project
- Source of funds

- Problems encountered
- Evaluation

The inventory survey has been conducted by the JICA study team member in early September 2000, based on direct interviews with the respective organizations through Indonesian language. These organizations mainly divided into three groups such as government, non-government and academic institutions. Details of this survey and categories of the organizations are explained below.

1) Governmental Organizations

No	Name of Organization	Table 14 Inventory Survey of Community and Beneficiaries' Participation						
		Category	Purpose of program	Location	Source of funds	Activities	No. of Participant	Problems encountered
1	KPPLH	Environment	Pollution Control	Malang City	Local govt. Enterprise contribution	River Clean Program	20,000	Lack of public awareness
2	DPKT	Plantation	Grow more trees	Malang Kabupaten	C. Govt. & L. govt	Plantation	2,280	Wide area of land
3	WRSO	Irrigation Service	Improve farmers' welfare	East Java Province	C. Govt. World Bank Loan	Detailed design of irrigation	188,896	Lack of farmers knowledge
4	WRSO	Irrigation Service	To support O&M of I. canals	East Java Province	Central Government	Training for operation & maintenance	1,060,000	Lack of HRD
5	BBLH	Pollution Control	Control pollution and HRD prog.	East Java Province	Australia & Central Government	Pollution control training	10,000	Miscordinati-on of the program
6	DP3 Program	Community Participation	To improve women status	Rural area of Malang	Ministry of Education & Culture	Adult education	90	Women less education

KPPLH : Committee for Environment and Pollution Control, DPKT:Forestration and Soil Conservation Office,WRSO:Water resources Services, BBLH:Bureau of Environment Guidance, DP3:A program under the Department of Education and Culture

2) Academic Institutions

No	Name of Organization	Table 15 Inventory Survey of Community and Beneficiaries' Participation						
		Category	Purpose of program	Location	Source of funds	Activities	No. of Participant	Problems encountered
1	IKIP Malang (University)	Awareness building	To build students' awareness	IKIP Malang	PJT IKIP, Malang	Training for school teachers	Teacher + students 48+500	Lack of fund
2	Brawijaya University	Water Quality	To converse water quality	Malang City	European Community	Training for water quality	Teacher + students 6+20	Financial problem
3	RHEIP Merdeka University	Watershed Management	Community awareness	Malang City	Australia & Indonesian governments	Education & demonstration	500	Less awareness of the people

3) Non-Governmental Organizations

No	Name of Organization	Table 16 Inventory Survey of Community and Beneficiaries' Participation						
		Category	Purpose of program	Location	Source of funds	Activities	No. of Participant	Problems encountered
1	LPKP (NGO)	Integrated Farming	Improvement of community income	Southern of Malang Regency	Belgium (FADO) ILO (Indo.)	Group Training for farmers	560	Lack of equipment & fund
2	LBMI(NGO)	Community Development	To improve community organizations	Malang City	Fund from language program	Education program	196	Lack of fund
3	WALHI (NGO)	Environment	To prevent pollution	Surabaya City	Contribution from members	Training on Environment policy	500	Fund is not adequate
4	PPLH(NGO)	Environment	To converse environment	Mojokerto	Donation from outside & own funds	Seminars, workshops on environment	30,000	People less awareness on environment
5	FOSSNU	Community Participation	Provide an umbrella for the scholar	East Java Province	University PJT and Private	Publish Magazine	400	Lack of operational funds

LPKP:Institute of Society and Development Studies, LBMI:Service and Consultation for Small Scale Business,WALHI:Indonesian

Forum for Environment, PPLH: Environmental Education Center, FOSSNU: Friendship Forum of Nahdlatul Ulama's Scholar Most of the organizations have certainly increased their outreach in recent years. Both the funds they spend and the numbers of people they deal with have been increasing. Majority of the organization stated that they have encountered problems such as operational funds, low level of education and lack of awareness among the beneficiaries. Some of them found that when the beneficiaries realized they were getting benefits from the program, then they become more self motivated undertake activities. Except for a very few most of the organizations recommend that their experiences of community and beneficiaries' participation will be applicable in the comprehensive management plan for the water resources of the Brantas river basin. However, it should be conducted stage by stage to raise public awareness and involved the community and beneficiaries in the water resources management activities of the Brantas river basin.

6. Problems in Formulating of Community and Beneficiaries' Participation

The JICA study team's questionnaire survey results shows that in some areas the intention of farmers to attend the Water Users' Associations (HIPPA) meeting has been very low. Although there is HIPPA in the Brantas river basin at almost every village level. It was observed that many farmers in the Brantas river basin were not aware about water resources nor use water efficiently. It may be said that free or very low-cost and availability of water has encouraged them to overuse, it reduces the incentive to cooperate and participate in water users' associations. None of the fish farmers make any payment for the water they use for fish farming. Most of the fish farmers see not to realize that water is becoming a limited resource and to its development and management costs, and therefore, there is no need to pay for it nor the water supply service. The survey results indicated that the following points are the major problems in formulating of the community and beneficiaries' participation in the comprehensive management plan for the water resources of the Brantas river basin. They are as follows.

1) The Farmers are Less Attendance in the HIPPA Meetings

In the Brantas river basin, HIPPA is working as Water Users' Associations (WUA), this HIPPA was established in 1993. Presently, there are 3,030 HIPPA members in 2,718 villages in the Brantas river basin, almost every village level. Unfortunately, in some irrigation areas the HIPPA members are not attending the meetings regularly in the Brantas river basin. Reasons for not actively attending the HIPPA meeting vary considerably between areas. In the Blobo irrigation area, the main reason is simply because of doing other more important things. The same reason was also encountered in Lodoyo irrigation area. In Warujayeng, Widas and Turi Tunggorono, an absence in attendance at HIPPA meeting is likely due to no interest, or because of not being invited. In the Brantas Delta irrigation area, the absence of farmers at HIPPA meeting may result in a number of reasons i.e. no direct benefit and doing something in the city area to earn cash money.

Irrigation Area	Table 17 Reasons for Not to Attend the HIPPA Meetings				
	Have no interest	Not invited	No effect to Attend	Others	Total
Blobo	2%	2%	-	6%	10%
Lodoyo	-	2%	2%	4%	8%
Warujayeng	12%	8%	6%	-	26%
Widas	7%	8%	-	9%	24%
Turi Tunggorono	17%	9%	5%	1%	32%
B. Delta	11%	3%	9%	12%	36%

2) There is no Fishery Water Users' Association in the Brantas River Basin.

It was observed that there is no organization like HIPPA for the fishery water users. The brackish water fish farmers are presently consuming a considerable amount of water, which is mainly derived from the Brantas river basin. Insufficient amount of water available at a reasonable quality is a problem for the fish farming. Presently, there is no Fishery Water Users' Association in the Brantas river basin. Some of the fish farmers seems to be less interested in to establishing of a fishery water users' association. Possible explanation is that they are still not sure whether such an association will be helpful since their experience with the existing formal agencies do not function as they are expect them to. The most serious problems encountered are associated with water shortage in the dry season. The water problems and issues are dealt individually or discussed in a small group of fish farmers. It is identified that there is need for better water resources management system for the fishery water.

3) Lack of Awareness and Education of the Irrigation Water Users

The water taken by the farmers' from the irrigation canals are not efficiently utilized in the Brantas river basin. Inefficient and ineffective use of irrigation water by the farmers in the basin is an acute problem for the irrigation water supply systems. The main reason is the farmers are taking water more water than their actual needs from the irrigation canal in the dry season, surplus water is spilled out from their paddy fields to the drainage canal. Most of the irrigation area in the Brantas river basin the farmers do not have a clear idea about

how much water they are taking for paddy or other crops. Again, most of them do not know how much water actually they need in different seasons/crops for per hectare. The problems most probably lie on the lack of awareness and the education level of most of farmers in the Brantas river basin is relatively low (elementary school).

4) Problems in Implementation of Beneficiary-Pay Concept

There has never been any specific and rationale charge imposed for irrigation and fishery water in the Brantas river basin area. Therefore, most of the irrigation and fishery water users' still keep the old perception that the charge of water used is included in the tax they pay and it is the duty of the government to supply the water.

Perception to the concept	Blobo	Lodoyo	Warujayeng	Widas	Turi Tunggorono	B. Delta
Reasonable	60%	64%	100%	94%	60%	78%
Not reasonable	8%	14%	0%	0%	3%	2%
Cannot reply	32%	22%	0%	6%	37%	20%
Total	100%	100%	100%	100%	100%	100%

As shown in table 18, the number of farmers who do not understand the concept in Blobo, Lodoyo and Turi Tunggorono irrigation area is relatively high (about 40 percent farmers). At a lesser extent it is also observed in the Brantas delta irrigation area. The survey results reveals that the concept has been understood to some extent by the irrigation water users. Because almost 80 percent of irrigation water users are paying irrigation service fees for the rehabilitation and operation and maintenance of the irrigation canals. However, the fish farmers in the Brantas river basin area are not used to paying for the fishery water they used for the fish farming. The failure to understand the beneficiary-pay concept may result that, the water users' decades old perception that the water is not a commodity rather a free natural resource and gift from the God.

7. Necessity of Cooperation of Related Agencies

Being an implementing agency of the Brantas river basin, the PJT needs to manage the water resources development, operation and maintenance and overall management of the basin. For this to be successful a favorable support and cooperation is required from the provincial/local government's related agencies, non-governmental organizations, academic institutions, social groups and community participation in PJT's overall management activities. It is necessary for PJT to formulate project/programs based on community and beneficiaries' participation in water resources management of the Brantas river basin. In the Brantas river basin's water resources management activities, a holistic approach is required, which will cover PJT's concerned areas as well as its all beneficiary groups. For the implementation of projects/programs on irrigation and fishery water, watershed and water quality management of the Brantas river basin, PJT needs the cooperation and close coordination with the related agencies/organizations.

7.1 Social Considerations for Introduction of Beneficiary-Pay Concept

Social consideration are required when an implementation of a program may bring about any negative socioeconomic impact to the community and respective beneficiaries. The purpose of the social considerations lies in emphasizing sustainability of the program benefits and minimizing the negative impact as far as possible. This impact is studied for the vulnerable groups in a community including low income groups. When the beneficiaries-pay concept is implemented in irrigation and fishery water supply system, then a new contribution to irrigation and fishery water supply system would be needed. This new beneficiary-pay concept would be an additional financial burden for the irrigation and fishery water users' of the Brantas river basin.

1) Considerations for the Irrigation Water Users

The capacity to pay of farmers for irrigation service fee is examined roughly based on the figures obtained by the questionnaire survey. The family income of farmers was derived at Rp.3,040 thousand per year. The payment of irrigation services fee was estimated at Rp.25,000 per ha/season. Assuming the family size of 5 persons per household and also assuming the average holding of 0.5 ha, the payment of Income of Survey Farmers (ISF) is estimated at Rp.25,000 per year (two harvest seasons) the. The share of this ISF payment toward total family income is derived at 0.8 percent by dividing Rp.25,000 by Rp.3,040 thousands. The expenditure of less than 1 percent of the total income is deemed to be within the capacity to pay of farmer. The low income is related to shortage of water, in respects to total income, Widas, Turi Tunggorono and Warujayeng are included in the lowest income group and these three areas correspond to the areas suffered most from water shortage. The considerations for income disparity among areas would be necessary for introduction of the beneficiaries-pay concept.

For social considerations for the irrigation water users in the beneficiary-pay concept the following items should be considered:

- (1) Cheaper water tariff for the low income and disadvantaged people.
- (2) Physical labor for the operation and maintenance of the irrigation canals may be introduced instead of water service fee.
- (3) Free water service for the poorest of the poor and disadvantaged women.

2) Considerations for the Fishery Water Users

The surveyed fishponds in the Brantas river basin mostly (70 percent) run by the share tenant and the remaining 30 percent are operated by the fishpond owners themselves. The fish farming area may be classified into four groups, i.e. 3.0-4.9 ha, 5.0-6.9 ha, 7.0-8.9 ha and more than 9.0 ha respectively. Majority of the fish farming area operated falls into the third groups. There is a wide variation of income of the fish farmers in the Brantas river basin area. About 80 percent of the fish farmers earns a gross income ranging from 2 to 8 million Rp. ha/year, and only 20 percent of them earns more than 8 million Rp. ha/year. Fishpond farmers' income considered to be much higher

than that obtained from the paddy cultivation. For social considerations for the fishery water users' in the beneficiary-pay concept the following items should be considered:

- (1) One of the key social considerations is the lack of education among the fishpond owners and tenants. The educational skills needs to be developed for them to become involved in the modern agro-business.
- (2) More than 70 percent of the fish farmers are tenants, incentives must be provided for them to achieve ownership of the fishpond.
- (3) The fishery water users' association should be organized like HIPPA, so that it can play an organized and effective role to overcome their water shortage problem.
- (4) A complete mapping of the fishponds and channels will be required before doing a needs assessment of social issues implementing the fishpond enterprise.
- (5) It has been observed by the study team that almost all brackish water fishponds in the Brantas delta are extensive fishponds. These are operated in a traditional way which has not changed for the last 50 years. The fishery enterprise need to be modernized as agro-business.

8. Recommendation for the Proposed Master Plan Based on the JICA's Survey

To formulate the community and beneficiaries' participation in the Master Plan of comprehensive management plan for the water resources of the Brantas river basin. A systematic and continuous participatory process should be implemented in the proposed Master Plan for basin area. This process should be based on the community and beneficiaries' participation in the water resources management activities. The PJT has been playing an important role through its participatory approach and periodical public campaign activities in water resources and increase public awareness on the environmental issues in cooperation with related agencies. According to the JICA study team's questionnaire survey also found that the water users' have an intention to participate in the management activities of the Brantas river basin. The following focal points are taking into account and recommended for the proposed Master Plan of the comprehensive water resource management in the Brantas river basin area in Indonesia. Some of them are explained below.

8.1 Irrigation Water Supply

The irrigation is the single largest water user among the water users in the Brantas river basin. This sector extends almost the basin area and consumes more than 80 percent of all available water in the basin. There are 3, 030 irrigation water users' associations in 2, 718 villages in the Brantas river basin. Awareness level of the farmers in the Brantas river basin is an essential factor to improve their knowledge and technical skills needed for them to become involved in the modern agro-business. The JICA study team's questionnaire survey results showed that in some areas the intention of farmers to attend the HIPPA meeting has been very low, although there is HIPPA in the Brantas river basin at almost every village level. It was observed that many farmers in the Brantas were not aware of water resources nor of how to use water efficiently. It may be said that free or very low-cost and availability of

water has encouraged them to overuse.

8.1.1 Details of Participatory Project in Irrigation Water Supply

<p>Organization HIPPA (Water Users' Associations) would be the appropriate implementing organization to carry out project activities. Because, HIPPA has basin wide network system at the village level and are already involved with the irrigation water supply system in the Brantas river basin.</p>
<p>Purpose The main purpose of this project is to increase the involvement of farmers in irrigation water Management activities of the Brantas river basin through a participatory process.</p>
<p>Location Kepanjen (sub-district) irrigation section is located under the Malang Regency.</p>
<p>Fund Sources The project's operation and maintenance costs are derived from the local/national government subsidy or from the international aid agencies. For the construction of primary canal, funds may acquire from the local/national government subsidy or from the international aid agencies.</p>
<p>Estimated Number of Participants Estimated number of participants will be 5, 000 HIPPA members' in Kepanjen.</p>
<p>Activities</p> <ol style="list-style-type: none"> Farmers' training for operation and maintenance of the irrigation canals. HIPPA's training for rehabilitation works of the irrigation canals. Increasing farmers' awareness in efficient use and conservation of water.

8.2 Fishery Water Supply

Presently, about 15, 790 hectares of land is used for fish farming in the Brantas river basin. But there is no reliable statistics on how many fishponds or how much water these fishponds are consuming from the Brantas river basin. There is no fishery water users' association, the water problems and issues are dealt individually or discussed in a small group of fish farmers. Water used for fish cultivation varies in origin in the Brantas river basin such as sea, river, irrigation canals, estuarine and rain fall water. Brackish water fishponds are presently consuming a considerable amount of water, which is mainly derived from the Brantas river. The most serious problems encountered are associated with water shortage in the dry season. The fishery water problems and issues are dealt individually or discussed in a small group of fishpond owners. It was observed that there is no organization like HIPPA for fishpond owners. It is identified that there is need for good quality of water and better water management system for the improvement and increase fishery production.

8.2.1 Details of Participatory Project in Fishery Water Supply

<p>Organization The fish farmers belonging to the KUD (village cooperative unit) can play an important role in the participatory project of the fishery water management activities.</p>

<p>Purpose</p> <p>The purpose of this project is to increase the fish farmers' participation in fishery water management activities in the Brantas river basin. It is also necessary to improve their technical skills in operation and maintenance of the fishery water canals.</p>
<p>Location</p> <p>Sedati is located in the Sidoarjo Regency of East Java. There is a village cooperative unit (Mina Makmur) in Sedati sub-district which consists of 16 villages. Among these villages, there are 6 fishponds and 250 fishpond owner/farmers. Some of these fishponds had been taking water from the irrigation drainage canals.</p>
<p>Fund Sources</p> <p>Management costs of this project fund should be derived from the fishery department (DPERIKAN). However, in the case of big projects (for example; construction of a fishery water canal) funds may be received from the government subsidy or international aid agencies.</p>
<p>Estimated Number of participants</p> <p>Estimated number of participants will be 250 (fish farmers) in Mina Makmur KUD (Village Cooperative Units).</p>
<p>Activities</p> <p>a. Training for O/M and rehabilitation of the fishery water & irrigation drainage canals.</p> <p>b. Demonstration for rehabilitation works of the fishery water & irrigation drainage canals.</p>

8.3 Watershed Management

Most of the sedimentation and soil erosion in the middle and downstream of the Brantas river basin as well as into the dams comes from the mountainous and critical land areas. The objective of the watershed management is to protect settlements and infrastructures in downstream areas by mitigating the effects of flooding and drought, sedimentation and river channel instability. The objective of the watershed management is to protect settlements and infrastructures in downstream areas by mitigating the effects of flooding and drought, sedimentation and river channel instability. To reduce this sedimentation, the watershed management programs immediately need to concentrate in controlling soil/river erosion and landslides. Many studies in resource conservation have recommended that local people be a full partner for the conservation of forests and land. The participatory watershed management activities need to involve the people in the community, those who are concerned with or have an interest in watershed management and who will be affected. To gain better cooperation from the community/social groups, it is necessary to motivate local people to realize that they can derive benefits from taking good care of the forest and land conservation. To reduce sedimentation and protect soil erosion plantation land terracing are necessary. Due to the financial constraints and shortage of manpower, it might be very difficult by the basin's management authority to carry out the plantation program and terracing the critical land. There is an alternative approach, to increase awareness of the inhabitants at the watershed area and make them understand to realize the necessity of the watershed management in their life.

8.3.1 Participatory Project in Watershed Management

<p>Organization</p> <p>It is necessary to form an implementing organization for watershed management at the village or watershed level with the concern of DPKT, village chief, as well as local government officials.</p>
<p>Purpose</p> <p>The main purpose of this project is to involve people in the watershed management activities through the community and beneficiaries' participation in the Brantas river basin. To make people more aware about soil erosion, flood and other natural disasters. At the same time these activities would play an important role for soil conservation in the Brantas river basin.</p>
<p>Location</p> <p>Pujon sub-district is located under the Malang Regency. For the proposed program two villages will be selected namely, Tawang Sari and Ngabab. In these two villages there are 9,000 inhabitants and about 10 hectares of plantable land.</p>
<p>Fund Sources</p> <p>The funds should be derived from the forest and land conservation agency and government subsidy. To some extent funds may be raised from the local/national enterprises, local/international aid agencies and academic institutions.</p>
<p>Estimated Number of Participants</p> <p>Estimated number of participants will be 9,000 inhabitants in Tawang Sari and Ngabab.</p>
<p>Activities</p> <ol style="list-style-type: none"> Community/social groups' training for plantation and follow-up. Inhabitants' training to improve their technical skills on terracing mountainous land.

8.4 Water Quality Management Activities

The source of pollutants in the Brantas river basin from industrial effluents, domestic garbage, human's activities and fertilizer and pesticides from agricultural activities. In many areas of the basin becoming to function as a waste disposal, which also the cause of river environment's destruction. Brantas river basin and its tributaries are the main source of water, and it is relied upon to meet the demand of different water users' in the basin area. Therefore, a sufficient quantity of good quality of water is required to fulfill the need of water to support the sustainable development and for the human dignity. Therefore, there is an essential need to increase public awareness in the river environment issues and water quality management activities through community participation. To preserve the ecological balance of the Brantas river basin, the water users' can play a vital role in the natural restoration of the water quality in the basin. The source of pollutants in the Brantas river basin from industrial effluents, domestic garbage, human's activities and fertilizer and pesticides from agricultural activities. In many areas of the Brantas river basin becoming to function as a waste disposal, which also the cause of river environment's destruction.

8.4.1 Participatory Project in Water Quality Management

<p>Organization</p> <p>An implementing community organization is necessary at the grassroots level. The organization should be formed in cooperation with BBLH, PJT and local government officials.</p>
<p>Purpose</p> <p>Purpose of this project is to make people aware about water quality management and river environment through public campaigns, education and motivation activities.</p>

Location Penanggungan (Kelurahan) is located under Malang Municipality
Fund Sources The funds should be derived from the BBLH, academic institutions, local Enterprises, and Industries in the Brantas river area.
Estimated Number of participants Estimated number of participants will be 11, 000 inhabitants in Penanggungan (Desa).
Activities a. Community/social groups' awareness building through environmental education. b. Public campaigns on water quality management activities.

9. Concluding Remarks for Project Implementation

To achieve the final goal of 2020, the basin wide participatory activities in the comprehensive management plan for the water resources of the Brantas river basin should be implemented. The PJT should taking into consideration few stages consider after judging the awareness level of the community and beneficiaries. Because there is a wide variation of the consciousness and lack of adequate knowledge about water resources among the water users' in the Brantas river basin. For a successful project implementation program in the water resources management. To begin the participatory activities, concerned participants need to understand that there are three stages (i.e. awareness, involvement and participation) involved in effectively mobilizing community support for participatory activities. Each stage is a step towards bringing the participants closer to attainment of community based participatory project. The PJT should focused on the following three stages for the implementation of participatory project.

1) Community Awareness

It is observed in some area that degree of awareness of water users' in the Brantas river basin is inadequate. Therefore, it is necessary to improve the water users' awareness and knowledge about water resources and management.

2) Community Involvement

The second stage is community involvement wherein the PJT can seeks the participants' opinions about ways of solving problems and involve them in its annual operational programs including water resources management activities.

3) Community Participation

The most important stage is community participation, if the awareness and involvement already achieved at a certain level among the water users' then PJT should implement the community based participatory project.

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