11 Management Organization

11.1 Organization

The present management approach to water quality is being made by many agencies. This tends to generate conflicting sectoral interests. The water quality management should be integrated and comprehensive for the whole basin. Thus, it is recommended that PJT has a responsibility for the water quality management as a water supplier. To put the assertion more concretely, overall management of the water quality in the Brantas river basin should be implemented under the responsibility of PJT. PJT should have a strong leadership of the water quality management and a line management responsibility will be required.

On the other hand, PJT can delegate its tasks to other agencies for implementation of the projects. Taking into consideration of the functions of BBLH which will be replaced by BAPEDALDA, execution of pollution control shall be done under the instructions and/or coordination of BBLH. In this manner, pollution control of each sector shall be undertaken by respective responsible agencies. All the related agencies shall report to PJT their requirements and the operation results with water quality data.

The recommended overall organization for the comprehensive water quality management in the Brantas river basin is illustrated in Figure A3-15.

11.2 Demarcation of Responsibilities

(1) Responsible agencies

(a) Water quality monitoring

Water quality monitoring should be supervised by PJT and coordinated by BBLH. Implementation of monitoring should be made by the following agencies.

- River water : PJT

- Domestic waste water : PJT, cooperated by DPU Cipta Karya and DKES

- Industrial waste water : PJT, cooperated by DPRIND

- Agricultural waste water : PJT, cooperated by DPERTA

All data monitored will be send to PJT in order to be compiled and evaluated. After compilation, the data will be reported to BBLH and related agencies, and the Basin Water resources Management Committee (hereinafter referred to as BWMC).

(b) Pollution control

Pollution control should be supervised by PJT as a secretary of BWMC. This means that PJT should prepare an overall pollution control plan in consideration of monitoring results and progress of countermeasures. PJT reports the plan and/or program to BBLH after the approval from upper organizations. Then, BBLH coordinates and instructs the implementation of pollution control activities to the responsible agencies.

It is noted that pollution load from major livestock houses has been controlled in the industrial sector under PROKASIH. Since agricultural pollution load have a great possibility of water quality deterioration, pollution control should be made by agriculture sector itself in order to implement that organically and effectively.

Therefore, pollution control activities should be conducted by the following agencies.

- Overall planning, programming: PJT as a secretary of BWMC

- Coordinating and instructions : BBLH (BAPEDALDA)

- Domestic pollution control : DPU Cipta Karya

- Industrial pollution control : DPRIND

- Agricultural pollution control : DPERTA

- Other pollution control : DKES

Above all, in order to enable implementation of activities (countermeasures), it is recommendable that domestic pollution control (sewerage systems including on-site systems) and other pollution control (sludge and solid waste disposal) are executed by local governments, sometimes public corporations. Implementation of sewerage systems and centralized treatment systems for the industries by "Built, Operate, and Transfer (BOT)" methods deserves full considerations. New PJT could have a possibility of BOT.

(2) Demarcation of responsibilities

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Recommended demarcation of responsibility for management and implementation of the required activities is shown in Table A3-22.

12 Requirements of PJT

12.1 Organization

In order to implement the projects organizationally and effectively, an independent department for the Water Quality Management is necessary for the new institution of PJT with a planning and coordination section, an water quality monitoring section, a research and development section, and a laboratory included. Recommended department for the water quality management will be established together with the department of River Environment Management.

According to the functions, each of the section in the department of Water Quality Management will have the following main activities, including inter and inner institutional coordination and fundamental decision for management plan both in short-term and long-term ranges.

Sections	Main Activities
Planning and Coordination	- to prepare plans, programs and/or regulations of water
Č	quality management
	- to formulate countermeasures, to review them
	- to advice the related agencies about countermeasures
	- to issue a discharge license (as a secretary)
	- to arbitrate a dispute regarding water quality
	to manage a subsidy, a loan and a bounty
	- to execute public relations (PR)
Water quality monitoring	- to execute the water quality monitoring (to prepare plans,
	programs)
	- to compile the data of results
	- to evaluate monitoring results
	- to make monthly and annual reports
Research and Development	- to execute simulation analysis
•	- to execute inventory survey
	- to identify pollution loads and their magnitude of impacts
	- to research and development of proper countermeasures,
	new technique for evaluation of water quality
Laboratory	- to take samples (water, river bed sediment, etc.)
	- to analyze samples (water, river bed sediment, etc.)
	- to operate and maintain automatic water quality
	monitoring stations

Management of the river maintenance flow will be made as a part of low flow management. This matter will be within the jurisdiction of the Planning and Controlling Bureau of PJT. Management will be made in consideration of the information sent from the Water Quality Management Department.

To make a final decision of implementation of projects according to the plans and programs together with the policies, to make budget plans for the sections and to allocate them will be done by the upper department.

12.2 Manpower

For implementation of comprehensive water quality management, the following manpower will be needed in the Water Quality Management department of PJT. Environmental planner, water quality engineers, computer technicians and so on will be necessary.

Sections	Required Manpower	persons
Planning and	- manager	1
Coordination	- coordinator	1
	- environmental planner	1
	- other staff	4
Water quality	- coordinator	1
monitoring	- reporters (including water quality engineer)	1
	- recorders (including computer engineer)	2
	- other staff	2
Research and	- computer engineers	2
Development	- engineers specializing in water quality, sanitation,	3
· •	chemistry, biology or microbiology, and so on.	
Laboratory	- analysts	10
(Malang and	- sampling staff	4
Mojokerto)	- technician for automatic water quality monitoring system	1
	- drivers	4

Note: 1) Administrators (2 staff) are required for all sections.
2) Figures in this table show required number of staff.

It will be necessary to have technical knowledge and/or know-how of specified fields of works, such as water quality management, evaluation of water quality, simulation study, analysis of water quality and so on. The practical knowledge and/or know-how of them could be trained by means of OJT and/or training organizations in and outside of the country. Recruitment of persons who have a related career and/or a background is required.

12.3 Facilities

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For establishment of the recommended Water Quality Management Department in PJT, additional preparation of a new work office for the staff and related facilities would be necessary. This office will be located near the headquarters of PJT. Besides, the foundation of a new laboratory covering upstream area of the Brantas river basin is recommendable in addition to the existing laboratory in Mojokerto, in order to take and transport samples and to analyze them timely. A work office for the Research and Development section is recommendable to be founded in new laboratory in Malang.

For the sake of implementation of comprehensive water quality management by PJT,

following main facilities will be needed.

Sections	Main Facilities
Planning and Coordination	- work office
	- computer unit, office supplies
Water quality monitoring	- work office
	- computer unit, office supplies
Research and Development	- work office (including research laboratory)
	- computer unit, office supplies
Laboratory	- laboratories (two places)
	- sampling, field testing and transporting implements
	- analyzing instruments (including laboratory equipment)
	- automatic water quality monitoring system
	- mobiles (including mobile laboratories)
	- computer unit, office supplies

Note: 1) Analyzing instruments include those that can analyze harmful components and microbiological parameters.

- 2) Automatic water quality monitoring system will be installed by the Wonorejo Multipurpose Dam Construction Project.
- 3) Mobile laboratory means that with small laboratory consists of sampling, field testing and transporting implements.

12.4 Required Cost

Necessary cost for establishment of the Water Quality Management Department in PJT is that for its manpower and facilities. Investment cost for the facilities and O&M cost (direct cost and personnel expenses, not include depreciation of equipment) are estimated as follows.

Sections	Investment cost	O&M co	st (million Rp./year)
	(million Rp.)	Direct cost	Personnel expenses
Planning and Coordination	100	10	45
Water quality monitoring	150	15	40
Research and Development	250	25	35
Laboratory	4,000	350	105
(Mojokerto, Malang)			
Total	4,500	400	225

Note: 1) Investment cost for laboratories include expansion and enhancement of existing laboratory, and foundation of new laboratory, not include cost for the automatic water quality monitoring system.

- 2) Research and Development section will use new laboratory.
- 3) Figures in this table are constant values as of 1996 (not include depreciation).

13 Project Implementation Program

13.1 Projects Identification

The final goal of the proposed projects is to comply with the target by 2020 in the Brantas river basin. In order to accomplish this target, it is clarified through the water quality prediction that all the proposed countermeasures for each source and direct purification should be implemented.

Most suitable and manageable countermeasures shall be applied, depending on commencement necessities based on magnitude of effects and technical and economical aspects, in principle. Thus, countermeasures shall focuse on pollution sources which can be specified at first. In addition, in order to put priority for implementation on the proposed countermeasures, institutional and/or legislative necessity shall be taken into consideration.

Table A3-23 shows countermeasures with priority positions which are divided into four groups, urgent projects, high, medium and low priorities.

13.2 Implementation Schedule

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The required activities for the water quality management in the Brantas river basin fall under 10 categories. All these activities have to be prepared and implemented from now on in order to attain the target by 2020.

On the other hand, reconstituting the organizations and enhancement of legislation and/or regulation are required. Besides, the development schedule of PJT and establishment of new department for water quality management in PJT should be considered. Furthermore, affordability of inhabitants especially low income households should be taken into consideration. For step-wise improvement planning, the outline of schedule phases are as follows.

- First stage (1999 2004): action plan
 reconstitution of the organization
 enhancement of legislation and/or regulation
 implementation of model projects
 masterplan (M/P) and feasibility study (F/S) on the selected urgent projects
- Second stage (2005 2009)
 commencement of high priority projects
- Third stage (2010 2014)

 commencement of medium priority projects
- Fourth stage (2015 2020)

 commencement of low priority projects

Implementation schedule is showed in Table A3-24.

13.3 Responsible Organizations

The implementation of the water quality improvement activities is proposed to be managed and administered by PJT, assigning the cooperation of the works to BBLH (BAPEDALDA). The important matters for the water quality management are to make proper plans and programs with clarified responsibilities and their activities. Responsible organizations for projects implementation are summarized in Table A3-22.

13.4 Preliminary Project Cost

Preliminary project costs for each pollution control sector are described in Table A3-24.

14 Action plan

Establishment of continuous water quality management system **(1)**

This is especially noteworthy in the case of the water quality management, a feed back system of monitoring results for taking countermeasures for actual implementation and O&M of the projects should be required. That is to say, a cycle of "Plan-Do- See/Check - Review/Assess" that can be called "a continuous water quality management system" as shown on diagram of Figure A3-16 should be developed. Components of the system are as follows.

- Plan

: target, plan initiatives, consolidate priorities,

allocate responsibility

- Do

1

1

: projects planning, implement actions, improve awareness

See/Check

monitor, report progress

- Review/Assess: identify directions, achieve endorsement

Strengthening of legislation and institutions **(2)**

The present institutional and/or legislative framework is not enough to successfully carry out the recommended countermeasures. In particular, legal supports which shall be arranged by the combined efforts of the East Java province and agencies concerned will be needed. The following preparations are necessary for the water quality management:

- enhancement of legislation and/or regulation enactment of "Water quality management law", "Sewerage law (including the functions of private sewerage system law)". guidelines for specific activities
- institutional development of PJT
- reinforcement of staff in duty in PJT

In the course of the institutional development of PJT, enforcement of existing PJT laboratory should be necessary. In particular, its' staff training is required urgently as well as overhaul and calibration of existing facilities and installation new facilities concerning analysis of river bed sediment, harmful substances and microbiological parameters.

For the staff training, the Environmental Management Center in Jakarta can be used. Generally, the center accepts trainee for water quality analysis and harmful substance management at BAPEDAL expense. Even if its' budget is limited, training can be available with PJT expense. One week training for water quality analysis will require a fee of about one million Rupiah.(as of 1997).

Preparation of waste water treatment map **(3)**

If a public sewer system becomes available soon after the installation of on-site sanitation facilities, owners will be reluctant to abandon their on-site facilities because they have already paid for the installation. To avoid such twofold investment, foresighted zoning is required. In addition, it is necessary to designate "hot zone" where early countermeasures are required because of high pollution loads flowing into the rivers.

In order to portray above zones, "waste water treatment map" contains the following zones and was prepared by the Study Team:

- areas planned to be provided with sewage systems
- areas planned to be provided with on-site treatment facility (CTPSTS)
- areas planned to be provided with sanitation facility
- hot zones

Based on the map as shown in Figure A3-17, establishment of adequate waste water treatment systems is recommended.

(4) Implementation of a model project of Gappei Johkaso

"Johkaso" is the term for privately owned excreta and/or domestic waste water treatment system common in Japan. It is a favored alternative used in individual houses, housing estates and public facilities where a public sewer system is not available. This kind of system is not still installed in Indonesia. There was only one experimentation for CTPSTS in Indonesia that was made by JICA in cooperated with Dept.PU. It goes without saying that examination of acceptability and training of experts of Johkaso systems are prerequisite for successful use of them.

To cope with this situation, implementation of a model project of CTPSTS is recommended. The installation of the systems as a module will be made to hotels, hospitals, large scale restaurants, collective housing areas or condominiums, public facilities or public toilets where water pollution control is crucial.

Considering affordability of inhabitants especially low income households, johkaso system seems to be expensive. Therefore, installation of CTPSTS to hotels, hospitals, large scale restaurants, collective housing areas or condominiums, public facilities, schools and public toilets where water pollution control is crucial, should be obliged at first. Next, the installation to a large income households should be obliged. Finally, most of domestic waste water should be treated.

(5) Implementation of M/P and F/S

Up to now, many studies concerning water quality have been made in the Brantas river basin, mainly focused on the Surabaya river. The Surabaya River Pollution Control Plan Study (Technical assistance from IBRD) is going on as well as the Surabaya Sewerage and Sanitation Development Program (PT INDULEXCO). However, attention has not been paid on Malang area. As mentioned in the previous section, water quality in Malang area is also deteriorated. No careful activities has not been tackled yet. Therefore, it is recommendable to implementation of M/P and F/S focusing on the river environment in Malang. In that plan, off-site and on-site domestic waste water treatment systems including Gappei Johkaso, sludge (septage) and solid waste management, related human resources development will be discussed.

15 Recommendations

(1) Pollution Charge System

The concept of "Polluter pays principle" has been adopted for a long time around the word. In general, this concept means that polluters have a responsibility for paying expenses to treat their pollution to prevent environmental degradation, and/or to retrieve previous environment if they polluted. In view of the concept, polluters like industries, in principle, should treat their waste water to attain the effluent standards on their own responsibility. Inhabitants who utilize a public sewerage system including waste water treatment plant shall pay a sewer user charge.

A pollution charge system as an economic approach of pollution control has been proposed by PJT together with the related agencies. This system, if established, should be one with a limited period of validity from a viewpoint of the principle. Besides, as the polluters can be specified, direct regulations against them are to ensure the decrease in pollution load.

Polluters of industry shall pay the charge before the effective waste water treatment system is established. Polluters charge will be used for establishing a fund in order to promote installation of waste water treatment facilities such as a subsidy, a loan and a bounty, and/or research and development. Finally, the system will be replaced to a regulation system not later than target year of 2020 (see Figure A3-18). In case of the regulation system, if the industries exceed the water quality standards which has been published by the East Java province, a penalty shall be imposed on them.

It should be also added that if the charge is lower than the cost of waste water treatment, there must be considerable doubt to promote installation of treatment facilities. Therefore, the charge should be set up in accordance with the treatment cost.

In addition, the charge can be focused on organic pollutants as represented by BOD and inorganic substances as represented by SS. In the Brantas river basin, most of industries can be categorized 2 main groups. One is the group of industries discharging organic waste water mainly, and the other is the group of industries discharging inorganic waste water mainly. Thus, BOD and SS can cover a wide range of industries. Most of other pollutants could be decreased in the treatment process for BOD and SS, if the process is of effective. If established, the maximum limits of pollution loads should be set up. As for harmful components such as heavy metals, exceeding discharge of them should be strictly prohibited and they are not proper to be accounted monetary values.

(2) Improvement of Kampung

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As a result of field reconnaissance, a high densely populated area along the riversides can be seen, especially in Surabaya and Malang. It is often called "Kampung" area. Most of domestic waste water from these area enters into the rivers without purification. Sometimes, open-air defecation or over hang latrine can be seen in and around the rivers. To make matters worse, it is difficult to install pipe network for sewerage systems, mainly due to densely located houses. Therefore, improvement of Kampung areas is necessary to improve water quality as well as river environment.

(3) Cleaner Production

Minimization of pollution load from industries can be made by means of pre-process, inprocess, end-of-pipe measurers and their combinations. Pre-process and in-process measurers are called waste minimization technology or cleaner production technology. Pre-process includes product changes, raw material substitution, in-process includes process changes, material handling improvements and recycling. Normally, production cost cloud be reduced by cleaner production technology. Therefore, adaptation of cleaner production is necessary.

(4) Others

For the implementation of the above water quality improvement plan, the following supporting tasks should be taken into consideration.

- Research and development for appropriate technology of pollution control
- Industrial audit (on-site industrial pollution inspection system)
- Implementation of Environment Impact Assessment
- Utilization of ISO 14000

Present Water Quality Monitoring System in The Brantas River Basin Table A3-1

Contract of

Mediani ...

Organizations	Monitoring	Monitoring items	Monitoring organizations	Purposes	O&M Cost
PJT	River water:	21 (physical and chemical items, not include heavy metal and microbiological items)	Sampling and Analysis: PJT laboratory Data compilation and Reporting: PJT	Water resource management	Water resource O&M: 75 million management Rp./year Personal expense : 78 million Rp./year
	Industrial waste water: 41	Industrial waste 13 (physical and chemical water: 41 items, not include heavy metal and microbiological items)	ditto		
PROKASIH	River water: 29	BOD, COD, SS	Sampling: DPU Analysis: BTKL Data compilation and Reporting: Work team of PROKASIH	Clean river 385 million Rp./ campaign in (1996/97) accordance with *including staff direction by training, suppor river cleaning BAPEDAL river cleaning activities and so	385 million Rp./year (1996/97) *including staff training, supports for river cleaning activities and so on.
	Industrial waste water : 58	5-32 items (depend on type of industry). BOD, COD are reported by PROKASIH report	Industrial waste 5-32 items (depend on type of Sampling: DPRIND (Municipal water: 58 industry). BOD, COD are reported by Analysis: BTKL, Laboratory of Kanwil PU, BPPI Data compilation and Reporting: Work team of PROKASIH		*not all for the Brantas river basin
Kanwil PU	River water:	About 60 *including heavy metals and microbiological items	Sampling: DPU Analysis, Data compilation and Reporting: Laboratory of Kanwil PU	Water resource management	Water resource 3 million Rp./year management (1996/97) *Analisis only
Courses	DIT DROKACIE	DEOK A SIH FARM I aboratory of Kanwil PI	114		

Table A3-2 Monitoring Points of Water Quality in The Brantas River Basin by PJT

No.	Code	Location	Rivers	Class	Period	Remarks
1	100	Dinoyo Bridge	Brantas	С	Monthly	Upstream of Malang
2	130	Bumiayu Bridge	Brantas	С	Monthly	Downstream of Malang
3		Segenggeng Tambangan	Brantas	С	Monthly	Downstream of Malang
4		Blobo Bridge	Brantas	С	Monthly	Downstream of Malang
5		Kd.Pedaringan Bridge	Brantas	С	Monthly	Upstream of Sengguruh Dam
6		Sengguruh Bridge	Brantas	С	Monthly	Downstream of Sengguruh Dam
7		Sutami Dam	Brantas	c	Monthly	Sutami Dam reservoir
		Kalipare Bridge	Brantas		Monthly	Downstream of Sutami Dam
9		Kesamben Tambangan	Brantas	c	Monthly	Downstream of Sutami Dam
10		Ngembul Bridge	Brantas	c		Upstream of Wlingi Dam
		Wlingi Dam-1	Brantas	c		Wlingi Dam reservoit
- 11		Wlingi Dam-2	Brantas	c	Monthly	Downstream of Wlingi Dam
12			Brantas	C	Monthly	Lodoyo Dam reservoir
13		Lodoyo Bridge	Brantas	C	Monthly	Downstream of Lodoyo Dam
14		Lodoyo Dam	Brantas		Monthly	in Blital
15		Demangan Bridge			Monthly	Upstream of join the Ngrowo river
16	!	Pakel Tambangan	Brantas	<u> </u>		
17	 	Jeli Bridge	Brantas	C	Monthly	Downstream of join the Ngrowo river
18	<u> </u>	Ngronggo Tambangan	Brantas	<u>c</u>	Monthly	Upstream of Kediri
19		Jongbiru Bridge	Brantas	<u> </u>	Monthly	Downstream of Kedin
20		Mekikis Bridge	Brantas	c	Monthly	Upstream of join the Konto river
21	<u></u>	Ngrombot Tambangan	Brantas	c	Monthly	Downstream of join the Konto river
22	940	Ploso Bridge	Brantas	В		In Ploso
23	950	Jatigedong Tambangan	Brantas	В	Monthly	Downstream of Pioso
24	960	Betro Tambangan	Brantas	В	Monthly	Upstream of Mojokerto
25	99	Padangan Bridge	Brantas	В	Weekly	Mojokeno
26	100	Canggu Tambangan	Surabaya	В	Weekly	Downstream of diverging to the Porong river
27	102	Peming Bridge	Surabaya	В	Weekly	Along the industrial strip
28	103	0 Irebeng Bridge	Surabaya	В	Weekly	Along the industrial strip
29	103	5 Cangkir	Surabaya	В	Weekly	Along the industrial strip
30	104	0 Bambe Tambangan	Surabaya	8	Weekly	Along the industrial strip
3	104	5 Karangpilang	Surabaya	В	Daily	Near intake of water supply treatment plant
3	2 105	0 Sepanjang Bridge	Surabaya	В	Weekly	Upstream of Gununnsari Dam
3	3 106	0 Gunungsari Dam	Surabaya	В	Weekly	Gunungsari Dam
3	4 110	0 Ngagel Treatment	Surabaya	В	Daily	Near intake of water supply treatment plant
3	5 120	0 Petekan Bridge	Mas	С	Monthly	Downstream of Surabaya
3	6 28	0 Wonokerto Bridge	Lesti	С	Monthly	Upstream of Sengguruh Dam
3		O Sengguruh Dam	Lesti	С	Monthly	Sengguruh Dam reservoir
3	8 57	0 Bendo Gate	Ngasinan	С	Monthly	Downstream of the Ngasinan river
		00 Lembu Peteng	Ngrowo	С	Monthly	Tulungagung
 		0 Plandaan Bridge	Ngrowo	С	Monthly	Between Tulungagung Gare and the Brantas river
<u> </u>		O Campurdarat Bridge	Parit Agung	c	Monthly	Campurdarat
—		20 Mergayu Bridge	Parit Raya	c	Montaly	Upstream of the Ngasinan river
1		0 Kendal Bridge	Tunnel Entr.	c	Monthly	
		50 Selorejo Dara	Konto	c		Downstream of Selorego Dam reservoir
1		70 Kayen Bridge	Konto	c		Upstream of joining the Brantas river
		10 Bening Dam	Widas	c		Bening Dam'reservoir
		00 Karangsemi Bridge	Widas	C		y Middle of the Widas river
<u> </u>			Widas	c	Monthl	
		10 Lengkong Bridge		c	Monthl	
-		30 Beng Confluence	Beng	c	Weekly	
\vdash		10 Jetis Bridge	Marmoyo			
<u>L</u> :	51 26	00 Perong Bridge	Porong	С	Monthl	y In Porong

Source: PJT

Table A3-3 Industries Monitored by PJT and PROKASHI in The Brantas River Basin

so.	Name of Industries	PJT	PROKASIN	Locations	Productions	Rivers		P/I	aler Quality (A	nacal Ave. 19	prokasih	
	1 martin martin m. m. m. 1974 (n. 111 (m. 2)	121		F14-MAN1-3	7.1.00(10)33		Discharge	800	Poliution Losd	Discharge	BOD	Politation Load
1							(m3/day)	(mg1)	_akaidwk	(m3:day)	(mg i)	– £.033 –_⊈kaldusk
	PT.Timur Megah Steel	*	_*_	Gresik	Steel	Tengah River	3,372	149.2	503	7.068	0.4	
\dashv	PT.Buey Chie	<u>*</u>	<u>*</u> -	Gresik	Textile dycing	Sarabaya River	14,400	170.4	2,453	14,400	72.3	1.04
+	PT.Surabaya Mekabos	_ <u>*</u>	*	Gresik	Carioon(pager) MSG	Tengah River	120,000	237.7	28,524	106.999	50.4	5.31
+	PT.Miwon Indonesia	*-	*	Gresik Gresik	Paper	Surabaya River	432,000	41.4 842.8	10,938 364,103	326.018 367.999	1.235.0	402,63
-+	PT.Surya Agung K. PT.Surya Sosra Kencona	<u>*</u>	<u>*</u>	Gresik	Tea	Surabaya River Tengah River	4,800	L.019.5	4,594	307.999 8,430	33.0	25,43
	PG Jombang Baru	_ <u>*</u>	*	Jombang	Sugar	Imigation Canal	16,500	157.0	3,142	15,528	28.9	4
	PG Mrican	*	*	Kediri	Sugar	Imigation Canal	3,600	533.5	1,921	7,169	201.8	1.4
	PG Ngatirejo	*	*	Kediri	Sugar	Irrigation Canal	39,600	678.5	25,868	128.448	56.6	7,27
	UD Sumberrejo	*		Kędiri	Yapieca	Inigation Canal	207,360	3,358.3	696,381		-	•
· · · · · · · · · · · · · · · · · · ·	PT.Gudang Garam	*	*	Kediri	Cigarene	Imigation Canal	60.658	133.5	8,126	43,872	36.4	1.59
· ŀ	PT.Sun a Zig Zag	*	*	Kediri	Paper	Brantas River	58,920	117.8	6,940	55.270	38.5	2,17
13	DIN Pemoi Hewan	*		Kediri	Slaughter-house	Brantas River	4,147	604.3	2,506	•		-
1.1	PT.Eureka Aba P	*	*	Mejokeno	Wrapping Paper	Porong River	60,000	1.364.8	\$1,890	130,999	836.8	109,63
15	FG:Gempol Kerep	*_	*	Mojekeno	Sugar	Mannoyo River	23,040	30.1	694	22,433	66.8	1,49
16	PT.Ajinomoto	*	*	Mojekena	MSG	Brantas River	230,400	25.8	5,951	223,601	58.1	12,99
	PD:Aneka Kimia	<u>*</u>	<u>*</u>	Mojokano	Alcoho!	Brantas River	14,490	989.0	14,242	13,320	2,567.0	34,19
	PT.Pakerin	*	*	Mojokeno	Paper	Porong River	432,000	617.1	266,566	435.001	82.8	36.10
_	PT Penamas	<u>*</u> -		Malang	Cigardite	Imigation Canal	4,14?	197.1	817	-	•	
	PG Krebet Baru	<u>*</u>	*	Malang	Sugar	Imigation Canal	154,848	158.0	23,461	(1.993	17.8	33
	PT.Intaf	<u>. *</u> .	*	Malang	Tapicca	Lesti River	27,624	1,507.9	41,655	(1,717	90.3	1.05
_	PG.Kebon Agung PET. Babi Jimbe	*	*	Malang Blitar	Sugar	Irrigation Canal Brantas River	93.312	334.6	31,219	108.144	98.5	10.65
	PT.Sumber Tani	*		Malang	Cattle Breeding Tapioca	Lessi River	62,208	3,712.6 1,766.3	230,956 41,061	47,395	963.0	45.64
	PT.Sumber Timur	*	*	Malang	Таркоса	Lesti River	24,137	1,367.8	33,014	6,696	245.3	4,99
	PT. Loces	*	*	Malang	Tapiona	Metro River	41,472	2,145.2	88,965	- 0,090	143.3	• • • • • • • • • • • • • • • • • • • •
	PT Kebalen Timur	*	*	Malang	Tanned leather	Brantas River	912	193.2	176	1.174	55.4	
	Pem Hewan Malang	*	*	Malang	Staughter house	Brantas River	566	2.304.7	1,305	1.231	136.9	16
29	PG.Lestari	*	*	Nganjuk	Sugar	Irrigation Canal	3.686	252.9	932	28.800	197.8	5,69
30	PT Jaya Kentas	*	*	Nganjuk	Paper	Widas River	67,200	400.8	26.932	275,016	155.8	42,84
31	PT.Tjiwi Kimia	*	*	Sidearjo	Paper	Mangelan Canal	840,000	5125	430,493	847.200	218.8	185.36
	PT.Sido Makmur	*		Sidoarjo	Tofu	Sorabaya River	1.560	2,112.0	3,295	-	•	<u> </u>
	PT.Supama	*	*	Surabaya	Рарег	Surabaya River	334,472	140.7	18,913	111,952	23.4	2,62
	PT. Tahu Purnomo	*	*	Surabaya	Tofu	Surabaya River	960	2.002.3	1,922	7.034	1,887.2	13,27
_	PT.Taho Gunungsari (Legowo)	*	*	Surabaya	Tofu	Surabaya River	612	1,328.8	813	874	247.0	21
-	Pen Hewan KMS	*	*	Surabaya —	Slaughter-house	Surabaya River	365	1,069.7	390	480	379.1	18
	PT.Setia Kawan PG.Mojopanggung	*	*	Turungagung	Wrapping paper	Brantas River Irrigation Canal	72,000	1,457.5 83.0	33.232 5,979	25.994 137.866	541.6 190.3	14.07 25,2
_	PET.Babi Batoan	*	*	Turungagung	Cattle husbandary	Brantas River	1,920	1,222.4	2.347	151.800	. (30.3	29,23
40	PT.Surya Pamenang	*	*	Kediri	Paper	Brantas River	144,000	334.7	48,195	144,000	107.3	15.45
41	PT.Eka Mas Fortuna	*	*	Malang	Paper	Lesti River	192,000	461.6	68,621	41,160	260.0	10,70
42		-	*	Mojokeno	Pig hosbandary	Sadar River				20.100	276.8	5,56
43	PT Jayantara Sakti	j	*	Mojokeno	Cartor	Sadar River	-		 	1,930	174.8	33
	PT.Spindo		*	Surabaya	Steel pipe	Tengah River	-	-		3.372	1.6	
45	PT, Wastra lodah	i	*	Malang	Textile	Brantas River		-		3,799	21.2	
46	L		×	Sidoarjo	Pig husbandary	Surabaya River	•	•		125	517.3	
	Petemakan Sapi	1	*	Sidoarjo	Cattle husbandary	Surabaya River	<u> </u>	-	<u> </u>	120	238.7	
<u> — </u>	PT Java Paper Indo		*	Mojosari	Paper	Sadar River	<u>:</u>	-		19,500	265.3	5,17
⊢	PT.Gawe Rejo	<u> </u>	*	Surabaya	Sock	Surabaya River	ļ	:_	ļ :	1,195	46.0	
h	PT Halim Jaya	 	*	Surabaya	Tofu	Surabaya River	<u> </u>	ļ <u>. </u>	<u> </u>	2.376	735.7	1,74
	PT Bintang Apollo		*	Surabaya	Dyeing Coeffood Pos	Surabaya River	 	 	ļ	1.156	16.8	
_	PT Kedawung Setia	<u>!</u>	*	 	Cardboad Box	Surabaya River	 	 		681	28. 2 1.0	
	PT.Kegaung Setia PT.Sama Jaya	-	<u>*</u>		Enamel Ketchup	Surabaya River Surabaya River				2.115	229.4	
$\overline{}$	PT_Mta Prima Canna	<u> </u>	 * -	 	Leather	Surabaya River	 	 	 		229.4	
—	PT.Sumber Baru	 	*	+	Dyeing	Surahaya River	 	<u> </u>		-	<u> </u>	
1	PT.Sumber Agung	 	*	 	Dycing	Surabaya River			 	117	238.7	
_	PT.Wijaya Indonesia Makumur	i	*	† <u>-</u>	Cacting	Surabaya River		i	 	961	5.3	
_	PT Kasin	i -	*	Malang	Tanning	Brantas River			<u>-</u>	1,440	166.8	2
⊢	PT.Usaha Leka		*	Malang	Leather	Brantas River	 	-	-	2.006	255.3	5
— —	PF Meries	<u> </u>	*	Mojokento	Textile	Sada River	 	-		26,400	252.0	6.6
	PT Kuda Mas Indah		*	Kedin	Paper	Brantas River		-	•		-	-
<u>. </u>	PT.Pagina Cita	 	*	Malang	Leather	Brantas River	!		-			-
-	PT.Surya Kencana		*	<u> </u>	Pig husbandary	Brantas River	-	· ·		1.354	643.4	. 8
64							— —	•	T	1100	A2.2	
_	PT.Nasional		*	-	Ruber	Brantas River		•		0.106	93.3	1
-	PT.Nasional Average	<u> </u>	<u> *</u>	1	Ruber	Branias River	95.214		65,42		275.1	<u></u>

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Source: PFF-PROKASIH Annual Report in 1996,1997

Note: 13 * Monitoring Factories
: 23 As of 1997, PET Babi Butoar(NO.59) was closed.

Table A3-4 Foundation Of PROKASIH

10° 1 V	BBLH	Sector Bureau	Private	Local Government	Total
Fiscal Year	(*10^3 Rp/year)	(DPU Cipta karya) (*10^3 Rp/year)	(*10^3 Rp/year)	(*10^3 Rp/year)	(*10^3 Rp/year)
1989/90	-	-	-	-	0
1990/91	30,000	-	-	-	30,000
1991/92	54,000	613,198	250,000	-	917,198
1992/93	80,000	382,000	250,000	±	712,000
1993/94	100,000	400,000	250,000	-	750,000
1994/95	125,000	735,120	300,000	-	1,160,120
1995/96	148,000	2,270,000	300,000	-	2,718,000
1996/97	155,000	2,350,000	300,000	1,325,000	3,825,000

Source: PROKASIH annual report 1996/1997 Note: 1)The foundation are not all for the Brantas river basin.

²⁾ The foundation are not all for the Diamas river pasin.
2) The foundation includes the cost for administration, sampling of water, laboratory analysis, training of staff, data arrangement and examination, supports for river cleaning activities, river bank ordering and catchment area greening.
3) Private means PJT.

Table A3-5 Water Quality of The Reservoirs and The Rivers

			Ĺ	्रा	ा	7.6	ਨ੍ਹੀ	2.2	7.1	6.2	7.	2	2	2	ठ्रा	श्र	ल्ला	z I	3	-	ত্র		ı
Rivers	Konto River	1	7/8/1/661	17:30	23.0		203				0.41				0.09	0.75	0.03	0.23	0.024		(0.25)	•	
Riv	Lahor River	•	9/8//661	16:00	27.5	7.8	286	7.6	19.3	6.2	1.13	12	14	122	0.03	0.13	0.03	0.23	0.06	0.039	(0.25)	•	
	Dam.	Sm	1997/8/7	16:15	24.0	7.3	253	6.1	10.9	5.9	2.26	14	12	109	0.09	0.12	0.04	0.33	0.072	0.007	(<0.05)	4	
	Selorejo Dam	Ē	1997/8/7	15:55	24.5	8.2	263	8.4	15.8	6.9	3.07	14	8	104	0.03	0.08	0.04	0.23	0.075	0.007	(<0.05)	0.1	
	Dam	20m	9/8/1661	14:45	26.5	8.0	222	3.4	6.5	5.3	1.62	12	8	35	0.05	0.03	0.02	0.25	0.067	0.008	(<0.05)	,	
	Lahor Dam	<u> </u>	9/8/1/661	14:30	27.5	8.4	211	9.9	15.8	7.4	3.39	12	10	93	0.07	0.02	0.02	0.27	0.047	0.012	(<0.05)	0.5	
	Dam	5m	1997/8/7	12:00	26.5	7.3	253	3.4	4.4	6.5	1.21	78	34	118	0.15	0.78	0.27	0.19	0.208	0.017		,	
	Lodoyo Dam	æ	1997/8/7	11:30	27.0	8.2	263	3.1	5.3	6.4	1.21	99	28	139	0.11	90.0	0.02	0.17	0.148	0.012	(0.5)	0.5	
Reservoirs	Wlingi Dam	E I	1997/8/7	10:45	27.5	7.2	326	3.3	5.7	4.3	2.42	8	22	137	0.11	0.72	0.17	0.1	0.146	0.01	(0.15)	0.5	
LE LE		25m	9/8//661	14:20	27.0	6.7	331	4.2	7.7	5.2	4.04	7.	12	141	0.05	0.08	0.02	0.23	0.052	0.008		•	
	Dam	10m	9/8//2661	14:00	27.0	8.1	338	5.5	12.5	6.1	0.93	12	01	124	0.05	0.75	0.02	0.23	0.047	0.005		•	
	Sutami Dam	Sm	9/8/1661	13:45	27.5	83	341	3.8	7.7	9.2	1.29	12	01	141	0.05	0.62	0.02	0.25	0.082	0.005	(<0.05)	•	
		æ.	9/8/1661	13:30	28.0	8.3	340	3.2	6.9	6:9	0.81	18	16	143	0.07	0.14	0.02	0.31	0.049	0.005	(<0.05)	1.5	1
	ıh Dam	# 4	9/8/1661 9/8/1661	9:30	25.5	7.0	373	4.1	8.5	6.4	1.20	12	8	161	0.03	0.87	0.28	0.29	0.093	0.058	(0.24)		
	Sengguruh Dam	lm	9/8//661	9:15	26.5	7.0	382	4.7	9.7	5.2	6839	12	01	162	0.05	0.84	0.12	0.31	0.186	0.044	(0.18)	1.0	
	Units	Depth from the surface			υ		mpos/cm	mg/l	mg/l	mg/l	mg/1	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	l∕g⊯	l/gm	mæ/i	,	Æ	
	Parameters		Date	Time	Water Temp.	Hd	EC	BOD	COD	OCI	λď	SS	VSS	T-HARD	N-4HN	NO3	NOS	Z-F	T-P	PO4		Transparency	A

Note: 1) () of PO4 and COD were analyzed by using a handy instrument, the Kyoritsu Chemical-Check Lab., Crop. 2) Water samplings were conducted on August 6th and 7th, 1997

Table A3-6 Results of Water Quality Survey in the Rivers and Canals by The Study Team with PJT

2	1 000000	River or Canal	Date	ΤW	Color	Water Flow	Hd	00	BOD	8	SS	N-L	T.P	EC	Remarks
<u>.</u>	100000			Ę		(m3/s)	3	(l/gm)	(mg/l)	(mg/l)	(l/ầm)	(l/gm)	(mg/l)	_	
-	Mainten Vac Magazian	Brantas river	8/16/97		- Yellowish brown	0.09	7.8	9.9	4.9	8.1	7	0.31	0.143	449 N	449 Near Intake of PDAM
9 0	Do 1 Mailaine Mar Landons	Brantae river	8/16/97		Reddish brown	43.2	7.8	6.5	16.1	36.4	9	0.15	0.133	439	
2 2	B-2 [Nojoken Nec. Lenghong	Voor canal I	26/91/8	'	- Reddish brown	9.1	6.7	n.a.	45.5	78.1	12	0.61	0.122	767	
, ,	V-2 Sidoardio Kec Miriprowo	Voor canal II	76/91/8	•	· Reddish brown	6.1	7.8	6.4	\$4	9.4	0	0.23	0.132	444	:
1. 67	V-3 Sidoardio Kec.Miriprowo	Voor canal outlet 8/15/97	8/15/97	29.5	29.5 Reddish brown	3.5	7.8	3.6	10.6	21.4	co	0.33	0.126	946	
Σ	M-1 Sidoardio Kec.Penambangan	Mangetan canal	8/15/97	29.0	29.0 Yellowish brown	2.4	7.3	0.7	17.4	45.7	91	0.89	0.126	% %	
∑	M-2 Sidoardio Kec. Kemasan	Mangetan canal		30.0	30.0 Yellowish brown	1.9	7.3	6.1	7.6	15.0	0	0.80	0.120	701	\$
X -3	M-3 Sidoardio Kec.Gedangan	Mangetan canal 8/16/97	8/16/97	31.5	31.5 Yellowish green	1.6	7.3	4.4	11.7	28.3	36	0.87	0.187	630	
2	R-1 Sidoardio Kec.Sidomulyo	Pelayaran canal	8/15/97	31.5	31.5 Light green	1.1	7.3	23	12.4	26.7	84	0.57	0.122	752	
R-2	R-2 Sidoardio Kec. Tawangsari	Pelayaran canal	8/15/97	29.0	29.0 Light green	6.0	7.2	1.8	12.9	27.5	0.	0.84	0.160	Z 707	704 Near Intake of PDAM
. K	R-3 Sidoardio Kec. Ngelon	Pelayaran canal	8/15/97	27.5	27.5 Light green	0.7	7.1	1.2	12.1	34.7	9	0.61	0.146	748 N	748 Near Siphon
P. 1	P-1 Sidoardio Kec Tanik	Porong canal	8/16/97	29.5	29.5 Reddish brown	1.2	7.3	3.6	16.1	31.5	9	0.82	0.199	4.	: : : : : : : : : : : : : : : : : : : :
2	P.2 Sidoardio Kec.Prambon	Porong canal	8/16/97	31.0	31.0 Light green	6.0	7.5	38	5.0	17.0	2	4.0	0.190	474	
3	P-3 Sidoardio Kec.Krembung	Porong canal	8/16/97	31.0	31.0 Yellowish brown	0.5	7.9	4.7	15.4	39.7	32	0.82	0.207	484	
4-4	P-4 Sidoardio Kec.Mindi	Porong canal	8/16/97	31.5	31.5 Yellowish green	0.1	8.4	10.4	9.3	23.4	85	44	0.194	464	
T-1	T-1 Sidoardio Kec, Tambak Sumur Buntong canal	Buntong canal	8/16/97	27.5	27.5 Grayish green	0.3	7.5	4.3	12.1	21.82	2	2.83	0.775	1.082 N	1,082 Nem Intake of PDAM
6	O-1 Sidoardio Kec. Pepe	Pepe canal	8/16/97	27.0	27.0 Yellowish green	0.01	7.1	1.7	17.6	37.17	38	5.43	0.653	1.202 N	.202 Near Intake of PDAM
1	F-1 Sidoardio Kec.Cemandi	Near fish ponds	26/9/8	1	- Yellowish brown	1.8	7.6		9.3	12.1	254	0.66	0.735	<u>Z .</u> .	Near Fish Pond
F-2	F-2 Sidoardjo Kec.Cemandi	In fish pond	8/6/97	1	- Yellowish brown		8.1		14.3	28.2	118	1.19	0.449		In Fish Pond
Į.	K-1 Surabaya Kayoon	Mas river	8/15/97	29.5	29.5 Yellowish green	3.2	7.3	2.3	6.2	9.3	14	0.35	0.143	N 606	909 Near Intake of FOAM
	Note: 1) Water flow is measured by means of float method by the Stady Team.	d by means of flo	at method	by the	tady Team.										

Note: 1) Water flow is measured by means of float method by the Stady Team 2) Water quality is analyzed by the labolatory of PJT.

(3)

Table A3-7 The Water Quality Standards of The East Java Province

	_						er Quality Stan	 	I =	
	F	annoters	Unit	Ct.	is A		8 8 as	Class C	Class D	Class 1:
···				Maximum recommended	Maxinum allowed	Maximum recommended	Maximum allowed	Maximum content	Maximam content	Maximun çontene
FHYSICS	١.	Тетреплите	C	Normal water temperature	Noninal water temperature	Normal water temperature	Normal water temperature	Normal water temperature +20	Normal water temperature	Normal was remperate +-5C
į.	2	Color	Pt.Co's Scales	5	50				1000-2500	<u>.</u>
ŀ		Smell		No smell	No smeli					
ŀ		Taste		No taste	Notasse	· · · · · · · · · · · · · · · · ·		}	 	<u> </u>
.		Turbidity	mg 1 Sio2	5	25	 		ļ		
ŀ		Amount of dissolved solid matter	mg·l	500	1.500	500	1.500		1000-2500	5,000
ŀ		Electric conductivity	n/pos/cm		1		100	2,000 150-400	1750-2250	37,000
		Pil	114:875-511	6.5 8.5	6.5 8.5		6.8.5	6.9	6-9	6-9
}		Calcium (Cz)			200	6.8.5	0.3.	0.9		
}			n'g'l	75	·			 	ļ-—	
}		Magnesium (Mg)	mg'l		150	ļ <u> </u>		.	ļ	<u> </u>
1		Barium (Ba)	mg1	0	0.05	0	<u> </u>	ļ	 	 -
-		Iron (Fe)		0.1	ļ <u>;</u>	1	5			10
ŀ	5.	Manganese (Mn)	mg'l	0.05	0.5	0.05	0.5		2	5
}	7.	Copper (Cu)	mg i	0	<u> </u>	0	lt	0.02	0.2	5
1	8.	Zinc(Zn)	ng"l	0	5	0	55	0.02	<u> </u>	15
		Hexavalence Chromium(Cr)	mgT	0	0.05	0	0.05	0.05	0.5	2
		Silver (Ag)	mg/l		L	ļ <u>.</u>		0.03	ļ	ļ
,		Cadmiura (Cd)	mg'l	0	0.01	0	10.0	0.01	0.01	0.1
ļ		Mercury (Hg)	<u>ოგქ</u>	0.0005	0.001	0.0005	0.001	0.02	0.005	0.005
ļ	13.	Lead (Ft)	mg1	0	0.1	0.05	0.1	0.03	I	5
	14.	Arsenie (As)	mg i	0	0.05	0	0.05	l l	1	!
	15.	Sclenium (Se)	mg1	0	0.01	0	0.01	0.05	0.05	0.5
	16.	Cyanide (CN)	mg1	0	0.65	0	0.05	0.02	j	1
	17.	Sulphide (S)	თვ1	nil	nil	rál	nd	0.002)
	18.	Fluoride (F)	mg T		1.5		1.5			15
	19.	Chloride (Ct)	mg/l	200	600	200	600			2,909
	20.	Sulphate (SO4)	mg i	200	400	200	400			1,000
	21.	Ammonia (NH3)	mg 1	lia	Bil	0.01	0.5	0.02		
	22.	Natrate (NO3)	mg:1	5	10	5	10	10		
	23.	Nitrite (NO2)	mg1	Bil	nil	uŋ	lin.	0.06	T	
	24.	Phosphate (PO4)	mg/l		1			0.5		Ī
	25.	Free CO2	mg/l	1	ļ			12	1	
	26.	Fluoride	mgl					1.5	T	1
	27.	Free Chlorine (CI2)	mg1	T	_			0.003	İ	
	28	Organic matter	mg1.KMcO4	0	10	0	10	1	T	1
	29.	Dissolved oxygen (DO)	nigi	<u> </u>		<u> </u>	 	T		>-2
	30.	Biochemical Oxygen Demand(BOD)	mg1	1	T	1	6	ļ		T
	!	Chemical Oxygen Demand(COO)	กเลา		1	1	10	1	T	T
	_	Negatively ionized detergent	mgl	0	0.5	0	0.5	0.2	1	1
		Fernel	mg1	0.001	0.002	0.003	0.002	0.001	†	
		Oil and fat	mg)	nit	nii	ni	nit nit	1	†	19
-	-	Extract of Chloroform Carbon	ng1	0.04	0.5	0.04	0.5	·	 	1
		PCB	mg1	nit	nil	nit .	nil .	nit	t	1
		Nickel (Ni)	mg1	· ·	1	† 	†	<u> </u>	0.5	5
		Cobalt (Co)	mg l	<u> </u>	 	 	 		0.2	t
	⊢-	Boric (B)	mal	 	- 	-	 	1	1	·
		2 N2	% Sodium	†	 -		<u> </u>	·	60	
		Sodium Absorption Ratio (SAR)	92	1	·	· · · · · · · · · · · · · · · · · · · ·	 	· · · · · · · · · · · · · · · · · · ·	10-18	t
	1	Residual Sodium Carbonate(RSC)	mg1	 	}		t	 	1.25-2.5	
3.MICROBIOLOGIC	-	Collidorn group	MPN/100ml	na	nil	- 	19.000	29,000	1.25.2.5	
Jnekonioloode	2.	Colliforn feces	MPN/100mi	+	- nn	 	 	+	-}	
			 			 	2,000	4,000		
	3.	Parasitic germ	} :-	nil	lia eil	 	 	ļ	1	+
		Pathogenic germ	1	nil .	lia	 		1	1 202-	
RADIOACTIVITY		Total of Beta activity	IC1	 		-	100	-	1.000	
l	2.	Superium 90	pCv1			4	2		13	_
	3.	Radium-226	pCt1		<u> </u>		<u> </u>		3	1
SPESTICIDE	ŧ.	Pesticide	mg l	1		กป	лil		នាមី	

Source: THE DECREE OF THE GOVERNOR OF THE PROVINCE OF EAST JAVA NUMBER: 413, YEAR 1987

Note: ** Activity without SP-90 and Ba-226

Table A3-8 Summary of The Results of Survey on Industries by the Study Team

										11/2/		(1/2000)		Remarks	SAME
		Products	Location	Date	Waste Water	Investment Cost	Treatment Cost Discharge	Discharge		7		•	1.		
ģ	Name of incostiles				Treatment	(million Rp.)	(Kp./dav)	(m3/day)	님	BOD	- 1	٠ĺ	[4	
[-	PT Sumbor Pani Ahadi	Starch or sugar from tapioca Malang	Malang	16/1/8	8/1/97 Screening and				4 2	3.6	8.516 5.46	4,236	¥.6.	5 5 6	
•					maturation pond			-	7.4	11040	0.0	500	2 2	104.40	[
F		Same or more from topical	Malano	20/1/8	8/1/97 Screening and	8	908.9	89	4.4	9/5.	1017	700	1.0	9.0	
N	2 Pl.Sumber 1 mur	Staren of sugal from mirror promise	Simple:	:	material and				4.	2,484	6:140	594	33.8	3.0	
					and manner				4.7	1.401	3 272	1,864	8.13	6:3	
- 1			Malana	60/1/0	6/1/07 Companies	900	16,000	801	7.2	46	3	266	96.3	4.5	
~,	3 PT.BM!	Package of Shrimp	Macank	0 11 70	settling process				8.9	537	252	55	14.2	5.13	1
			140 1000	20/1/0	971707 April 20 pood				6.9	38	6:2	386	رم. رح.	5.0	
4	4 Pf.Eka Mas Factory	Paper	twa lang	0/1/2/	See Company				7.4	121	287	192	3.6	0.5	
1				20/10/2					n.a	n.a	ย.ถ	ก.ล	ยู่	n.a Closed	3
v.	5 PET. Babi Suraya Kencana Pig breeding		TOTAL STANKS WELL	1611511					0.0	G .	ก.ล	n.3	D.A	n.a.	
				0.77						101	3.232	2,612	8.5	0.8	
0	6 PT.Setia Kawan	Paper	Tolungagung 1/24/	1/24/91	/9 / Segimentation pond					781	1,632	160	1.9	0.4	
				9					7.2.	30	307	162	0.7	0.9 *b)	
7	7 PG.Mrican	Sugar	Kediri	1//31/97	/y/ sedimentation pond				4	23	ō	8	6.0	0.1	
					and aeration tank				, r	3	<u>@</u>	ક	0.5	6.0	
									7.7	=	24	36	0.7	0.7	
				70000	7.1.0	7 500	000 000	10,800	-	8	188	l	0.5	0.2	
20	8 PT.Suraya Pamenang	Paper	Kediri	1674711	//24/9/ Claimer and biological treatment		200			11	25		9.0	0.1	
[100000	0/4/07	poor acritical poor				4.4	4.4: 84,001: 2	507.757 3	7,594	202.7	0.7	
S.	9 PT.Aneka Kimia	Alcohol distillery (molasses) Mojokeno	Мојокепо	2000	Action point				6.7	.706	3,070	4	26.7	1.9	_
1				50/20/0	page assistance in S EU SCIE	4 (900)		000'9	-	586	066	950	4,	2.2 (*c)	
2	10 PT.Eureka Aba Paper	Pulp and Paper	Mojokeno	16/07/1	Sedimentation point				•	1.505	3.272	478	.: %	2.8	_
			ļ	2012014	Anic acimination with				-;	436	.688	88	215.3	0.5	
П	1 Pr. Miwon Indonesia	Yeast and derivative	Gresik	16/67//	Claurier and					45	129	38	31.3	0.2	
ļ				701410	OVANO Collifian and				8.9	: 	1.471	948	29.	·	
3	12 PT.Suparma	Paper	Seraoaya	À F	Claimed and		1,200,000	15,000		38	ବ	121	6.3	2.0	
					DIOLOGICAL LICALIFICATION	T		I	İ						

Note: 1) Water samples are analyzed by the laboratory of PJT

2) In columns of water quality, upper lines show before treatment and lower lines show after treatment or discharge to the river directly.
3) *a) There are 2 outlets to the river in the industry. One is not by way of treatment plant.
*b) There are 2 inlets to the treatment plant and 2 outlets to the river.
*c) There is another waste water entering into the treated water. The sample was taken after mixture.

Table A3-9 Effluent Standards in the East Java Province

Type of industries												strbij)			
	βł .	BOD	COD	TSS	† Oil & - Grease		Sutricte (H/S)	CN	Cr (Total)	Cu	2n	Ni	1.0	NH4-N	C Others
Pulp and paper	6.9	50-100	120-300	60-100		0.01	0.64		(1(2:1:)		!				10(T-P), 0.01(Chloroform), 17(AOX)
	6.9	100	250	100				:			:	!			
aper	6-9	30-70	70-150	35-70							i				
	6.9	N	150	70											
Alcohol distillery	69	100	300	100			0.5	<u>-</u>			i				l
Ethanol)	69	150	!	300				:							
MSG	6.9	50	150	60					·			;	i	_ 3	
	6.9	80	150	100				<u>:</u>		<u> </u>		:		5	
Sugar cane	6.9	60	100	.0			0.5	1	:			<u>.</u>			
	6.9	60	100	.50			0.5	!	<u> </u>						<u> </u>
Hectroplating	6.9	:		20	-	·		0.2	0.5	0.6		1.0	0.1		0.3(Cr 1, 0.05(Cd)
	6.9			20	!			0.2	0.5	0.6	1.0	1.0	0.1		0.1(Cr^), 0.65(Cd)
Leather tanning	6-9		100-110			ş	0.5 0.8		0.3-0.5					5-10	<u></u>
Caustic soda	6.9	: 13-100	200-250		3-5		0.5-0.8	1	0.3-0.5			!	0.8	5.10	10.5 (C)2)
TREATE SAIR	6.9		:	25 25		-			0.5	1.0	1.0	1.2	0.8		0.5 (C12)
Rubber	69	100	200	100				÷	0.5	1.0	1.0	:1-4		10	10.3 (4.12)
No cocci	6-9	100	200			i				!		¦		10	<u></u>
Textile	69	50	150	50	3.6	1.0	0.3	i	: 1.0	:	<u>.</u>	<u>:</u>		8	*
•	69	50	150	50	3.6	1.0	0.3	i ·	1.0	• • • • •	j	<u></u>			
Urea fortilizer	69	<u> </u>	200	100	20		1		: :-		ì	:			100(T-N)
	6-9	100	250	100	20]		====		·	1		–	50	
Nitrogon familizer	6.9	<u> </u>	200	200	20		İ				•			100	¹ 150(T-N)
i	6.9	100	250	200	20		<u> </u>			<u> </u>	:			100	<u> </u>
Accumulator (Wet)	6-9		30	6	4					0.6	0.4		0.14		1.0 (Fc), 0.2 (Sb)
	6-9		30	6	4		· -	1	<u>; </u>	0.6	0.4	<u>l i</u>	0.14	i	1.0 (Fe), 0.2 (Sb)
(D _(y))	6.9		1	8	2	:		1	0.06		0.2	0.4			0.01(Hg), 0.3 (Mn)
	5-9		<u>i</u>	8	. 2	<u>!</u>	:	<u>l</u>	0.06		0.2	; 0.4			0.01(Hg)_0.3 (Mn)
Paint	6-9	Ļ	80	50	10	0.2	ļ	ļ	i	0.0	1.0		0.3	Ì	02(C4'), 0.01(Hg), 0.03(Cd), 0.4 (Ti)
	6-9	<u>!</u>	80	50		0.2	!	<u>}</u>	1		1.0		0.3	·	0.2(Ce ⁻), 0.01(Hg), 0.03(Cd), 0.4 (Tr)
Pesticide	6.9	25	75	20	į	1.0	ļ	0.8		0.8		<u> </u>		1	0.1 (Benzene), 0.1 (Toluene), 1(Active Materi
	6-8.5	25	75	20		1.0	-	0.8	·	0.8		<u>{</u>		$-\frac{1}{\cdot}$	0.1 (Benzene), 0.1 (Toluene), 1 (Active Mater)
Plywood	69	75	150	75	4	1.0			<u>:</u>		!	<u> </u>		!-	
Nitrise acid	6-9 6-9	75	150	75	-	1.0	<u></u>				 -				
VALUE 9037	5-9	. 80	100	50			 -	 -	;		ł	†		-	
Doiry and hog farm	6-9	100	200	100		 	0.06	 -			 	÷		<u> </u>	
	6-9	100	200	100		ļ	0.06	·		†		<u>-</u>			
Slaughter House	5-9	100	250	100	25	1	1	1	İ	1	<u> </u>	•		25	
	6-9	100	250	T 100	25		i	-	!	İ	T			25	1
Palm oil	6.9	100	350	250	25	Ī				i				20	Ť
	6.9	100	350	250	25	1	— -			111	i	-		20	7
Vegetable oil and	6-9	75	150	60	15)		i			1	1		Ī	10 (PO41), 30 (MBAS)
ScapDetergent	6-9	75	180	60	15		i		ι		<u> </u>	<u>i </u>		<u> </u>	10 (PO4'), 30 (MBAS)
Fish canning	6.9	100	150	30	6.5	<u>:</u>	<u> </u>	ļ	i		!	<u> </u>		1	
	6-9	100	150	30	6.5	}	<u> </u>	ļ	<u> </u>		<u> </u>	<u> </u>			
Cold storage	6-9	100	200	100	30	<u> </u>	 -	<u> </u>	<u> </u>		ļ	ļ			ļ
	6.9	; 100	200	100	30)		 	<u> </u>	<u> </u>	į	1 .			
8eer	6.9		! 120	· 40		<u> </u>	:		 	<u> </u>	<u> </u>	<u> </u>			
147b.	6.9	1 10	120	40		i .			 	1	 				1
M®k	6-9	30	90	25		<u>!</u>	·		ļ	1	 -	:			
Soft drink	6-9 6-9	50	1 90	; 25 i m		·	:	:	1	1	:	:		<u>:</u>	<u> </u>
Section of the sectio	6-9	50	100	30	6 6		1		T	1	<u>-</u>			<u>;</u>	
Coffee peeling, Candy,	6-9	1 35	200	1 100		;·····	<u> </u>		1	i	:	į i		-	
Noodle	6.9	15	200	100		-	† 		+	-		ļ			
Tofu, Soy sauce,	69	75	200		1	<u>:</u>		air ceann			<u></u>	:		<u> </u>	
Tempe	6.9	150	300	1 100			?	·	†	:	Ţ	į		<u>-</u>	4
Fruit and vegetable	6-9	75-85		60	;	:	1	-j — -		$\dot{-}$	T	i		i	- , · . · · · · · · - · - · · · · - · -
processing	69	75-85		60	<u> </u>		ļ	1		Ţ	i	i			· · · · · · · · · · · · · · · · · · ·
Tapioca starch	6.9	100	250	80	1	1	ſ	0.2	1	1	T				1
•	6-9	150	300		ļ	Ţ		0.2	[i	7	-:		: :	·
Риализсоросіа	6.9	100	300	100		1.0	:]	-	——	1			i	30(T-N)
-	6.9	150		130		5.0		<u> </u>		1	<u> </u>			<u> </u>	45(T-N)
	1	 -	160	;	. 15	0.4	0.5	Ī			ī	i		5	
Oil refinery	6-9	. 00			:										

Note: 1) This table shows maximum concentration only.
2) Upper line of each industry is applicable to new industry (including expansion of industry), lower line is to existing industry.
Source: Government Decree No.136, 1994 in East Java Province

Table A3-10 Unit Pollution Load (BOD) of Domestic Waste Water

	Items		Urban area	Semi-urban area	Rural area
1. Water consumption	a manufacture in the second second	Present	190	120	100
rate	(I/cap.day)	2020 forecast	200-250	150	120
2. Raw Pollution load	1) Gray water	Present	30	17	14
	(g/cap.day)	2020 forecast	44	22	18
l:	2) Black water	Present	11	11	11
	(g/cap.day)	2020 forecast	11	11	11
	3) Total	Present	41	28	25
	(g/cap,day)	2020 forecast	55	33	29
3. Pollution load with	1) Gray water	Present	30	17	14
sanitation	(g/cap.day)	2020 forecast	44	22	18
	2) Black water	Present	0	0	0
	(g/cap.day)	2020 forecast	0	0	0
	3) Total	Present	30	17	14
	(g/cap.day)	2020 forecast	44	22	18
4. Pollution load with	1) Gray water	Present	-	-	-
Gappei Johkaso	(g/cap.day)	2020 forecast	9	4	4
	2) Black water	Present	-	-	-
	(g/cap.day)	2020 forecast	3	3	3
	3) Total	Present	-	-	-
	(g/cap.day)	2020 forecast	12	7	7

Note: 1) Increasing rates in pollution load of gray water are as follows

- 1.5% in urban area

- 1.0% in semi-urban and rural areas

2) Water consumption rates are in PDAM service areas. Source: Brantas III Project (revised by the Study Team)

Table A3-11 (1) Industries (Major Producers) in Bumiyau Bridge Sub-basin

Ţ

Γ					Present			2020 Frecast	
	Name of Industries	Products	Discharge	Discharge	Water Quality	Discharge Water Quality Pollution Load	Effluent	Effluent Pollution Load*	Amount of
į			Location		(BOD mg/l)	(BOD kg/day)	Sundard(mg/l)	(BOD mg/l) (BOD kg/day) Standard(mg/l) (BOD kg/day) Decrease(kg/day	Occrease(kg/day)
F	1 Dr Kobalon Timur	Tanning	Branyas river	ĺ		921	75	3	80
-'c	Dam Howing Malang	Clauchter house	Brantas river		2304.7	1,304	8	57	:.248
4.6	OF Waster Tadeh	Toytor	Brantas river	3.799	4	81	50		0
-	Dr. Daging City	Tanning	Brantas river		r. u	ກຸກ	75	เลา	יקי. עיים
1	r i ragina cha	9				95 !		206	356.
	1007								

Note: Pollution load* is caluculated on the assumption that industries will attain the effuluent standards by 2020 Source: PJT

Table A3-11 (2) Industries (Major Producers) in Demangan Bridge Sub-basin

				_	Freschi			10707	1	- 1
- 5	Name of Industries	Products	Discharge	Discharge	Water Quality	Pollution Load	Effluent	Pellution Load*	To Junomy	
}			Location	(m//day)	(BOD mg/l)	(BOD mg/l) (BOD kg/day) S	Standard(mg/l)	Standard(mg/l) (BOD kg/day)	Decrease	2.7
Ĉ	Pahi limba	Catalo brooding	Brantus river	62.208	3.712.6	230,953	301	6,22	224.733	
11.	Loud Janier	2		2000		1030.000		06.7	224 233	r
	Total			97.70		CCK10C7		4.44	2011	_
			1000 to 1000 t		After Land of China	ACCOUNTS TO TO				

Note: Pollution load* is caluculated on the assumption that industries will attain the effuluent standards by 2020 Source: PJT

Table A3-11 (3) Industries (Major Producers) in Jogbiru Bridge Sub-basin

					Present			2020 Frecast	
Ş	Name of Industries	Products	Discharge	Discharge	Water Ouglity	Pollution Load	ង	Pollution Load*	Amount of
<u>.</u>			Location	(m/day)	(BOD mg/	(BOD kg/day)	tanda	(BOD kg/day)	Decrease(kg/day)
1	PT Sumberreio	Tapioca		207,360	3,358	696,377		31.104	665,273
, C	PG Neadireio	Sugar	(rrigation canal	39.600	678.5	26,869	İ	2,376	24,493
1 (1	DC Magan	Sugar	Irrigation Canal	3,600	533.5	1.921	i	216	1,705
.	4 PT Cudana Camm	Cigarette	rriestion canal	60.888	133.5	8,129	ļ	1,827	6,302
ľ	T Surva Zio Zao	Parer	Brantas river	58.920	17.8	6,941		5,892	1,049
, <u>v</u>	S PT. Surva Pamenang	Paper	Brantas river	144,000	334.7	0 334.7 48.197		14,400	3.
7	T. Kuda Mas Indah	Paper	Brantas river	n.a.	7.2	n.a.	100	D.a.	
	Total			514,368		788,432		55.815	732,618

Note: Pollution load* is caluculated on the assumption that industries will attain the effuluent standards by 2020 Source: PIT

Table A3-11 (4) Industries (Major Producers) in Canggu Bridge Sub-basin

L					Present			2020 Frecast	*
2	Name of Industries	Products	Discharge	Discharge IV		Vater Quality Pollution Load	Effluent	Pollution Load*	Amount of
:			Location			(BOD kg/day)	Standard(mg/l)	(BOD mg/l) (BOD kg/day) Standard(mg/l) (BOD kg/day) Decrease(kg/day	ecrease(kg/day)
	1 PT A inomoto	MSG	Brantas river	230,400	25.8		08	5,944	0
• • •	PD Apeka Kimia	Alcohol	Brantas river	14,400	0.686	14,242	150	2,160	12.082
	Peternokan Bahi	Pig hishaneary	Surahava river	125	517.3	65	8	3	52
	A Peternakan Sani	Carrie hijshandary	Surahava river	120	238.7	28	001	12	17
L	Total			245,045		20,279		8.129	12.150

Table A3-11 (5) Industries (Major Producers) in Karangpilang Sub-basin

dustries	Discharce	Discharon		Water Quality Pollution Load	Effluent	Pollution Load*	Amount of
cornego							
	Location .	(veb//m)		(BOD kg/day)	(BOD mg/l) (BOD kg/dav) Standard(mg/l)	(BOD kg/day)	(BOD kg/day) Decrease(kg/day)
	3		7	3000	95	234	3.061
PT Sido Makmur	Surabaya river	200.	2,112,0		•	***	
DT U.S. Ohio	Surabaya rive	14.400	170.4	2.454	S.	07/	* C / * I
	Court Parket	120 000	7777	28 524	8	12,000	16,524
	Suiabaya	- 1	-		Vo.	10 030	
4 PT Miwon Indonesia	Suravaya river	≈		-	00	0.2.0	
	Tengah river	4.800		4,894	75	3	4.5.4
Company of the Contract of the	Tongs House			:		0	402
	Dallity Colball 119Ct			:	02		0
	ss Tengah river	₹	2.0		5.	2000	
Or Combany Makabox	Tengah river	120.000	237.7	28.524	3	0007	475.01
31	Tenneh rivor	3 375	-	4	08.	₹	0
	Cingali Haci	1		•	V.	-	
10 PT Kagaing Setia	Surabaya river	2,116	O:	7	?.	1 !	
	Surabaya river	134.472	140.7	18,920	8	3,447	5,473
		ľ		47() XG		508.65	48,25
Total	0.00,000	550,600		70,00			

Table A3-11 (6) Industries (Major Producers) in Ngagel Sub-basin

-				L	Present			2020 Precess	
		Deaducte	Discharge	Discharge	Water Ouality	Pollution Load	Effluent	Effluent Pollution Load*	Amount of
ģ.	Name of Industries	LICONOLIS	1.ocation	(m/dav)	(BOD mg/l)	(m/day) (BOD mg/l) (BOD kg/day) Standard(mg/l) (BC	Standard(mg/!)	(BOD kg/day)	(BOD kg/day) Decrease(kg/day
†	121 Tahu Puraomo	Totii	Surabaya fiver	960	2,002.0	1,922	150	144	\$17.1
-	1		Surabaya river	1,195	46.0	55	30	36	5.
÷		i	Surabaya river	1.166	16.8	82	30	8	٥.
+		1	Surahava river	1	-	38	8	37	354
+ 12	4 FU. Femot, newan Kiwa	Total	Surahava river		1		150	356	1,392
π€			Surabaya river	612	1,328.8	813	150	92	721
ন :	ri.ianu Cunungsan (Legowo)					4,948		†8 9	4.264

Note: Pollution load* is caluculated on the assumption that industries will attain the effuluent standards by 2020 Source: PJT

Table A3-11 (7) Industries (Major Producers) in Pelayaran Sub-basin

				Present		2020 Frecast	
Ž	Name of Industries	Products	Discharge Location	Discharge Water Quality Polluti (m/day) (BOD mg/l) (BOD	ty Pollution Load Effluent Po (BOD kg/day) Standard(mg/l) (E	ilution Load* 3OD kg/day)	Amount of Decrease(kg/day)
1	Dr. Time Viscos	Daner	Mangeran cana	840,000 512.5	430,500 100	84,000	446.500
1	r t. 1 jtwa rannia	12.4		840,000	430.500	84,000	346,5(X)
	LOUI				0000		

Note: Pollution load* is caluculated on the assumption that industries will attain the effuluent standards by 2020 Source: PJT

Table A3-12 (1) Number and Output Value of Industries in the East Java Province

I

		arge	I arge and Medium Scale Industries	dustries	
		-0			
		ŗ	Outent Volus	Output value per	Output value per
Year	Establishments	Density	Output value	Establishment	Area
		(units/km²)	(million Rp./yr)	(million Rp./yr)	million Rp./yr) (million Rp./km²/yr)
1007/05	0000	0.2	15.744.890	1,749.4	355.1
「ハーハハー			CO. CO.	7 000 -	
1995/96	660.6	0.2	16,583,500	1,822.0	
2000		0.0	18 064 241	1.808.6	407.4
/ な/のなべ!		7.	1 2 2	TORKS	0 077
1997/98	10.966	0.5	19,680,623	1./94./	
0/2//					

Source: Provincial Industry Service (DPRIND)

			Small Scale Industries	20	: :
Year	Establishments	Density	Output Value	Output Value per Establishment	Output Value per Area
		(units/km²)	(million Rp./yr)	(million Rp./yr)	(million Rp./ki
1994/95	476.837	10.8	3,343,400	7.0	
1005/06		10.8	3.515.300	7.3	i
1004/07	· · ·	0.01	3 541 664	7.3	79.9
1990/27		11.0	3,679,733	2.7	83.0
2/1/1					

Source: Provincial Industry Service (DPRIND)

Table A3-12 (2) Number and Output Value of Industries in Surabaya

I		Large	and Medium Scale It	ndustries	
Year	Establishments	Density	Output Value	Output value per Establishment	Output value per Area
		(units/km²)	(million RpJyr)	(million Rp./yr)	(million Rp./km/yr)
1980/81	824	3.0	280,025	340	1,022
1981/82	830	3.0	329,198	397	1,201
1982/83	874	3.2	396,623	454	1,447
1983/84	897	3.3	430,478	480	
1984/85	899	3.3	547,018	608	
1985/86	907	3.3	683,635	754	
1986/87	919	3.4	765,574	833	
1987/88	941	3.4	999,140	1,062	
1988/89	1,018	3.7	1,538,725		
1989/90	1,131	4.1	1,944,161	1,719	
1990/91	755	2.8	2,154,091	2,853	
1991/92	770	2.8	2,575,588	3,345	
1992/93	783	2.9	2,934,848		
1993/94	803	2.9	3,309,495		12,076
1994/95	817	3.0	4,463,294	5,463	
1995/96		3.0	4,183,161	5,022	15,264

Source: Surabaya in Figures 1995

			Small Scale Industrie	es	
Year	Establishments	Density	Output Value	Output value per Establishment	Output value per Area
		(units/km²)	(million Rp./yr)	(million Rp./yr)	(million Rp./km/yt)
1980/81	3,784	13.8	62,873	17	229
1981/82	4,594	16.8	95,801	21	350
1982/83	4,747	17.3	108,511	23	396
1983/84	4,954	18.1	123,772		
1984/85	5,173	18.9	137,124		500
1985/86	5,434	19.8	158,439	29	578
1986/87	5,679	20.7	174,296	31	636
1987/88	6,033	22.0	186,420	31	680
1988/89	6,420	23.4	236,255		
1989/90	6,841	25.0	240,645	35	
1990/91	7,537	27.5	432,183	57	1,577
1991/92	7,758	28.3	522,649	67	
1992/93	7,973	29.1	574,382	72	
1993/94	8,326	30.4	702,283	84	
1994/95	8,648	31.6	841,401	97	Tracker or give (Author Red Hall) and state for further hand and warren
1995/96		35.9	908,713	92	3,316

Source: Surabaya in Figures 1995

Table A3-13 Unit Pollution Load (BOD) of Industrial Waste

**

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ISIC	Sub Sector	Unit Waste Water Discharge	Waste Water Quality	Unit Pollution Load
		(m'/day/million Rp/yr.)	(BOD mg/1)	(g/day/million Rp/yr.)
31	Food, Beverages, Tobacco	0.011		
32	Textile, Garment, Leather	0.002	190	:
33	Wood industry	0.003		-
34	Paper, Printing and Publishing	0.003	096	2.88
35	Chemical, Oil, Rubber, Plastics	0.010	092	
. 36	Non Metal Mining	0.027	280	7.56
37	Basic Metal	0.027		
38	Metal, Machine and its Equipment	0.027	280	7.56
39	Other Manufactured industry	0.010	110	1.10
	Average (Weighted)	0.019	482	68.9
,				

Note: 1) ISIC means International Standard Industrial Code

2) Avarage were weighted with following output values per establishment Source: The Study on Urban Drainage and Wastewater Disposal Project in The City of Jakarta, JICA 1991

East Java Province (Large and Medium Scale Industries)

ISIC	Sub Sector	Establishments	Output Value	Output Value per Establishment
			(million Rp./yr)	(million Rp./yr)
31	Food, Beverages, Tobacco	1,714	11,409,612	6.657
32	Textile, Garment, Leather	604	2.859.067	4,734
33	Wood industry	400	1,524,992	3.812
34	Paper, Printing and Publishing	161		12,153
35	Chemical, Oil, Rubber, Plastics	431	2,985,195	6,926
36	Non Metal Mining	328	920.336	2,806
37	Basic Metal	32	1.777.908	55,560
38	Metal, Machine and its Equipment	447	2.035.189	4,553
39	Other Manufactured industry	69	203,047	2,943
	Total (Average)	4,186	25,671,967	6,133

Note: ISIC means International Standard Industrial Code Source: East Java in Figures 1995

Table A3-14 Population of Livestock and Pollution Load (BOD)

Horse	Cows 19,634 1,0634 1,0634 1,06308 1,36,808 1,36,	Dairy Cows Dairy Cows 1,411 1,777 23,798 2,367 2,539 2,539	Carabaos Carabaos 6.826 3.587	Geats	Shoon	Diec	Horses	Course 1	She Grand Charles She	ambaos			13:00	(ke/day) (I	" - And any My man
(km2) Horses 592 592 744 1,156 1,186 1,183 1,148 1,148 1,148 1,148 1,148 1,148 1,148 1,148 1,148 1,148 1,148 1,166 1		Dairy Cows 1,411 1,777 2,3367 5,367 5,367 5,367	Curabaos 6.826 3.587	Goats	Shoon	Diec	Horses			1000	. orte				KE/GRV/KIDE
3,168 1.136 1.136 1.138 1.138 1.148			3,587		Since!	-		1	Ally COWS		CEGE	13315	-		
3.168 3.168 1.156 1.183 1.143 1.143 1.143 1.143 1.143 1.143 1.143 1.143 1.143			6,826										: [091 66	2
3.168 3.168 1,156 1,186 1,183 1,183 1,183 1,183 1,183 1,183 1,183 1,183 1,183 1,183		2	3,587	10 513	10,01	1.886	Ç	12,566	903	4.369	1.951		ν,	101.77	
744 3.168 1,156 1,186 1,186 1,183 1,183 1,183 1,168 1,168 1,168		2	3,587	7 2 2 2	100		19	30.695	1.149	2,296	4.854	1,744	512	50,116	4.70
3,168 1,156 1,138 1,148 64 64 64 64 136		7	1.897	48,542	/**/	1			15 933	1.214	7,660	4 379	629	97.43	70.8
1,156 1,138 1,133 1,148 603 64 603				76.597	43,787	3,143	388	105.70	1000		367.	2636	55.5	52.938	8.57
0.11.03.00 1.18.3.00 1.18.3.00 1.18.3.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0			4.663	54.275	26,246	2.675	48	40,182	1.137	7.784	5.440		· ·	1000	
1,386 1,143 1,143 0,44 0,44 0,44 0,44 0,44 0,44 0,44 0,			4 694	192 130	30 156	2,966	86	70,783	3,435	2,998	12,2131	3.916	Ž.	94.0.53	5
1.183 1.148 sung 8.44 ok 603			4,004	70.00				87.556	1.625	4.264	6,667	6,450	308	109,937	92.9
tung 8.44 ok 603			6,662	96,672	\$	140		2000	3.400	2 068	9.604	2,715	415	580'09	\$23
844 8 603 3 136		ļ	4.637	26,042	27.153	2,075	4	017.0	2000	000	136.4	104	3.13	\$3,250	63.1
agung 8-44 alek 603 136		3.671	1.763	47,644	11.942	15.610	56	40.666	[1	1.128	,			200	30.5
alek 603		1	- 1067	80 612	15.400	233	Ξ	11,814		1,259	8.96	1,541	4	001.53	(). I
136	1	200	2000	71010		-	2	\$ 456	25	24	849	583	0	6,848	50.
	7 8.525	39	SS .	8,480	4.0.4	- j :	213	9100	715:	<u> </u>	1.270	8	9	12,995	6
Pasuman 220 429	15,493	1,117	8	12,697	6,429	72	*	2,71		70000		27.010	176.9	583.589)	52.2
-	Ĺ	14 47.067	36.851	672,211	279.189	31,736	853	427,542	30,123	25,583	177.10	41.3			
Sub-total 11,180 3,017			-	-		-								- 	
(Municipality)		-				: 0		727		204	528	175	0	7.077	15.6
Surabaya 197 36	6 2,105	1,274	319	\$ 279	1,747	> ·	· ·	550	011	1251	146	· 64	Š	1,602	<u>S</u>
191		172	36.	1,457	493	4,542	7	8, 5	200	8	346	756	0	4,458	37.5
	5,703	ļ	154	2,478	2.558	0	× :	3.050	199		Ş	1.70	· c	5.363	. 8
			293	4,023	1.751	0	5	4,430	159	88	200		> <	1093	7.571
Negin 23			29	2.752	1.562	0	=	5,047	114	- <u>5</u>	C/7	<u>.</u>			Ţ
35	1	•	8	15 989	X,151	4,542	4	14,734	1.386	969	285	815	Š	- O	} {
427	ı		24 644	lwc say	787.340	36.278	268	442,276	31,509	24,220	68,820	28,734	7,256	603.711	0.25
Grand Total 11,607 4,075 691,056 49,233 37,844 Ch	5 691,056	56 49,253	- 10 VC	2000	2 1 113										

Source: Jawa Timur Dalam Angka 1990 and 1959, East of Note: Polution load units (BOD) are as follows:

| Unit : BOD g/head/day | Unit : BOD g/head/day | Ones | Dairy Cows | Carabaos | Goats | Sheep | Pigs | 220 | 640 | 640 | 640 | 100 | 200 |

()

able A3-15 Pollution Load (BOD) from Livestock at e	ach Sub-catchment
ole A3-15 Pollution Load (vestock at e
ole A3-15 Pollution Load (D) from Liv
ole A3-15 Poll	Load (BO)
ole A3-15	2
	ole A3-15

I

				3			Pol	otherion Unit (1)	(\$66)	Live	stock Pollution	(1) pror uo)4)
No.	Location	Location Supplements	Ì	Semi-urban	•	Total	Urban	Semi-urban	Rural	Urban	Semi-urban (ka/day)	Rural (ke/day)	Total (ke/day)
				(km)	(km²)	(km ₃)	(kg/day/km²)	(kg/day/km)	(kg/day/km²)! (kg/day/km²)! (kg/day/km²)!	(Kg/day)	(KEGJA)	CKE/Clay	100
Bumiavu Bridge	Malang	0009	0.0		2	201	37.6		2.5	32.6	+	1 845	2 OX1
		100%	3		59.9	8	37.6		30.8	;		020.0	1200
		13020	0.3		287.9	298.3	Ì		Y.O.	100.		600'0	200
		100	25.9		159.6	185.5			30.x			016	200
		B022	60		0.0	10.9	37.6		8.08	ĺ			5000
Kubtota			53.4	-	578.5	631.9				2,007		, X, Z	1000
2. Demandan	Rlinar	18142		7.X	51.2	59.0		173.7			707	4.	60/
Z Cellianigati Di vest		B150		2.2	87.1	93.8		7.3.7	8.54	!	1.17	286	2,100
		1 2 2		0.0	523	52.3		73.7			õ	2,393	2,373
		1		14.6	190.5	205.1					2,533	8,725 35	1,25×
Subforal	1000	9		20	86.6	97.3		84.6			900	5,873	6,776
agoing punggor s	New I	6	1	6	48.5	70.2		6.4%		:	1,838	3,286	5.125
		1						84.6	1		255	4	280
		71.17	1		100	1		¥4.6			38	0	381
		51.5			2.9	7 (1	846	1	}	266	3	8
		13.14		7.5	C & E		1	9 78		!	1.120	068	3,010
		8315		7,2	5/.6	4		2.0	:		134	0000	344
-		0316		٠. د	3.2	4.		2	İ		200	1120	\$ 614
		83.17		1.2	125.5	126.8	1	Ž.	×;/		2 6	1000	27.020
Subcota				0.08	157.1	351.7					4 99	74X.	24,8,13
A Padangan Briefon	Mojoken	8403			23.1	23.1			4.74				ccc I
THE MONIBURY THE PARTY OF THE	and Court	200	 -	,		1.19			4.79			4, 20	07 7
		3 3			27.6	23.6			4.79	 		1,587	1.587
		COC C	-		i k ö	16.0			67.4		-	080.1	0 0 0 1
		92G		-	22.5	76			8,12			177	177
		6.07			0.7	2,74	1		469	-		3,134	3.174
		6510			9:	2			4/9	; 		7,868	7,868
		B511			7.0.7	0 0		į	4.59			4	4.544
		R\$12	****		0.0	2.5			V C4			874	878
		R513		- 1 i	o.	13.0			*****	1	-	12.467	12.467
		B514			185.0	182.0	1	1	5 5		-	2.702	, 70X
		13515	o		.	40.2	57.2		0/0	10	J	201.0	A1 100
Subrota			0		728.6	728.7				0		VO 87	7
5 Canggu Tambangan Mojokert	Mojoken	8619			7.9	7.9			67.4		-	2.0	TOX .
	•	B620			7.3	7.3	;		4.70	- 1		?	,
		8820			0.0	0.0		:	4.70			2	1
Subceral		! !	Ĺ		5.2	15.2					237	1,044	
A. Karangralang	Surabaya			12,0		12.0		50.7	2		36	:	700
6		B622	; 	38.5		38.5		20.		į	2,23		
. 		B623	! !	15.5		15.5		50.2		1	8/1	-	90/
		1624	! !	6.2		6.2		S.			§.	-	3
		B630		7.05		39.7		50.2			400	1 : :	300
		16031	!	9		6.1		20.	F3 5		200		3.5
		8672		20.1		2		 	2		83	;	500.
Subtotal						138.1					0.044		0,7,34
7 Nosoe	Surabaya	(A)X	2.6	6.4	_	0'6	15.6	50.2		4	7.	1	(9)
19.9.		104	0.0			17.8	5.6		2	0	2		C
		3642	33	7.2		10.	15.6	50.2	C1.				100
		18643	1.61	2.7		19.8				607			5
		H644	S			×.	95-1	50.2	2	0 2			200.0
Subtoral		-	28.7	34.2		65.5				C C C	l		17
8 Kayon	Surabaya	-	2				15.6		-	/v.	Ī		₹. 3
		B646			† _j	Ç.,	3.61			30		:	. 6
Subtotal			~~	-		9-		6.8			54.		95.
9 Pelayaran	Sidoardjo			1.0		200		14			61		01
10 Perceng	Sidoardo					3		-					

Table A3-16 Domestic Pollution Load (BOD) produced in each Sub-catchment (1994)

Burniayu Bridge Malang 10001 100	<u> </u>	97.006 97.006 97.006 152.921 64.2.161 152.921 64.2.161 15.2.921 15.2.921 15.2.921 15.2.921 17.7.749 17.7	33,521 28,278 1,55,908 75,331	13,521 55,283 196,875	(kg/day)	(kg/day)	(kg/day) 838 707 3,398	(kg/day) X3X 2.224	(5) 33 SS 53 SS	(46) (46)	(kg/day) 55; 0 55 1,295 55 2,131	day) (kg/day) 0 1,293 2,131 5,345	(kg/dny) 635 536 2,575	63.77.0 6.777.0
Malang Kediri Kediri	<u></u>			13,521	1,517		3,398	2.224	888		55 55 2 5.1	\$	2,575	6.77 6.77 6.77 6.77
Malang Kediri Kediri				65.283 196,873	1,517		3 398	2,224	55		55	¥ 3.4	2575	4 70 77.0 7.7.0
Kediri Kediri				196.875	900		3 308		35	_	7.7		1.428	6.77
Blitar Kediri Mojoken				, 630 000			100	7,637					07	6
Biltar Kediri Mojokett					0.0 4		N.C	8,153	25		1			
Bittar Kediri Mojokett			0	707,077	2,472		ō	2.633	55		7	4.	2	1
Bilter Kediri Mojoken				42.7	0.007	-	958 9	9 745	555		551 11.01		7 72	e o
Blitar Kediri Mojoken			273,038.	3XX, 40	7,713	1508	CX	1.627		4	S	3	φ ξ.	€
Kediri Mojokett			5. 72.845	01,010		- 69	1 30X	2,090		44	9	4	(20°)	1
Kediri Be Mojoken			55.918	40.04		100	1000	05.8		84	9	0	617	5
Kediri ge Mojoken		<u>. </u>	33,545	33.545	1	5 200	3,000	4 556	-	. 2	ક	1 004	2,250	
Kediri Be Mojokett			122,307	175,801	-	, 46.78	1000	200		150	3	834	1,513	
Mojoken		<u> </u>	16 82 202	121,398		.007	2,0551	3,130			! ! !	×69	×46	2.54
Mojokert			45 908	125.747	-	2,233	1,150	1.08		+ 15	3 5	73%	•	či
Мојокен			377	853 1	•	310	2	322	-	j	3.5	26	c	
Мојокен			6/4 (A)	21.5	1	462	0	462	į	10	3	1 c	ء ٔ ہ	
Mojokert	2888 × 200 × 20		2	2000	:	123	121	335		19	ç.	7	N 100	15
Mojoken	10 0 c 5 3 8 8 6;		6/4	200		170	17.75	2.022		61	g,	75.0	3	3 .
Mojokert	2 × 3 × 3 × 5 × 5 × 5 × 5 × 5 × 5 × 5 × 5	<u> </u>		75,0.99	1	100		366	-	9	8	511	57	-
Mojokert	2 2 3 8 8 6 5	<u>' </u>	3.075	0,470		101	77	20, 0		19	09	56	2.92	22.
Мојокен	5 3 8 8 Si	1 1 1	77 119.128	123,605		2	8/67	2	-	1.09	5	0197	5.112	0
Mojokert	5 3 8 8 5°	1 !	10% TTT ROI	494 331		6.063	6,945	800.5.			1	٥	420	5
Mojoken	2 3 8 8 6	J.	25 270	27 830	-	-	175	571	× ×	1	3 5		711	-
	4 % % %!	-	0.077	01.5 07	+	-	513	-	æ æ	- i	3	5 (•
050 050 050 050 050 050 050 050 050 050	2 × 61;	-	VIC.00	3			583	583	æ		8	0	424	1
088 128 128 128 128 128	× 8:			200			797	397	% **	[99	3	46.	,
1830 1831 1831 1831			2/8/0	200			59	3	×86		8	0	ç Ç	
			2.594	7.		1	181	11511	- Se		ક	o		ž (
181 181	_		46.035	800	•	-	088	2 880	×55		9	0	2,126	1
RSI	-		15.563	15.56	-	-	400	4.074	88	:	3	0	8	ŏ. ∽.
	12		198,941	3.		-	1.00	-11-62	28	!	ક	0	236	
8513			12,840	2,840			1865 V	×45.7	. 88	<u> </u>	ક	0	3.3691	¥. i
1881	4		18.4,120	183,120	130	1	1000	018	88	- - -	8	<u>د</u>	97	
— B515	13	620	39,689	9	3.5		F 033	18.059	88	-	09	19.	13.272	
[eloylor]	! !		721,324	721 944	3	-	105	501		-	09		4	- ; ;
Tambangan Mojokert	ē.		7,80	7,80	-	1	200	I SO	-	! ! !	8		133	- 1
8620	8		7.20,	7.207	-	1	303	122		-	69	-	276	1
Subsected			15,008	15,008	-	800		370		8		ž.		7
	21	13,524	24	13,524		5	1	1216	-	9		55		ا
o Narangpuang	2	43.4	10	3.6		27.7	5	- 200		9	: -	37.		
1	1	461	99	17,469		684	0	684	-	3 5	1	14		
6700	3/2	401		6.931		194	ò	44		3 3	<u> </u>	950	-	
#700i			78	47.76		1,254	0	5		8 3	1			
Drog -		6.920	20	6,920		Ž	o'	194		3 9	!			4
0.98	1 02	22.6	53	22,65.3		459	3	0 0		5	-	3,331		1.1
-		155.6	73	155,673		4.59	أد	4.559	000	\$	 -	730: 10:	2	oc.
100	-	L	97	26.829	50	137	0	1,036	CV.	3.5		0 292	1	
7 Ngagel	 	9 6	3	13,622	0	381	0	×	ī,	8			7	
ļ	1	i	981	32,859	!	54	0	1.276	0/	3.5	1	12/2		
2902	+	0,000	MAX	145 108		57	0	5.923	9,	8.5	-	1	-	
3	1	ĺ	000	289 09		-	0	2,857	70	28	4	7,7		9.2
i	1	00 ye	10	288.103	10,743	731	0	11,473	20	8		37		ľ
18	-}	ļ		19 588				803	70		-	200	-)
8 Kayon Surabaya Bo	9000	2007	1	29,215				861.	1,20			509		
<u>]</u>	1	18 803		48,803	2,001			2,001	2	16.2		2	10	
	-	l	2.738	2.738		77		77	-	\$ 5				
9 Pelayaran Sucoardio			312	913		36		3		3	1			

()

Table A3-17 Estimated Pollution Load (BOD) produced in each Sub-catchment (2020: Without Project) 4,206 2,397 2,397 2,397 2,397 2,397 2,397 2,397 3,497 847 Urban 1000 1000 1000 1000 1000 1621 1623 1624 1624 1630 1631 9619 8620 Surabaya Gresik Surabaya Gresik Location Subtotal Canggu Tambangan Mojoken Malang Demangan Bridge Padangan Bridge Bumuyu Bridge Subtotal 3 Jogbiru Bridge Subtotal Subtotal N. Kayon

I

Table A3-18 Pollution Load (BOD) from Large and Medium Scale Industries at each Sub-catchment

Particular Par	Name Buttiayu Bridge N Sultiotal Demangan Bridge P	,	CHEST	2	TO STATE OF THE PARTY OF THE PA	-				C			72.5	2020 Net 2	20.000
The color of the	i I	}		ni-urban,	Rufal	Total	Urban Sen	-	(nra)	Cream S	(ke/day)	(kep/ax)	(ke/day)	(kg/day)	(Kep/dax)
The control of the	i I				(24)		(A) Cold	THE PARTY	0. v	C		174	174		1
The control of the	1	8000	0		25.219	25,219	6.89		000	202		147	850		
Fig. 12 Fig.	ı	18	100 113		21.274	123.387	6.89	1	0.00	1	1	20.	1866		
Fig. Fig.			72.C 03	[102,247	270.482	6.89	j	(S)	60.		<u> </u>	0000		
Fig. Fig.		107081	000		46.674	478,644	6.89		80	2,907	- :	26.			:
Fig. Refine Hiller (1992)	- 1	1	1016.15#			201 661	e xo		6.89	1,221		5	1771		200
Fig. 10 Fig.		-	17,192	-1	10000000	1,00,00	-		-	166,5	1	1.41.5	7.405	37.7	7.7.7
Fig. Rocella (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		-	369.510	-	C(+)(0)	1000	- -	08.7	0× 4		5,46	125	961		
Fig. Fig.		B142		77,762	8.00	٧,٧,٧		0.00	00.4		4	2	674		_
Fig. Color Fig.				66.85	30,929	97,781	-	1000	600	-	 - -	128	128	:	
Second S	_			o	8,554	18,554		ž č	2	1	1	774	CA4.	3.510	2 XOX
Fig. Color		200		144 612	059 69	212.263					§	Ş			
State Note	ļ			100	030.00	0.77 72	 - 	08.9	689	-	730	717	747	:	-:
N.1.1 1.1.1. 1.1.1.1. 1.1.1.1. 1.1.1.1.		93.10) 2	1		03.9	0% 9	- ~ - 	587	<u> </u>	Ž		. :
11.17 2.0.004 1.0.00 1		B311		215,531	7,212	71/43		1	9	-	200	:= :	203		
101 102 102 103		B312		29,954	×.	70,132		0,44	0.00	1	300	C	308		
The control of the		-		44.634	٥	44,634		0.87	60.0			:=	Y		:
10 10 10 10 10 10 10 10			-	31 144	178	31.322		6.80	0.X		7		3		
1515 1515		2		21 292	0 407	141.219	 	6.83	6.89		S.	8		-!	:
1116 116 116 116		0315	- - - - - -	100	200	12.31	1	68.9	689		8	×	5		
Color Colo		1316		0XC	10,1	10,000	-	00.7	- 08 X		S	307	Ş.		
Fig. Majoker 1000		8317	1	12,101	44.576	56,676	-	0.69	800		7.022	716	4.748	4.74K	3,799
1975 1975		1	-	585.197	103.948	689,146	-				7.07	2	3,		
Color Colo	1	4		-	8	× 192		-	68.9	!		00	2.5	:::	<u>;</u>
1,000		į	-	-	100	200.10	! !	-	68.9		-	2	2		
Note	_	000		- -	200	276.0	1	-	9			0°	28		
Niving		3505		- 1	ç, ç	000		Ì	08.7			6	ε.		_
10.00		808	-		5,692	2,072		-	1 9	•	: ,		9		
United State Unit		20.07	1	- 	930	0.0		-		-	T	-	41.		
1911 1912 1913 1914 1915				<u> </u> .	16.512	16,512			686			You C	YAC		1
1,11,11		2			41.45	41.453			6.89		i	007	200	!	•
1972 1972		1 2 2		+	456.15	135	-		68.9		-;	760	74		:
Bija 1,629 1,629 1,629 1,190 4,4447 1,190 1,19		9512	-	!	70,0	4.606	-		S8.3			g	7		:
Political Poli		222	-		507 57	287 37	- -		689			45.3	- - - - - - -		:
Post Post		12514		1	3000	390 3	08.9		689	=	-	86	- E		
'g Surabaya Locate Locate C.596 C.597 C.597 C.597 C.597 C.596 <		8515	679		14,230	036.076	1	-	1	=		1.783	794	4 X4 4	C & S
'E Surrabaya 2,778 2,778 2,778 2,778 2,778 2,778 18 17 18 17 18 18 18 17 18 18 18 17 18 18 17 18 <t< td=""><td>Subdotal</td><td></td><td>1,629</td><td>- </td><td>C21, NC2</td><td>2007</td><td>-</td><td></td><td>08.7</td><td></td><td></td><td>61</td><td>2</td><td></td><td>į</td></t<>	Subdotal		1,629	-	C21, NC2	2007	-		08.7			61	2		į
E620 2,585 2,585 2,585 2,585 2,585 2,587 177	South Manhant Monde				2,798	2,798			200	1		81		Ĺ	
***Surabaya Bods ***Surabaya 6.89 6.89 6.89 6.89 5.93 1.059 ***Surabaya Bods ***Surabaya	Signatura I wandangan majama		-		2,585	2,585		+	600			12		 	08
'g Surabaya 6621 119 (02) 6.89 6.89 6.89 2 6512 2 6512 2 6512 Box23 381 965 781 738 6.89 6.89 6.89 420 420 Box32 6.0399 6.0399 6.89 6.89 6.89 420 420 Box32 394,066 394,066 6.89 6.89 6.89 420 420 Box32 394,066 394,066 6.89 6.89 6.89 420 420 Box31 1.370,056 1.370,056 6.89 6.89 6.89 3.74 1.374 Box41 1.370,056 1.370,056 6.89 <td></td> <td></td> <td>1</td> <td>_</td> <td>5 383</td> <td>5,383</td> <td>-</td> <td>-</td> <td></td> <td></td> <td>000</td> <td></td> <td>15</td> <td></td> <td></td>			1	_	5 383	5,383	-	-			000		15		
Becal Beca				1000	-	119,023	- ·	689	6.89	-	3		250		
Surabaya Bosts 153,738 150,000 150,0		100	-	290 20	- 	381.965	- 	68.9	6.89		7.07	 	0.50		-
Biocat	-	9622		201.00	÷-	143 738		68.9	6.89		1,059	-	ŝ		!!
No.24		8623	i	15.1,70	†	00000	-	08.9	6 80		420	-	24 22		
No.		8624		86.8		8		2007	9		2.715		2,715		:
bigst 60,000 </td <td></td> <td>8630</td> <td></td> <td>394,066</td> <td></td> <td>494,000</td> <td></td> <td>1000</td> <td>3</td> <td></td> <td>420</td> <td></td> <td>77</td> <td></td> <td></td>		8630		394,066		494,000		1000	3		420		77		
No.32 199,364 199,37 2,534 2,		1698		8 9 9		00,00	-1	00.0	00.7		1.774		135		
Surabaya Bods 1,376,056 1,376,056 1,376,056 1,376,056 1,376,056 1,376,056 1,376,056 1,376,056 1,378 1,218 2,510		R632		99,364		199.304	-	0.09	200		OFF O	-	944	41.535	33,228
Surabaya uses 42,659 65,73 6,89				1370.056		1,370,056		-					24	-	
Surrabnya Boss 51,255 71,216 176,849 6,89 6,89 6,89 50 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,413 855 85 1,018 10 1,01		Т	42 660.	87.5.78		106,248	68.9	6.89	8	5	:	-		-	:
Duckst 25,255 71,216 124,471 6,89 6,89 5,89 1918 2,101 2,101 15,80 15,			V	176.840		176.849	68.9	689	6.83	۰ ز		-	14.	*	:
USAST 25,522 304,010 6,89 6,89 6,89 1,918 2,101 Boss 135,500 4506 135,500 6,89 6,89 6,89 3,512 2,534 5,846 Surabbnya Boss 505,752 138,100 6,89 6,89 26,1 26,1 Surabbnya Boss 56,838 6,89 6,89 35,2 2,534 5,84 Sydonicio 14,878 14,878 14,878 103 103 103 Sydonicio 6,89 6,89 36,94 36,94 36,94 36,94		200	2000			124 471	68.9	689	68.9	767	1	1	Č	1	:
1644/3 278,022 40,67 135,995 6,89 6,89 6,89 6,89 73,4 5,846 Surabaya B644 38,109 6,89 6,89 6,89 26,1 26,1 Surabaya B644 38,109 8,89 6,89 6,89 6,89 Surabaya B644 36,233 6,89 6,89 6,89 6,54 Sydony 14,878 14,878 1,65 103 103 103 Sydony 1,656 6,89 6,89 6,89 103 3,4		2642	3,4,25	5 6	1	010.50	08 9	68.9	689	1,918			2.10	-:	:
Biodat 135,500 4906 135,702 2,334 5,846 5,846 26,13 2,334 5,846 5,846 26,13 2,334 26,13 2,334 26,13		19643	278,328	79797	1	300	1.55	08 9	08.9	974			23		
Surabaya B645 338,720 848,472 263 263 263 392 39		B644		496		3	0.07	200		150	2334				21,983
Surabaya B6465 38,169 6.89 392 792 6546 56,838 6.89 654 654 8,4047 6,89 6,89 103 103 8,4047 14,878 4,576 6,89 34 34	lesone. O		1	338,720		848.472	-			200			26		
Surfamily Bode 56,838 6,839 6,830 6,840 6,54 6,54 6,54 103 103 103 103 103 103 103 103 103 103		╀	8 ×			38,109	689			0.7		-	92		İ
Sidonido 54.947 6.89 6.89 34 34		i	86 X 78			56.838	68.9		1	6	-	1	77		3.460
Sidonida (6.89 (6.89 (9.9) 34 (9.9)		1	04 047			74.047	-			20					797
2000mg/0				14 878		14.878		6.89			O		Ď.		
		-		9,0		4.959		68.9			4.				3

Table A3-19 Pollution Load (BOD) from Small Scale Industries at each Sub-catchment

1

Name	Location	Location Subbasins	Out	out Value of Ir	odustries(199	(4)	0	팋		Pollution	n Load from	Industries (19	75/2)	Stemated Pol	1urion 1.ond 2020 80%
			Crban	Semi-urban Ruta (million Rut/vr)	Rutal	Tota	Urban Semi-urban (g/day/million F	lion Rp.)		kg/day)	(kg/day)	(kg/day)	(kg/dav)	(kg/day)	(kg/day)
1 . Hoseniante, Bridge	Matane	9000	0		5.355	5.355	6.89		68.9	٥		25.			
Source of section of the		į	61		4.517	23,766	68.9		68.9		-		5 3		
		13020	31,713	 	21,711	53.424	68'9		689	7.7		2,6	e c		
		005	2		12,034	91,578	6.89		28.5			2	02.0		-
		8022	33,402		٥	33.62	6.89		200	000		2/2	2 9	1,412	2.745
Subtotal			§ 		43,617	207,524			- (90	20.	617		
2 Demangan Bridge	e Blitar	H142		12,330	3,857	16,187	*****	6.89	600	+	3 5	75	1 3	!	:
		0310		10,600	6.567	17.167		680	68.6	-j-	<u>:</u>	1 5			-
		B153		ō	3,940	<u> </u>		0.89	200	1	2 2	8	257	617	403
Subtotal				22,930	14,364	17.284		- 00	000	-	13	45	٤		
3 Josphan Bridge	Kediri	19310		16.796	6.531	23,328	!	0.69) 0 3	Ī	210	3,6	3,63	*	
		1150		34,175	3,655	37,829		0.89	X (0)		12) 	2		• • •
		5312	<u> </u>	4,750	38	4.787		680	0.07		ş (o c	9	!	:
		8313	1	1,077	0	//07/	· · · · · · · · · · · · · · · · · · ·	6.0	00.9		1		34		
		9314		4,938	1 2 3 3 4 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	4 7/0	+	6 8) (0) (0) (0) (0) (0) (0) (0) (0) (0) (0	•	143	. 4	158		:
		3315	: 	20,87.3	2.3	77.77		200) S	.:	<u>.</u>		œ		
		0316		2,312	707	000,7	-	2 5	200	;	-	5	30		
		18317	1	1919	9.465	200			; ;		930	(3)	162	167	6.5.0
Subtotal				92,789	22,072	14,80		-				2	61		
4 Padangan Bridge	Mojokert	8503		L	1652	1 739		-	686			3 00	4 6	*****	:
9		300	 		4,609	4,609		-	69.0	- :		7.	<u> </u>	:	
		203			1,776	1.776		-	689	-		3	4 :		
		3,506	! 		1,209	- 209		- 1	<u>\$</u>			×	χi.		
		1307			861	86. 86.			\$ \$			_ _	7	1	
		9510		-	3,506	3.506			\$2.5 9.			72	3.		
		132			8,80I	8		. !	68.9		- :	6	10	1	
		RS12	1		15,152	15,152			6.89			8	Ş.	}	!
		RSIT			87.6	978	<u> </u>		68.9			7	F- \{ 1	:	
		4414		-	1,1,947	13,947	 		6.89	- 1		8	8		:
***		3130			1.023	3,330	689		6×9	7		7	. 23		
1			9	-	54.937	\$5.244		1		2		370	381	1.028	X22
Nucrotal	May May be	9190			594	594	-		68.9		7	₹	4		
S Cangga tamoangan wejoken	gar Mojokert	9630		-	1645	540			0×9			4	4		
-		2700	-		143	143	<u> </u> -	İ	!	-		*	œ	7	12
Suototal	and and	-		18.872	-	18.872		68.9	68.9		000	- !	130	:	!
O NATAINED CHAIR	Contracts		1	595 09	+	60.565		6.89	68.9		417		417		
	CICSIN			24 177] 	24.377	ļ	686	68.9		168		3	!	
		5000		0,470	-	9 672		689	68.9				67		
-		200	1	4.0 CX		62.483	1	68.9	68.9	:	431		431		,
		0.00		9590	+	0.646		68 9	689	; :	67		67		
u		2	1		:	31611		689	68.9		218	-	218		
		7600	! !	27237	1	217.237		<u> </u>	-	† !	765		1,497	6,586	5.269
Subjetal	Section 1	-r-	× 043	1800	-	18.124	6.89	689	68.9	35	3		ធ		
i ngagei	Suradaya		7	Ĺ.,	-	28.08	6.89	68.9	689	Ó	193	:	£61	!	:
	Y SEE	304	0000	i		21331	689	6.89	68.9	\$	oc.		147		
		7500		İ		33.75	689	68.9	6×9	361	20		363		:
		500	(P) 30			25.62	689	689	689	176	-	: !	171		:
Subroral			96.00	83 708		149,799	-	•	1	662	370		1.032	4.851	3,881
X Kaupin	Surabava	ļ.	7.184			7.184	68.9		-	64	:		64.		
		3646	10,714		!	10,714	6,89			4			7.2	Ond	1.00
Substoral			868,71			17.898		_	-	123			5	OW	36
9 Pelayafan	Sidoardio			2,359		2,359		6×.9	1		2		5	<u> </u>	3
10 Porong	Sidoardio			382		786		6.80	4		c		1	-	
2000															

Table A3.20 Estimated Population with On Site Sanitation Facilities including Shared and Public kacillus

Unit: thousand

	- 1-			Paritable		Served Pon	Incre	Increase in Number	is is	Population	Served Population	ation
Area	Served Pop.	ropulation	ropulation Served Pop.	1008(%)	1998	1998	96, 76	per year in 26 years	126 years	2020	2020	(%)
(10 2 2 2 2 1)	1224(70)	+661	1	(21)277								
(Regency)	77	1 070	648	59	1 165		110	22	571	1.774	1,218	58.7
Sidoarjo	200	1,0/2		3	858		99	13	346	1,110	837	75.4
Mojokerto	3	010		3.9	7317	1 390	163	33	846	2.846	2,073	72.8
Malang	3	757.7	-	-	1 075		63	,60	327	1,164	963	82.8
Blitar	3	-			0.00			. .	457	1 553	1.246	80.3
Kedin	9	1.316	i	1	000.1		100		3000	0911	1.053	80.0
Nespink	84		i		286	:	44	- : - : - :	077	201.1	1,000	2 5
T. Semilario	25	7.06			1 107		70,	4	363	365	05/	7.00
Jomoang	-	500.1			940		36	7	185	1,077	855	79.3
I ulungagung	7.0	717	756		661	ļ ,	41	8	2111	783	299	85.2
Trenggalek				1	008		3	13	329	1.088	851	78.2
Gresik	9	X0X	-		022		3 6	13	7.27	1.415	1116	78.9
Pasuman	09	1,140	684	65	1,180	1	Ç .	~ 1	7.00	T C	01111	7 7 7
ON CANDING V	709	100	!!	64.8	1,140		75	15	350	4 v	3.	<u>.</u>
AVCIANC			,		12 539	8 125	826	165	4,295	15.337	11.594	•
Subtotal	•	12,095			7000							
(Municipality					F0C 0	1421	; ;		330	2.972	1.945	65.5
Surabaya	70	2,294	3. -	0/	7.56.7		3	2 -	76	140	124	80.00
Mojokerto	88	102			10/		,	1	1 0	2 .	7.00	7 63
Majano	55	700	385	•	758		70	7	400	// [*]	44	3 6
1/10 die:	17	233		;	233		Ġ	7	8 4	233	2	o i
Neglin	0	110		85	122	103	4		19	139	011	85.5
Butar	+0	200			721		31	9	161	932	625	67.1
Average	4.70	060		. 1	3 607		551	, r	804	4,660	3,127	
Subtotal	-	3,448			_		001	106	5 100	19 997	14.721	73.6
Grand Total	1 61.9	15,543	9.621	65.7	16,145	10,002	701	122	2.100	77777		

Note: Targets were set up based on REPELITA VI

Table A3-21 (1) Estimated Pollution Load (BOD) produced in each Sub-catchment (2020: Case-1)

) *

A]" f	ocation 3	TOOMS HES			}		in .	Ι.		Jan Jan	400 (%)	Sura	Crosn	Nema-terban	N UTT	1001
Columbration Colu	1 1				emi-urban	Rurai	- Total	ļ	ŀ	- 1	2	Dall Contration	કુ	(ke/day)	(ke/day)	(kg/day)	(kg/day)
The color of the	1		_		_			_	1	1	-]	-		1	77	807	6×
The color of the	1	Astone	t-	0			42,754			63.6	1		3,1	•		757	27
Fig. Fig.	1	-	ī	00.00		:	98.314	8		0	-		1,77		:	07.4.5	×
Fig. Fig.	1	-	ī	100 556		-	275.896			63.6		-	077				200
Fig. Fig.	1	-	-	100.032		04,070	157.734			63.6		_	X		: :	2	1 2 4
Fig. Fig.	1	_!	1			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1000	٤	<u> </u> -	9 69		-	72.8		-:		30.
Fig. Fig.	- 1		ī	10801	-	0.00	200	3.56	00	3	-		i .	8.			2 2 3
The control of the	1		_	530,056		14X 7.39	0.000		2		10 \$	9	8.2.x		1945	316	- 3
11.57		Slitar	19142	-	33,602	30.01	^io 30			-	: : : :		-		, c. 1	1,220	1.73
War Name War		<u>:</u> _	912	i	28,888	61,318	8.58				7.6		:			725	73
Columb C		<u>, </u>		-	C	36.784	36.784	_				_ {			2	077.0	, ,
The color			6133		> 00,00		50,50		! 	-	20	ļ	<u>v.</u>	-	1,107	5,003	3.66
1975 1975	Subtotal	-	Ţ		27,470		X0,000					- X		-	35	955	2.06
1971 1971 1970	١		•		86.5	97.014	136,210			1	-				1.00	- 284	2.530
1,100 1,10		_		- -	70.740	£4.286	34 036				-	81.					ř
10.00 10.0		1	1		200	3	1.5		: 			 	_	-	20.		
No. 10.10 1.50 1.			13312		20.1	ğ	į	•	1	!	1				55	Ö	ຂີ
1915 1915	_	<u>!</u>	1		16.515	0	16,515	-		-			;				; -
Columbation Columbation	_	_1_		-	763	093	12.084				<u>s</u>		1	-	> <u>-</u>		
1314 1315			33.14	-	1,00	3	30		-		-	×		re.	×74	9	Ž.
1977 1972 1972 1973			0315		48,591	31.214	7,300			1		15	:		40	73	
Wildly Worker Work Wor		•	13216		5 395	3.629	9,024			- 1		10	-		5	2000	100
riggr Mojorert Land Ling Control					100 ×	10 50A	146 07 I	-				,			ē	7,000	1
1975 1975		'	0317			,	1000	+		1			, '		089	6,612	05.0
1,000 1,00	Subtotal	'-		:		327,858	×84.48×	_		ļ			1	*		543	R
Colored Colo	İ	A Contract	5		-	30.983	30.983			1						2	r
Fig. 60 Fig.		יוס מעלוני	1			30000	90, 00	1	_				75.	nd'		3	2
National Property Nati			R504	1		060,20	0000			Ī			75.	-		553	8
New York 1972 1975 197			8505			3 628	3.628			-			7	:		466	4
1970 1970	_	•	¥250			21.528	21.528			_		i		1	-	i	
Prof. Prof			36	-		2.2	015	 - 	<u> </u> 	<u> </u>			 	÷		•	•
Bill Bill			R507	- :	الم	2			1	1		1		4		.293	2
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					-		.500			-		99					1

Table A3-21 (2) Estimated Pollution Load (BOD) produced in each Sub-catchment (2020: Cave-II)

Column C	1 Ruminon Bridge		Location Subbasins	Tichan Tom	Population (2020) Rumi	Total	Urban (%		! و	mi-urban (%)	Rural	Urban Semi-urban Rural	Ruma (ke/day)	Total (ke/day)
Company Comp	1 Ruminon Bridge						1	-	Sanita	-4-	Јокаво Запианен	1 × ×	0:0	768	79×
Fig. Cont.		Malang		ö		42,754	42,754		5	0 0		22.8		757	7.57
Fig. Fig.		:	1001	62,249		36,066	98,314	3:				72.8	1	3,639	6.50
Fig. 1972 Fig.			B020	102,556	-	73,340	275.8%		43	2.4		72.8	; ;	2,017	9.215
The color of the			í	257,234		6/00	353,514	90		1		72.8	-	0 0	203
The color of the			1	108017		02. 371	278 705	32.1		-			1305	71.7	
The color of the	Subtotal	- 1	- 1	١	17.607	36.017	619,69			5.0	50%	22.0		-	73
State Stat	LDemangan Bridge		24.5		28.888	318	90,206			5.0	80.5	X 9	_ -	732	73.
Fig. Fig.			2 0		ō	36.784	36,784		 		300	6.76	-	2.668	3,775
Wildle W			0133		62.490	134,119	196,609			5.0	COX 0	1, 00		956	95
No. 11 N	Subtotal formation Designed	Kodiri	0330	_	361.68	97,014	136.210				0.00	80.3	-	1,005	2,536
1917 1918	ASSOCIATION OF THE PROPERTY OF		3311		79,749	54,286	134,036			· ·	×		:	Ξ	21
First 15.19 10.519 10.			8312	-	1.083	200	23			1	30	×0.3		0	દ
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1,177 1,477 1,578 1,124 1,12			2014	-	11.524	260	12,084		-	2	0.0	S	8	630	- 50
10 10 10 10 10 10 10 10			03.5		48.591	31214	79,805	-			0.00	80.7	60	73	-
10.00 10.0		•	160		5.05.5	3.629	9.024				0.10	90,2		2835	7.01
The color of the			0.410	+	4 477	140 594	145.071	:		: :	8:18	3	9.0	6144	0.0
1992 1993 1994 1995			1717	-	016 570	727.858	544 388			5.3	0.//			193	3
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1,000 1,00	Padangan Bridge	Мојокец]	82.098	82 098			:		***		559	. 5
17.00 17.5			200		i	31.628	31,628					× ×		465	4
1975 1975			2058		<u> </u> _	21.528	21,528					75.7		7.5	7
No. No.			2050	-	<u> </u>	3,519	3,519			-		25.7		1.293	2
William Will			1510	<u> </u>		62,450	62,450				:	75.6	:	3,246	3.24
History Hist			150		ļ	56,768	156.768		- -	;	:	75.4		\$ 588	85.5
1814 1814 286,415 246,415			B512			269.876	209,870		-	<u> </u>		78.4		2	₽ ¥
No. No.			223	1		1 2 4 8 4 5	248.415	1				75.		<u> </u>	
Windle W			4150	· È _	<u> </u>	53.84	\$4,688	001	0	0		, d		20,261	20.26
Sumbaya Notice	S. Mannel		-	<u>.</u>		978,523	979,370	001	O	0		75.4		219	64
Name Name	Cangru Tambang		8619			10,583	10.583		:			75,4	-	ខ្ល	'Ä
Sumbaya Ro21 19.872 20.760 20.760 20.760 20.760 20.760 20.760 20.760 20.760 20.760 20.760 20.775 25.668 25.668 25.668 25.668 25.668 25.668 25.668 26.775 25.668 26.775 26			1620		!	6.777	9.777		-	-			1	422	4
19,872 19,872 19,872 19,872 19,872 10,973 1	Subtoral					20,360	20,500				78.2		342	1	3.
Great Biolization 65,773 Columnia (Columnia) 78,2 78,2 44,2 Biolozation 10,184 10,184 10,184 10,184 10,184 10,184 10,184 10,184 10,104 0 </td <td>Karanepilang</td> <td>Surabaya</td> <td></td> <td></td> <td>19,872</td> <td></td> <td>19,872</td> <td></td> <td></td> <td></td> <td>78.7</td> <td></td> <td>8</td> <td></td> <td>5</td>	Karanepilang	Surabaya			19,872		19,872				78.7		8		5
Digitary Digitary	5	Gresik		-	63.773		077.70		-	20.0	78.2		45		
B624 C C C C C C C C C			B62.		25.00%	-	78) 97		-		78.2		2.		-:-
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Surabaya Biole 23,873 15,73 100 15,73 100 10			595	<u> </u>	11,100	-	13.286	<u>;</u>		001			201.6		3.)
Sumbaya Toda 28.440 6.134 34.543 6.61 6.61 72.3 0.271 0.271 Gresik 4.641 3.6451 4.653 4.653 4.653 1.034 1.034 1.034 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 0.871 2.50 1.03 0.871 2.51 1.03 0.871 2.51 0.871 2.51 0.871 2.51 0.871 2.51 0.871 2.51 0.881 <t< td=""><td></td><td></td><td>7007</td><td></td><td>228,743</td><td></td><td>22%,743</td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td><td>6</td></t<>			7007		228,743		22%,743				0				6
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Hi chi	'ABaB'	Gresik	1641	i	17,063		17,063		8		72.3		:	1	3
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nicket 90,214 481 30,2142 481 30,2142 4820 48711 520 Surabaya Blods 25,934 25,934 100 60 60 60 Surabaya Blods 27,842 100 60 60 60 60 Siccordio 63,215 100 6877 687 687 23 Siccordio 4499 4499 1,500 687 23			15.5	ii	2,565		87.872	-	5 3				2,624		9.7
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Surabaya 8648 22,373	Subtotal			339,386	32,682		1007715	5 3	2				0		
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Table A3-22 Demarcation of Responsibilities on Water Quality Management in the Brantas River Basin

nitoring systems ediment (Business activities) (Dwellings) er (livestock houses) er (livestock houses) er (livestock houses) all-bore or shallow systems) tranent facilities ustrial zone all scale industries system trent system copping and mulching, etc. systems es es es es es es es es es es es es es				Responsible	i implementation
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y monitoring Monotrang of intervention particular control of WOMPECS Oracle intervention of inv	Overall plan, program and	Establishment of Water Coarry Management and	Condinatios	BWMC (PJT)	PYT/B91.H
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Monitoring of domestic waste water (Dwellings) Monitoring of domestic waste water (Dwellings) Monitoring of other sources Monitoring the methods wasterned facility Community of the methods was control Termeting, controlling for small scale industries Controlling or biological treatment facility Community of themetical wasterned to the methods of biological treatment facility for densely industriated control densely and mulching, etc. Improvement of familia gractices Soil of waster (actorings) management Densels, wasterned treatment and disposal systems Controlling or clearing License systems License systems License systems License systems License systems License systems License systems License systems License systems License systems License systems License systems License systems License systems Monitoring to clearing Domestic vest waster treatment methods Monitoring to clearing Monitoring to cle		Pollution sources inspection	Monitoring of domestic waste water (Business activities)		Contract Circle Contract
Monitoring of industrial waste water (investock houses) Preparation of inventory On-site treatment facility On-site treatment facility Off-site treatment of facility facility Off-site treatment of the facility facility facility for industrial value value treatment methods Non-industry value treatment methods Non-industry value treatment methods Non-industry material subject regulation Off-site treatment of rel			Monitoring of domestic waste water (Dwellings)	Ē !	Politica Cipia Natival
Monitoring of agricultural waste water (ilvestick houses) Monitoring of other sources Preparation of inventor Inventory (including semi-off-site treatment facility) On-site treatment facility On-site treatment facility Off-site treatment methods Interprovement of familysity for metalty management treatment methods Nater resource development family family family of dischess Donesite vaste treatment methods National waste water treatment methods Donesite vaste water treatment methods Donesite vaste water treatment methods Donesite vaste water treatment methods Donesite vaste water treatment methods Not information of selection treatment methods Not information of selection treatment methods Adequate treatment of stabs of the composition of compation of semplation treatment and other adequate methods Monitoring wethods Monitoring wethods Decenter of the com			Monitoring of industrial waste water		UNIXIOUE
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Preparation of inventory On-site treatment facility On-site treatment facility (including semi-off-site treatment facility On-site treatment facility Off-site treatment facility Off-site treatment facility On-site treat			Monitoring of other sources	PJT	PJT/DKES
Preparation of investment facility Consiste treatment facility On-site treatment facility Contralized treatment facility for analysis on charactery Natice treatment of farming practices Solid erosion coantrol River maintenance flow Natershed management Ontinum water allocation River maintenance flow Natershed management Ontinum water allocation River maintenance flow Natershed management Ontinum water allocation River maintenance flow Natershed management of environmental orgineering industries Soli erosion coantrol (afforestation, sediment control dam, etc.) Unitingation of Self-purification function River maintenance flow Natershed management Ontinum water allocation Ontinum water water treatment methods Individual assistance Propositor of campaign. Facility mancinum methods Adequate treatment methods Moniecting methods and/or regulation Nater quality management severes etc.				PJT	Pyf
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(including semi-off-site treatment facility) Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Off-site treatment facility Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment methods Interpretation facility Optiment water vaste water discharge Assistance systems License systems License systems Community participation Forecurgement of stabsicy, both and objects of vaste water discharge Forecurgement of stabsicy, both and objects of vaste water discharge Community participation Environmental education Community participation Environmental education Community participation Environmental education Similation nethods, cache pollution sources Adequate treatment methods Analysis, conviconmental planner or engineer Promotion of campaign file in the rivers Analysis and carried and and of campaign treatment methods Analysis, conviction from the pollution of depth facility for sources water queries Waiter quality management of education reduction treatmen	Domestic pollution control	On-site treatment facility	Contration facility (Septic table etc.)	DPU Cipta Karya	Local government
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Off-site treatment facility On-site treatment methods On-site treatment methods On-site treatment methods On-site treatment methods On-site treatment methods On-site on-systems On-site treatment methods On-site on-systems On-s			Other methods (and treatment) completed or shallow switchns)	DPU Cipta Karva	Local government, etc.
On-site treatment facility Oritistic treatment facility Centralized treatment facility Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment facility for industrial zone Centralized treatment system Solid waste (gardage) management Solid waste (gardage) management Collection, treatment and disposal systems Solid waste (gardage) management Collection, treatment and disposal systems Solid erasion control (afforestation, sediment control dam, etc.) Watersted management Deeging or clearing Utilization of Self-purification function Optimum water allocation Community participation Community participation Community participation Community participation Community participation Community participation Community participation Simulation methods, magnitude of each pollution sources Adequate treatment methods Adequate treatment methods Adequate treatment methods Adequate treatment methods Monitoring methods Water quality management, sewerage, etc. Encouragement of related law and/or regulation Water quality management, sewerage, etc.		Off-site treatment facility	Newerage Nysterins (conventional, small conventional)	Ļ.	DPRIND
Off-site treatment facility Centralized treatment facility Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industries Centralized treatment facility for small scale industrial zone Marcing control farming practices Collection, treatment and disposal systems Soil every industrial and mulching, etc. Collection, treatment and disposal systems Soil every maintenance flow Watershed management Collection, treatment and disposal systems Soil every control (afforestation, sediment control dam, etc.) Watershed management Collection, treatment and disposal systems Soil every control (afforestation, sediment control dam, etc.) Watershed management Collection, treatment and disposal systems Soil every control (afforestation, sediment control dam, etc.) Watershed management Collection, treatment and disposal systems Soil every control (afforestation, sediment control dam, etc.) Water resource development Community and provided disposal systems License systems License systems License systems Local population function Management of subsidy, found ab bounty Local population sources Community participation Community participation Community participation Community and deartification Community and population methods Analysis, environmental passistance Community and deartification Community and deartification Community and deartification Community and deartification Community and of campaign Soil treatment methods Management creatment methods Monitoring methods Monitoring methods Water quality management, sewerage, etc. Enactment of Pelated Law and/or regulation Water quality management, sewerage, etc.	Industrial pollution control	On-site treatment facility	Physical, enemicated photogram acamera manner	ONBAC	DPRIND
Centralized treatment decines are more treatment decines. Waste water treatment (livestock houses) Agricultural etemicals uses control Improvement of larming practices Solid waste (garbage) management Solid waste (garbage) management Collection, treatment and disposal systems Solid waste (garbage) management Optimen water allocation River maintenance flow Water resource development Oredging or clearing Assistance systems License systems License systems Community participation Management of subsidy, loan and bounty Assistance development Community participation Promotion of campaign Promotion of campaign Soli treatment and disposal systems License systems Community and integrated Promotion of campaign Promotion of campaign Adequate treatment methods Adequate treatment methods Adequate treatment methods Adequate treatment methods Adequate treatment and of each pollution sources Adequate treatment methods Adequate treatment methods Adequate treatment and other adequate methods Management of Enacer production technology Adequate treatment and other adequate methods Adequate treatment methods Adequate treatment methods Adequate treatment methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Adequate treatment and other adequate methods Ad			Centralized treatment facility for industrial zone	CNIdde	DPRIND
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Agricultural chemicals uses control Agricultural chemicals uses control Agricultural chemicals uses control Improvement of farming practices Sludge and septage management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) Solid waste possal systems Assistance system Chemitication of Self-purification function Management of subsidy, ban and bounty Assistance system Frocouragement of subsidy, ban and bounty Annagement of subsidy, ban and bounty Annagement of subsidy, ban and bounty Domestic waste water treatment methods Domestic waste water treatment methods Monitoring methods Monitoring methods Monitoring methods Solid treatment, plant treatment and other adequate methods Monitoring participation Simulation Fractional band and other adequate methods Monitoring by aqualic life in the rivers Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and/or regulation Water quality management of pelated law and pelated treatment methods Water quality management and pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelated pelate			Centralized treatment facility for densely industrialized zone	CINING	CINT MACE
Agricultural chemicals use control Improvement of farming practices Sludge and septage management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste (garbage) management Solid waste systems Solid waste systems Solid waste systems Solid waste systems Solid waste systems Free or suspension of iterative frametal assistance Free or suspension of iterative frametal planner or engineer Community participation Free pollution load identification Domestic waste water treatment methods Direct purification methods Direct purification methods Direct purification methods Monitoring methods Monitoring methods Soli treatment, plant treatment and other adequate methods Monitoring participation Encouragement of relation Solid waste water treatment methods Monitoring by aquatic life in the rivers Water quality management of relation Solid readment, sewerage, etc.		Wester water treatment (livestock bouses)	Physical, chemical or biological treatment system	DPERTA	Orginal
Improvement of farming practices Improvement of farming practices Improvement of farming practices	Agricultural politilion control	A CONTRACT OF STREET OF STREET	Fertilizer and pesticides control	DYEKTA	DPCK IA
Improvement of farming practices Sludge and septage management Solide waste (garbage) management Solide waste (garbage) management Solide waste (garbage) management Solide resion control (afforestation, sediment control dam, etc.) Watershed management Dredging or clearing Solid restment and disposal systems Soliderosion control (afforestation, sediment control dam, etc.) Water maintenance flow Water participation Dredging or clearing Assistance systems License systems License systems License systems License systems License systems Community participation Fencouragement of subsidy, loan and bounty Issue or suspension of selection Fencouragement of environmental education Fencouragement in the control of campaign Fencouragement methods Domestic waste water treatment methods Domestic waste water treatment methods Domestic waste water treatment methods Direct purification methods Monitoring methods Monitoring methods Water quality management, sewerage, etc. Litting Emercine of felated law and/or regulation Water quality management of isoner of the control of sand the race of the control of sand sand sand sand sand sand sand sand		Agricultural enemicals uses control	managed contracts buffer stain cropping and mulching, etc.	DPERTA	OPEKEBU
Sludge and septage management Collection, treatment and disposal systems Solid waste (garbage) management Collection, treatment and disposal systems Natershed management Collection, treatment and disposal systems Dredging or clearing Collection of Self-purification function Assistance systems License systems License systems Community participation Environmental education Community participation Environmental education Simulation methods, cleaner production technology Industrial waste water treatment methods Domestic waste water treatment methods Direct purification methods Monitoring by aquatic life in the rivers Monitoring methods Water resource development Community participation Environmental education Simulation methods, cleaner production technology Direct purification methods Monitoring by aquatic life in the rivers Monitoring methods Water quality management, sewerage, etc. Enactment of related law and/or regulation Nater quality management.		Improvement of farming practices	Terracens, concerning, context and context and	DKES	Local government, etc.
Solid waste (garbage) management Collection, treatment and disposal systems Watershed management River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River major and calcing development River maintenance flow River major floor floor flow floor f	Other pollution control	Sludge and septage management	Collection, freatment and disposal systems	3220) ocal sourmment etc
Watershed management River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow River maintenance flow Water resource development Dredging or clearing of disches Utilization of Self-purification function Assistance system License system Recouragement of subsidy, loan and bounty License system Recouragement of environmental engineering industries Recouragement of environmental engineering industries Recouragement of environmental engineering industries Recouragement and engineering industries Recouragement and engineering industries Recouragement methods Domestic waste water treatment methods Industrial waste water treatment methods Monitoring methods Monitoring methods Monitoring methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.		Solid waste (garbage) management	Collection, treatment and disposal systems	2 130 1 130	PRIKT
River maintenance flow River maintenance flow Dedging or clearing Utilization of Self-purification function Management of subsidy, loan and bounty Assistance systems License system Facouragement of environmental engineering industries Community participation Community participation Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. Simulation methods Industrial waste water treatment methods Adequate treatment methods Monitoring methods Monitoring methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.		Watershed management	Soil erosion control (afforestation, sediment control dam, etc.)	TACA	710
Dredging or clearing Dredging or clearing Utilization of Self-purification function Assistance systems Licence systems Licence systems Licence systems Licence systems Licence systems Licence systems Community participation Focuragement of subsidy, loan and bounty Issue or suspension of license for waste water discharge Analysts, environmental planner or engineer Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion of campaign. financial assistance Promotion for campaign. financial assistance Promotion of campaign. financial assistance Promotion for campaign. financial assistance Promotion per treatment methods Adequate treatment methods. cleaner production technology Soil treatment, plant treatment and other adequate methods Monitoring methods Monitoring methods Monitoring methods Monitoring methods Water quality management. severage, etc.		Diver maintenance flow	Optimum water allocation		2 6
Dredging or clearing Utilization of Self-purification function Assistance systems Licence systems Licence system Community participation Community participation Community participation Community participation Environmental education Pollution load identification Domestic waste water treatment methods Industrial waste water treatment methods Monitoring methods Monitoring methods Monitoring methods Water quality management, sewerage, etc. Dredging of rivers, clearing of ditches Soil treatment and other adequate methods Water quality management, sewerage, etc.	Unrect purification		Water resource development	7.59	<u>.</u>
Utilization of Self-purification function Utilization of Self-purification function Assistance systems License systems License system Encouragement of environmental engineering industries Community participation Environmental education Pollution load identification Pollution load identification Pollution load identification Donestic waste water treatment methods Industrial waste water treatment methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.			Predeing of rivers, clearing of ditches	FLG	T.G
Assistance systems License sys		Dredging of clearing	Coll trastment plant treatment, cic.	PJT	PJT
Assistance systems Licence systems Licence systems Licence systems Licence systems Licence systems Licence systems Facouragement of environmental engineering industries Facouragement of environmental engineering industries Facouragement of environmental engineering industries Formulation for compaign. Financial assistance Fromotion of campaign. Financial assistance Fromotion for each pollution sources Adequate treatment method		Utilization of Self-purification function	Management of subside load and bounty	PJT	PJT/DPRIND
Licence system Encouragement of environmental engineering industries Tachnology development, financial assistance Human resource development Community participation Environmental education Pollution load identification Pollution industric waste water treatment methods Industrial waste water treatment methods Direct purification methods Monitoring methods Monitoring y aquatic life in the rivers Water quality management, sewerage, etc.	Supporting activities	Assistance systems	issue or suspension of license for waste water discharge	PJT as a secretary	PJTYDPRJND
Encouragement of environmental engineering industries sectioness. Sectioness of campaign. Human resource development Community participation Environmental education Peromotion of campaign. financial assistance Environmental education Peromotion of campaign. Promo		License system	Transcondenses described the second of accidence	MIT, DPRIND	BPPT, BPPI
Human resource development Community participation Community participation Environmental education Promotion of campaign. financial assistance Environmental education Promotion of campaign. Promotion of campaign. Simulation methods. Adequate treatment methods Adequate treatment methods Adequate treatment methods Direct purification methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.		Encouragement of environmental engineering industries	A Linear manufacture of the state of the	BAPEDAL	EMC BBLH
Community participation Environmental education Environmental education Environmental education Simulation methods, magnitude of each pollution sources Pollution load identification Domestic waste water treatment methods Industrial waste water treatment methods Adequate treatment methods Adequate treatment methods, cleaner production technology Soil treatment, plant treatment and other adequate methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.	-	Human resource development	Analysis, environmental planner of collamora	PIT BRLH	PJT. BBLH
Environmental education Promotion of campaign Pollution load identification Adequate treatment methods. Page and pollution sources Domestic waste water treatment methods Adequate treatment methods Industrial waste water treatment methods Soil treatment, plant treatment and other adequate methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.		Community participation	Promotion of campaign, unancial assistance	H INN	3868
Pollution load identification Donnestic waste water treatment methods Industrial waste water treatment methods Industrial waste water treatment methods Direct perification methods Monitoring methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.		Environmental education	Promotion of campaign	rid	Pyr
Donestic waste water treatment methods Industrial waste water treatment methods Industrial waste water treatment methods Direct production methods Direct partification methods Monitoring methods Monitoring methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.	Research and development	Pollution load identification	Simulation methods, magnitude of each poliution sources	Cott Cara	DPIT Cinto Karva
Industrial waste water treatment methods Adequate treatment methods, ckanct production technology Direct purification methods Monitoring methods Monitoring methods Water quality management, sewerage, etc.		Domestic-waste water treatment methods	Adequate treatment methods	Children Trim	RRPT, RPP1
Direct purification methods Soil treatment, plant treatment and other adequate methods Monitoring methods Monitoring by aqualic life in the rivers Enactment of related law and/or regulation Water quality management, sewerage, etc.		Industrial waste water treatment methods	Adequate treatment methods, cleaner production technology	Mill, Of Nation	1
Monitoring methods Monitoring by aquatic life in the rivers Enactment of related law and/or regulation Water quality management, sewerage, etc.		Direct purification methods	Soil treatment, plant treatment and other adequate methods	2 2	n laa
Enactment of related law and/or regulation Water quality management, sewerage, etc.		Monitoring methods	Monitoring by aquatic life in the rivers	11815	
	I aministration and/or Damilation	Fraciment of related law and/or regulation	Water quality management, sewerage, etc.	BBLH as a secretary	
Stringent of regulation or standards	Legislandi and or regulation		Stringent of regulation or standards	BBLH as a secretary	

Table A3-23 Required Projects on Water Quality Management in the Brantas River Basin

		harmon (alternative description) and the	Priority	Sepuds
Management activities	,	Actions (projects) required	Linorni	
Overall plan, program and	Establishment of Water Quality Management system	Transference of Wood Continu Mannagana Changement in PIT	Urecot	
coordination	institutional development of PJ i	Enhancement of existing laboratory	Urgent	Panty commencement
		Foundation of new laboratory in Malang	Medium	
Water quality monitoring	Monitoring of river water	Isaabishmeni new system of river water	Urgent	
	1	Sampling and analysis of harmful components	High	
		Installation of automatic water quality monitoring system:	16.53	
		Sampling and analysis of river bed sediment	This is	
	tion sources inspection (monitoring)	Compession wester white (Casimess and Compession Compes	Xecium Xecium	Party comprehent
		London waste water (Dwellags)	Ursent	Alicady commencement
		Industrial Waste Water (Industrials)	1 to 1 to 1	
		Industrial waste water (small scale industries)	11.21	-
		Industrial waste water (harmful components)	11.0	
		Agricultural waste water (livestock houses)	Creent	Partly commencement
		Other sources		L'anty commencement
	Preparation of inventory	Inventory survey	H Sh	
Domestic pollution control		CTPSTS (Sumbaya)	l'Urgent	As a model project
		CTPSTS (Malang)	Organi	01110
		CTPSTS (Crocial facilities in other cross)	101gan	
	Company of the contract of the	Concessor facilities (Sewie Look emboff tank), Surphaya	13.5	Partly commencement
	and merities	Sanitation facilities (Sertic tank, imhoff tank), Malang	H.	ditto
		Sanitation facilities (Septic tank, 19thoff tank), Others	Medium-low	dino
	Offisite treatment incluses	Sewempe system (Sumbaya, SSDP)	. Urpemi	Fanty commencement
		Sewerige system (Malang)	Urgent	_
		Sewemge systems (Other cities)	Medium-low	
Industrial pollution control	On-site treatment facilities	Waste water treatment facilities for major producers	Circent	Parly commencement
		Waste water treatment facilities for remaining large and medium scale industric High	11.gr	
		Waste water treatment facilities for small scale industries	Wedulin low	•
	Off-site treatment facility	Centralized reasoned Jacinty for hot Zone	Modium	٧ -
		Contraction transmines facilities for industrial model to the contraction of the contract		A ready commencement
		Where unjections managed the little for major produces.	Urgent	Рапіу сопиненсемен
Agricultural pollution control	Waste water treatment (Twestock houses)	waste water incament inclinios for remaining livestock bluess	High-low	
	Control of the second s	Propagation of supplieds	五五	,
	Institution of familia orderes	Technical approaches	Medium-low	As a watershed management
		Vegetative approaches	Medium-low	ditto
Other patturen control	Solid wasie (garbage) management	Domestic solid waste collection, treatment and disposal systems	14.87	Partly commencement
		Industrial solid waste collection, treatment and disposal systems	High	
	Sepage and sludge management	Septage collection, treatment and disposal systems	5. ·	Property Communication
		Studge collection and disposal systems	High High-low	As a wareshed management
	Watershed management	Soli erosion construitation del section de	High	
Direct purstication	Kiver manienance now	Opposition water association. Water resource development	t.	Already commencement
	Diedging or cleaning	Dredging of rivers, clearing of disches	High-low	As a neer facilities management
	Utilization of Self-purification function	Soil treatment, plant treatment, etc.	Tow	
Supporting activities	Assistance systems	Establishmen of subsidy, low-interest loan and bounty	HZIH.	There was a particular of the said of
	License system	Issue or suspension of license for waste water discharge	High-low	Paully commencement
	Encouragement of environmental engineering indust	Technology gevelopment, unancia, assistance, art privilege. A colorie analogomental planter or contineer	Urzen	
	Human resource development	Promotion of Consoling Distances assurance	High-low	12 and y commencement
	Community participation	Promotion of compatign	ligh -	ditto
Research and development	Pollution load identification	Sinulation methods, magnitude of each pollution sources	High	Already commencement
	Domestic water treatment methods	Adequate treatment methods	£.	onto.
	Industrial waste water treatment methods	Adequate treatment methods, cleaner production (confology	1	Partie companient
	Uncer purification methods Monitoring methods	Monitoring by aquatic life in the rivers	worl	
Legislation and/or Regulation	Enactment of related law and/or regulation	Enactment of related law and/or regulation Water quality management, sewerage, etc.	Urgent	Party commencement
- 1		Stringent of regulation or standards	าไม่ยา	Party commencement

Table A3-24 (1) Implementation Schedule of Water Quality Monitoring

Monitoring of river water (Equatishment of new brontony in PTT) Contact of the production of the profit of the	Actio	Actions (projects) required	Investment cost	1999	2000	2002		2010	2015	2020
Sampling and analysis of harmonitoring system) Nonitoring by automatic Nonitoring by automatic Nonitoring by automatic Nonitoring by automatic Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Nonitoring and analysis of river bed softment Included in ** In	ŧ	Establishment of new laboratory in 1917		-1-	-					
Sampling and analysis of included in " Naminoring by automatic user communic included in " Nampling and analysis of river bod sediment included in " Nampling and analysis of river bod sediment included in " Domestic water water (dwellings) included in " In	3	(Establishment new monitoring system)	*4,500	!	200	3,500				
hamful components Monitoring by automatic Monitoring by automatic Monitoring by automatic Monitoring by automatic Monitoring by automatic Monitoring system Sampling and analysis of river bed sediment Included in ** Domestic waste water (business activities) Included in ** Industrial waste water (major producers) Included in ** Included in **		Sampling and analysis of								; I
Nonitoring by automatic Nampling and analysis of river bed sediment Nampler quality monitoring system Domestic water (business activities) Included in "		harmful components	Included in **							
Sampling and analysis of river bed sediment included in " Sampling and analysis of river bed sediment included in " Domestic waste water (business activities) included in " Industrial waste water (major producers) included in " Industrial waste water (ternaning industries) included in " Included in "		Monitoring by automatic	installed by Wonorejo		111					
Sampling and analysis of river bod sodimont Included in ** Domestic waste water (business activities) Included in ** Include		water quality monitoring system	Dam Project							
Domestic waste water (business activities) Included in ** Domestic waste water (dwellings) Included in ** Industrial waste water (temaining industries) Included in ** I	Monitoring of	Sampling and analysis of river bed sediment		· 1 1 1 1 1 1 1 1 1	; 	The state of the s				
Domestic waste water (business activities) Domestic waste water (dwellings) Included in ** Industrial waste water (remaining industries) Included in ** I	river bed sediment		Included in **							
Domostic waste water (dwellings) Included in ** Industrial waste water (remaining industries) Included in ** Industrial waste water (remaining industries) Included in ** I	Pollution sources inspection	Domestic waste water (business activities)								
Domestic waste water (dwellings) Included in ** Industrial waste water (remaining industries) Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Included in ** Inventory survey	(monitoring)		Included in **							- \ -
Industrial waste water (major producers) Industrial waste water (remaining industries) Industrial waste water (small scale industries) Industrial waste water (hternful components) Included in ** Agricultural waste water (investock houses) Included in ** Includ		Domestic waste water (dwellings)		1				100		
Industrial waste water (major producers) Industrial waste water (remaining industries) Industrial waste water (small scale industries) Industrial waste water (harmful components) Included in ** Agricultural waste water (ilvestock houses) Included in ** Included in **			Included in ".	!	-					
Industrial waste water (remaining industries) Industrial waste water (small scale industries) Industrial waste water (harmful components) Included in ** Agricultural waste water (livestock houses) Included in ** Included		Industrial waste water (major producers)				- Control of the cont			l.i.	
Industrial waste water (remaining industries) Included in ** Included in ** Included in ** Included in ** Agricultural waste water (hatraful components) Included in ** Other sources Inventory survey			Included in *·				i			
Included in *. Included in *. Included in *. Included in *. Agricultural waste water (harmful components) Included in *. Other sources Included in *. Included in *. Included in *.		Industrial waste water (remaining industries)		!	<u> </u> !		1			1
Industrial waste water (small scale industries) Included in *. Agricultural waste water (livestock houses) Included in *. Other sources Included in *. Included in *.			Included in *		_					
Included in *. Included in *. Agricultural waste water (hivestock houses) Agricultural waste water (livestock houses) Included in *. Other sources Included in *.		Industrial waste water (small scale industries)							: 	
Industrial waste water (harmful components) Agricultural waste water (livestock houses) Included in **. Other sources Included in **. Inventory survey			Included in *							
Agricultural waste water (livestock houses) Agricultural waste water (livestock houses) Included in ** Included in ** Included in ** Included in **		Industrial waste water (harmful components)				<u> </u>				
Agricultural waste water (livestock houses) Included in ** Other sources Inventory survey			Included in **							
Other sources Included in ** Included in **		Agricultural waste water (livestock houses)				The second secon	1	A Comment of the Comm		
Other sources Included in **			Included in **							-
Inventory survey		Other sources								
Inventory survey			Included in *.							
•	Preparation of inventory	Inventory survey			Andreas Pality Comments	The second secon	The state of the s			
			•						_	_ _

Note: Figures in this table are constant values as of 1996 (unit: million Rp.)

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Table A3.24 (2) Implementation Schedule of Domestic Waste Water Treatment

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4,500 4,500 18,000 4,500 18,000 20,000 5,000 20,000 12,000 3,000 12,000 4,500 4,500 18,000 4,500 18,000 4,500 8,000 8,000 32,000 8,000 16,000 16,000	Acti	Actions (projects) required	Investment cost	6661	2000		2005		2010	!	2015		2020
CTPSTS (Malang) CTPSTS (Malang) So,000 CTPSTS (Crucial facilities in other cities) Septic tank, imhoff tank (Malang) Sewerage system (Malang) Sewerage system (Malang) Sewerage systems (Other cities) Sewerage systems (Other cities) So,000 Sewerage systems (Other cities) So,000 Sewerage systems (Other cities) So,000 Sewerage systems (Other cities) So,000 Sewerage systems (Other cities) Sewerage systems (Other cities) Sewerage systems (Other cities) Sewerage systems (Other cities) Sewerage systems (Other cities)	On-site treatment facilities	CTPSTS (Surabaya)											
CTPSTS (Malang) 50,000 50,000 5,000 20,000 5,000 20,000 5,000 20,000 20,000 20,000 20,000 20,000 12,000 3,000 12,000 3,000 12,000 3,000 12,000 3,000 12,000 3,200 12,000 3,200 12,000 3,200 12,000 3,200 12,000 3,200 12,000 4,500 18,000 4,500 18,000 4,500 18,000 3,200 18,000 3,200 18,000 32,000 18,000 32,000 18,000 32,000		•	000'001	4,500	4,500	18,000	4.500	18,000	4,500	18,000	4.500	18,000	5.500
CTPSTS (Crucial facilities in other cities) 30,000 12,000		CTPSTS (Malang)			282								
CTPSTS (Crucial facilities in other cities) 30,000 12,000 3,000 12,000 CTPSTS (Others) 20,000 4,500 12,000 12,000 12,000 Septic tank, imhoff tank (Surabaya) 100,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Malang) 100,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Others citise) 300,000 8,000 32,000 80,000 Sewerage system (Malang) 200,000 8,000 32,000 16,000 Sewerage systems (Other cities) 160,000 16,000 4,000 16,000			20,000			20,000	5,000	20.000	5.000	20,000	5,000	20.000	2,000
CTPSTS (Others)		CTPSTS (Crucial facilities in other cities)		<u> </u>	89								
CTPSTS (Others) 20,000 4,500 18,000 4,500 18,000 4,500 18,000 2,200 Septic tank, imhoff tank (Malang) 100,000 4,500 18,000 4,500 18,000 18,000 Septic tank, imhoff tank (Others citise) 300,000 4,500 18,000 4,500 18,000 Sewerage system (Surabaya) 200,000 8,000 8,000 8,000 32,000 8,000 16,000 Sewerage systems (Other cities) 100,000 16,000 4,000 16,000 16,000 16,000 16,000			30,000	ļ		12,000	3,000		3,000	12,000	3.000	12,000	3,000
Septic tank, imhoff tank (Surabaya) 20,000 4,500 4,500 18,000 4,500 18,000 4,500 18,000 18,000 18,000 20,000		CTPSTS (Others)											
Septic tank, imhoff tank (Surabaya) 100,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Malang) 100,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Others citixe) 300,000 30,000 8,000 8,000 80,000 Sewerage system (Surabaya) 200,000 8,000 32,000 8,000 32,000 Sewerage systems (Other cities) 100,000 16,000 4,000 16,000			20,000	1			:	5,200	1,300	5.200	1.300	5,200	008.1
Septic tank, imhoff tank (Malang) 100,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Others citise) 300,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Others citise) 300,000 8,000 8,000 80,000 Sewerage system (Surabaya) 200,000 8,000 32,000 8,000 32,000 Sewerage systems (Other cities) 100,000 16,000 4,000 16,000 16,000	Sanitation facilities	Septic tank, imhoff tank (Surabaya)											
Septic tank, imhoff tank (Malang) 100,000 4,500 18,000 4,500 18,000 Septic tank, imhoff tank (Others citixe) 300,000 3,00,000 8,000 80,000 Sewerage system (Surabaya) 200,000 8,000 32,000 8,000 32,000 Sewerage system (Malang) 100,000 16,000 4,000 16,000			100,000	1	4,500	18,000	4,500	18,000	4.500	000*81	4.500	18,000	5.500
Septic tank, imhoff tank (Others citixe) 300,000 4,500 18,000 18,000 Sewerage system (Surabaya) 300,000 8,000 32,000 32,000 Sewerage systems (Malang) 100,000 16,000 4,000 16,000		Septic tank, imhoff tank (Malang)											
Septic tank, imhoff tank (Others citixe) 300,000 80,000 Sewerage system (Surabaya) 200,000 8,000 32,000 8,000 32,000 Sewerage system (Malang) 100,000 16,000 4,000 16,000 16,000			100,000	4,500	4,500	18,000	4,500	18,000	4,500	18,000	4,500	18,000	5.500
Sewerage system (Surabaya) 300,000 8,000 80,000 Sewerage system (Malang) 100,000 16,000 4,000 16,000		Septic tank, imhoff tank (Others citise)											
Sewerage system (Surabaya) 200,000 8,000 32,000 32,000 Sewerage system (Malang) 100,000 16,000 4,000 16,000			300,000					80,000	20.000	80.000	20.000	80,000	20,000
Sewerage system (Malang) Sewerage systems (Other cities) Sewerage systems (Other cities)	Off-site treatment facilities	Sewerage system (Surabaya)											
100,000 1,000		•	200,000	8,000	8,000	32,000	8,000	32,000	10,000	40,000	10,000	40,000	12,000
100,000		Sewerage system (Malang)											
			000'001			16,000	4,000	16,000	4,000	24,000	900.9	24,000	6.000
1		Sewerage systems (Other cities)		·					_ ====				
00005			20,000	!	· · · · · · · · · · · · · · · · · · ·			1	:	16,000	98; 98;	22,000	8,000

Note: Figures in this table are constant values as of 1996 (unit: million Rp.) CTPSTS: Combined Type Private Sewage Treatment System

Table A3-24 (3) Implementation Schedule of Industrial Waste Water Treatment

	hariane (meniane) sancired	Investment cost	6661	2000		2005		2010		2015		2020
	מווים להולינים המשתה ב			<u> </u>		-						
Op-site treatment facilities	Waste water treatment facilities											
	for major producers	1,000,000 45,000 45,000	45,000	ļ	180,000	45,000	180,000	45,000	180.000	45,000	180,000	55,000
	Winterman reaction facilities for remaining					ı				Ì	-	
	Targe and medium scale industries	400,000		<u>;</u>		1	100,000	25,000	000'001	25,000	100.000	20,000
	With the state of the little o					-		**				
	Waste water treatment facilities	000 00				·		i	32,000	8.00	32,000	8,000
	for small scale industries	onnine				1				-		
Officity meatment facility	Centralized treatment facility for hot zone											
לוויסופ חישומים מועיווסו		800,000		:	140,000	35,000	140,000	35,000	180,000	45,000	180,000	45,000
	Centralized treatment facilities			-		1			•	- 1		
	for small scale industries	80,000							32,000	8,000	32,000	80.8
	Centralized treatment facilities	Alredy commenced	, 		•		1	:			-	
	for industrial parks	,										

Note: Figures in this table are constant values as of 1996.

Table A3-24 (4) Implementation Schedule of Agricultural Waste Water Treatment

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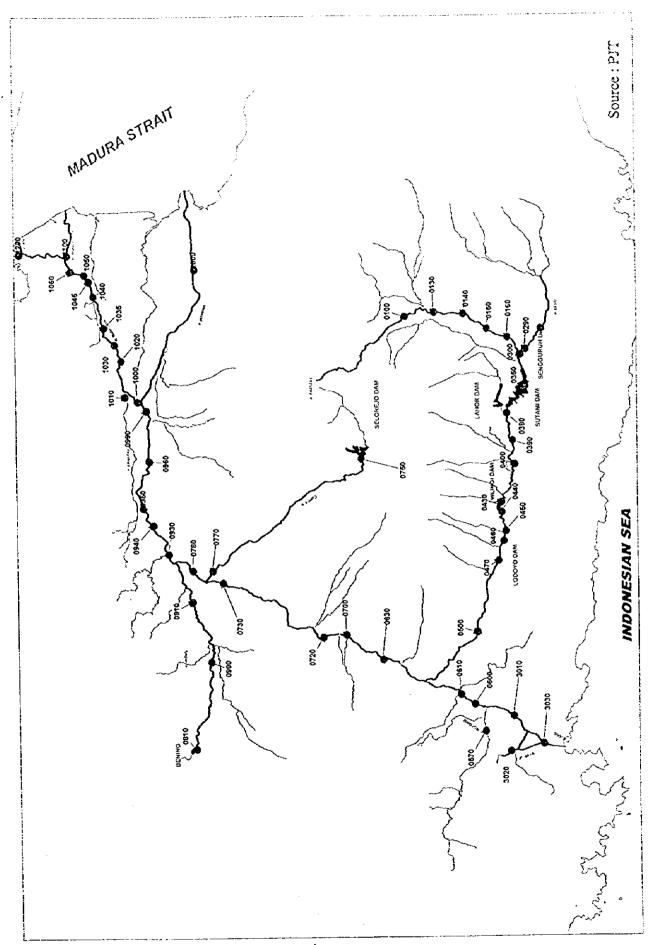
Waste water treatment Waste water treatment facilities for major producers Waste water treatment facilities						3					_	
nent .	r facilities r facilities			1		1						Control of the Control
	r facilities									_		
1 2	r facilities	000'001	4,500 4,500	4,500	18,000	500	18,000	4,500	18,000	4,500	18,000	5.500
						704						
for remaining livestock houses	sk houses	000'09					16,000	4,000	16,000	4,000	16,000	16,000
Agricultural chemicals uses Preparation of guidelines	ines		ptot		2							·
control		•										
Improvement of Technical approaches		Included in water-										
farming practices	<u>। जि</u>	shed management					į					
Vegetative approaches		Included in water					į					
	: T 3	shed management										

Note: Figures in this table are constant values as of 1996 (unit; million Rp.).

Table A3-24 (5) Implementation Schedule of Solid Waste and Septage Management

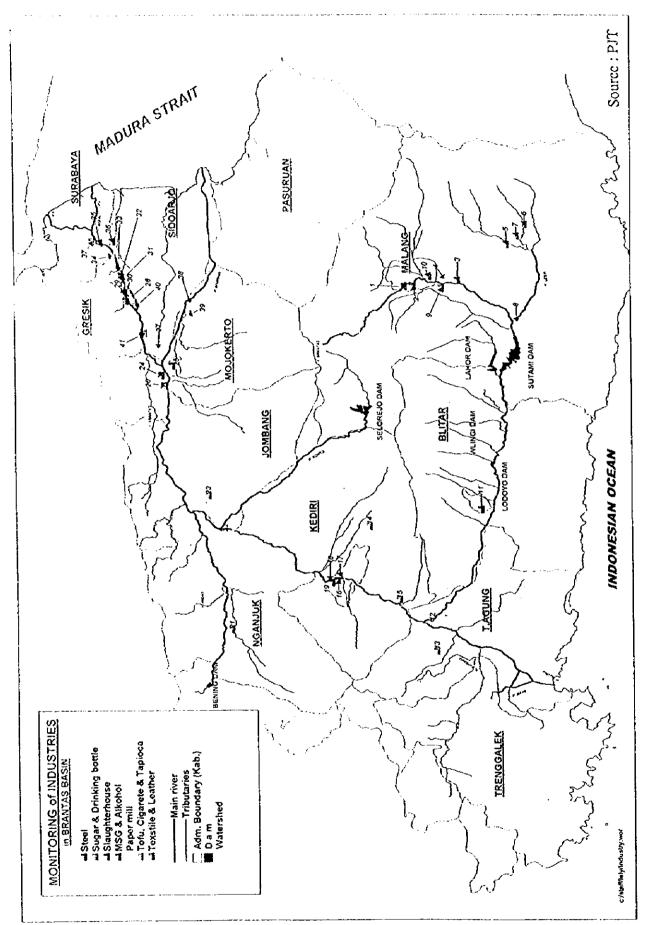
		,	900	0000		2005		2010		2015		2020
Activ	Actions (projects) required	thvestment cost	1999	3		3				1		
			-				The second second second			,		
Solid waste (carbage)	Domestic and industrial waste collection.										· · · ·	
management	treatment and disposal systems	000,111	2,000	2.000	12,000	3,000	24,000	6,000	24,000	000'9	24,000	8.000
Hallagellielli			†	-							200000000000000000000000000000000000000	100000000000000000000000000000000000000
September and sludge	Septage and sludge collection,									_		
	-	000	4 000	1 8	23,000	8	48,000	12 000	48,000	12,000	48,000	16,000
management	treatment and disposal systems	222,000	3	3	24,000	2000	2000			-		
Watershed management	Soil crosion control	Included in water-								:	:	
·				!						-		
	(afforestation, sediment control dam, etc.)	shed management	•					-				

Note: Figures in this table are constant values as of 1996 (unit: million Rp.).



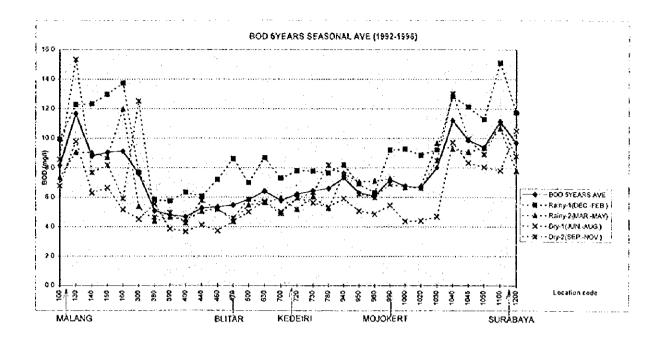
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Figure A3-1 River Water Quality Monitoring Points by PJT



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Figure A3-2 Location of Monitoring Industries by PJT



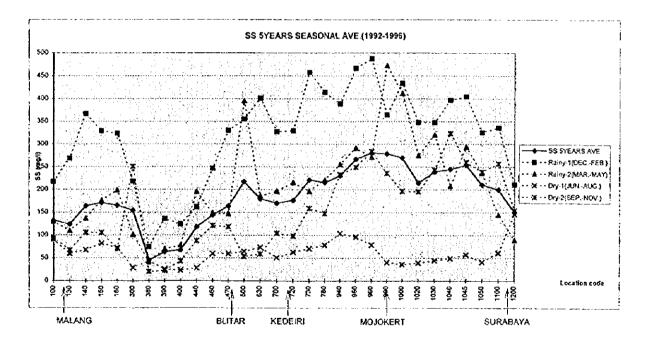


Figure A3-3 (1) Seasonal Variation and Geographical Distribution of BOD and SS in the Brantas, Surabaya and Mas Rivers

Source: PJT

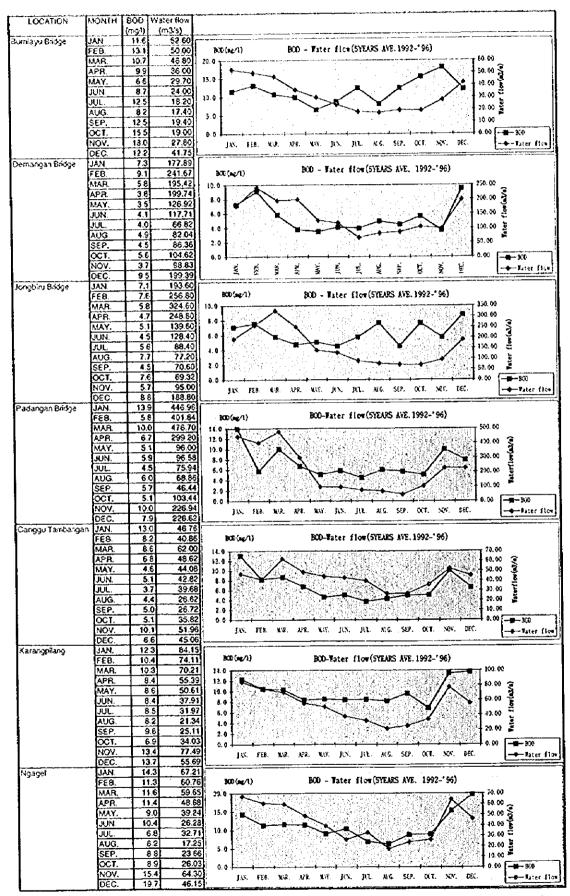


Figure A3-3 (2) Seasonal Variation and Geographical Distribution of BOD and SS in the Brantas, Surabaya and Mas Rivers

Source: PJT -

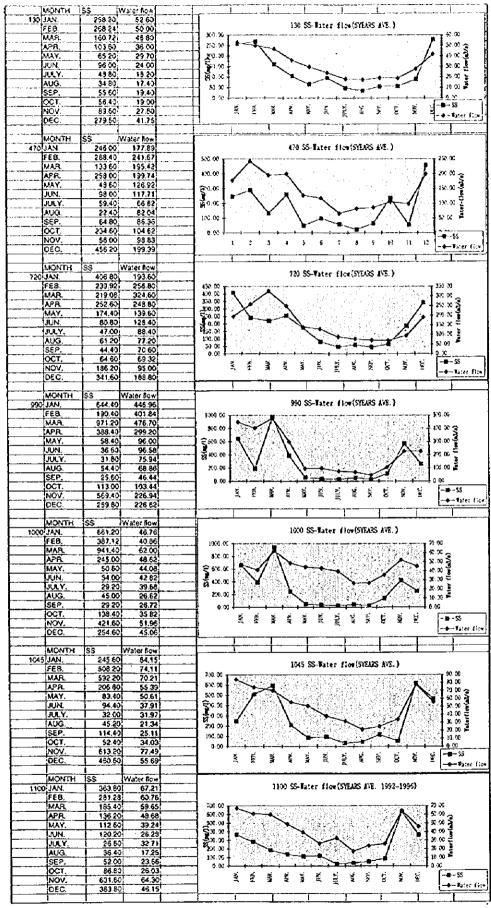


Figure A3-3 (3) Seasonal Variation and Geographical Distribution of BOD and SS in the Brantas, Surabaya and Mas Rivers

Source: PJT

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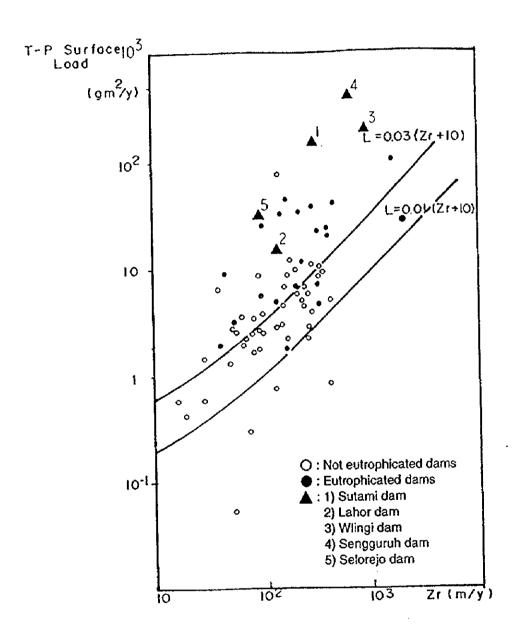
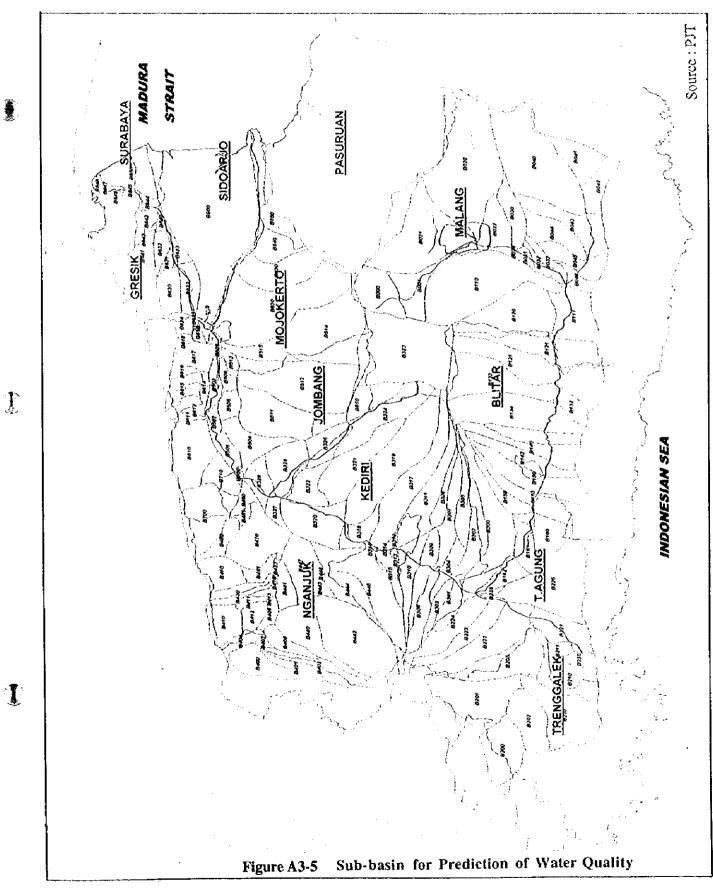
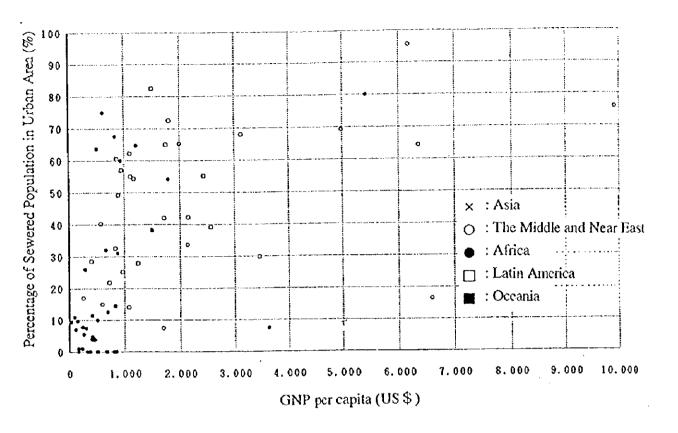


Figure A3-4 Assessment of Eutrophication of the Reservoirs (Vollenweider Model)





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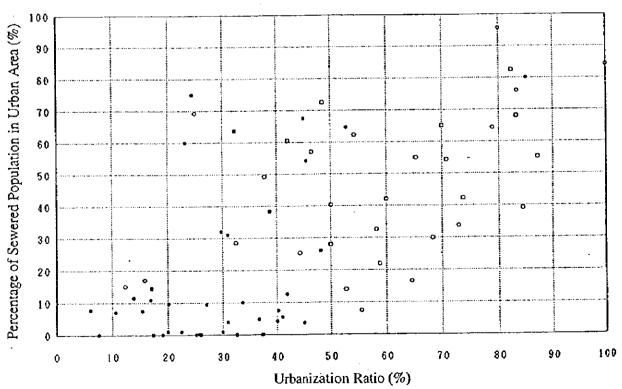


Figure A3-6 Relationship Between Percentage of Sewered Population in Urban Area and GNP per capita and Urbanization Ratio

Source: JICA

Discharge-BODLoad-SS

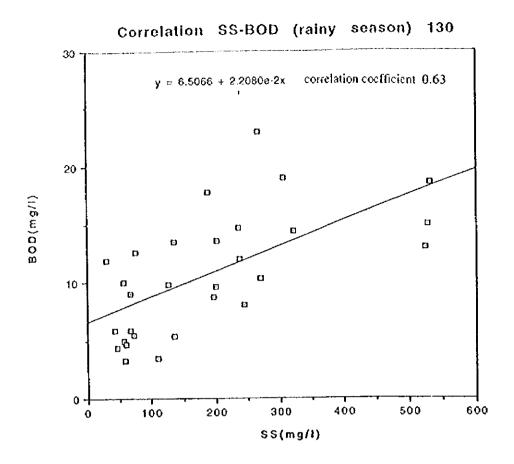
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Figure A3-7 Run-off Pollution Load and Water Flow

Discharge(m3/s)

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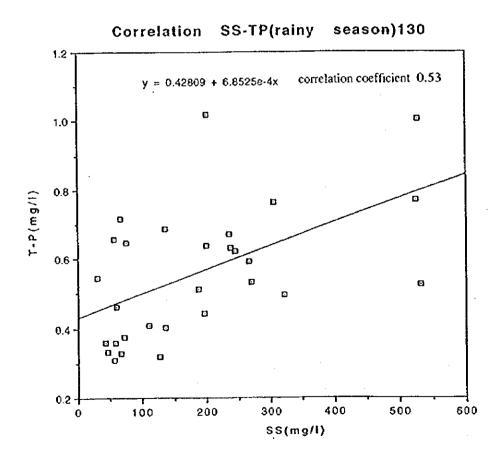
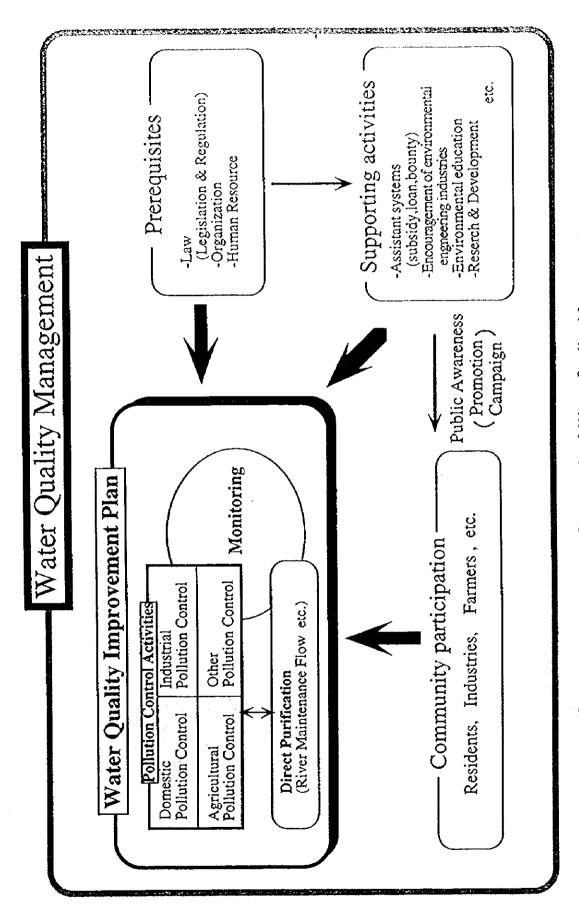


Figure A3-8 Correlation between BOD, T-P and SS



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Figure A3-9 Proposed Framework of Water Quality Management

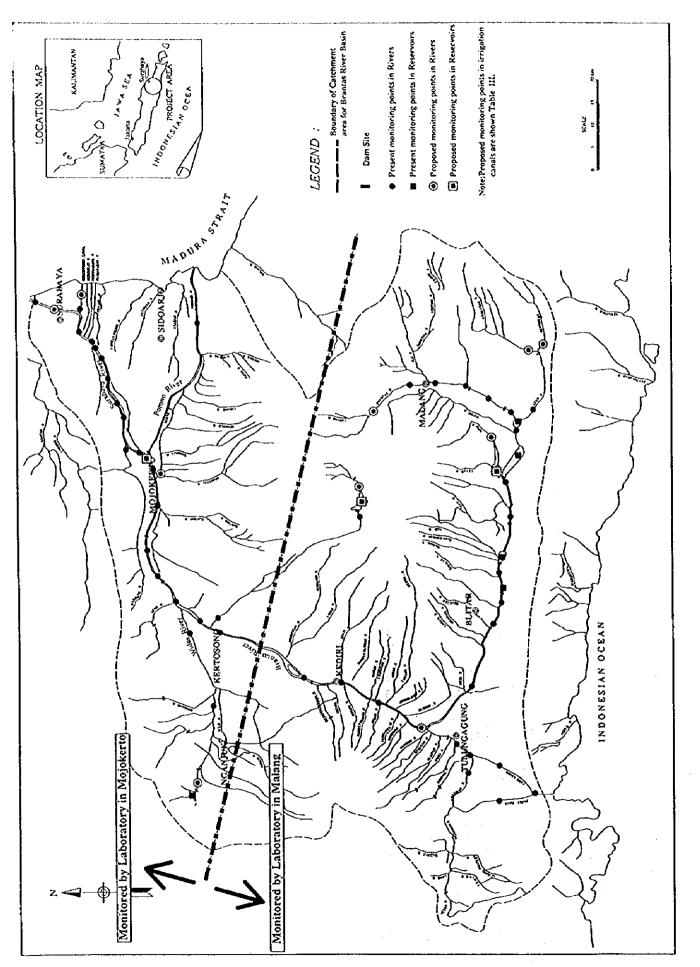
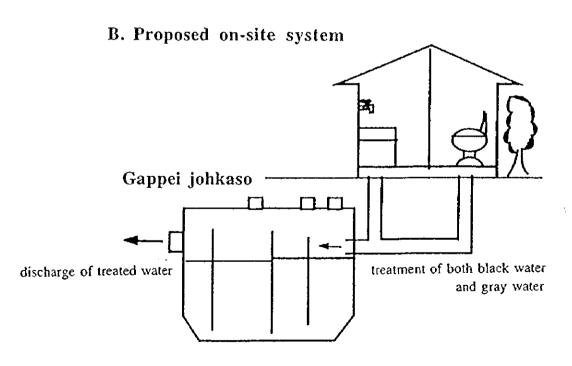


Figure A3-10 Proposed Monitoring Points in the Rivers and Reservoirs



to night soil treatment plant or final disposal site

Figure A3-11 Present and Proposed On-site Domestic Waste Water Treatment Systems

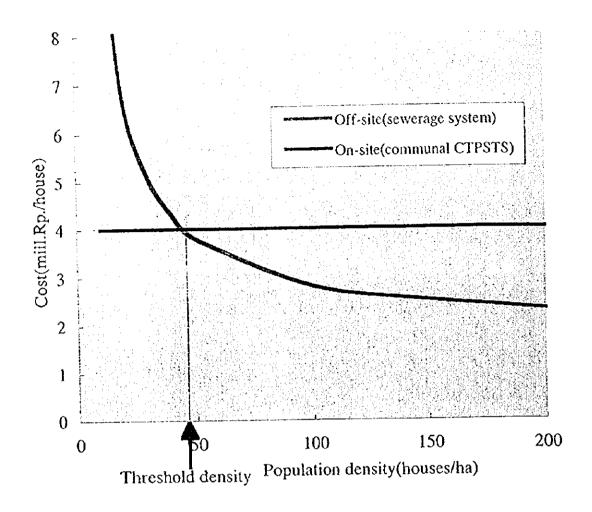
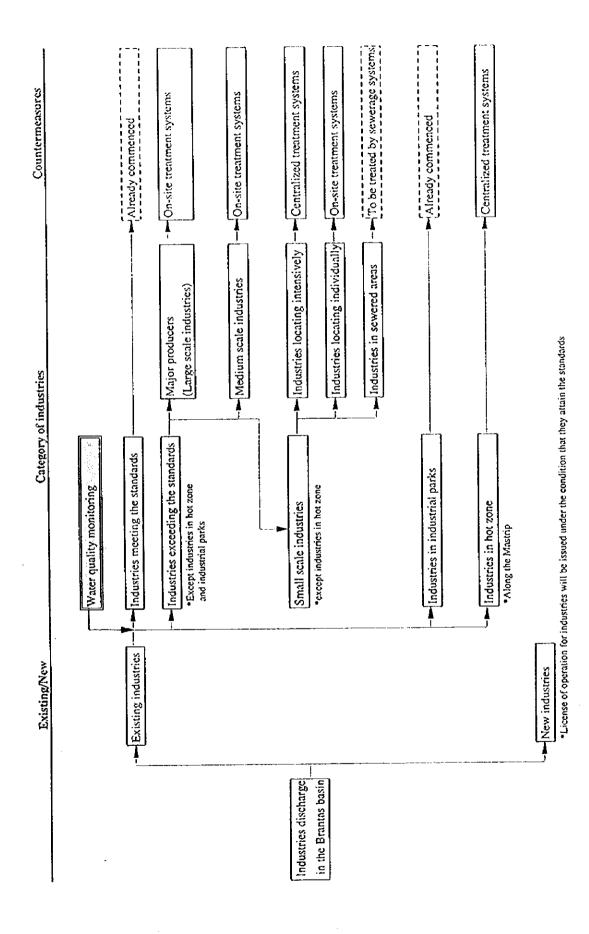


Figure A3-12 Per House Cost Comparison Between Off-site and On-site Systems



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Figure A3-13 Basic Principal on Industrial Waste Water Treatment

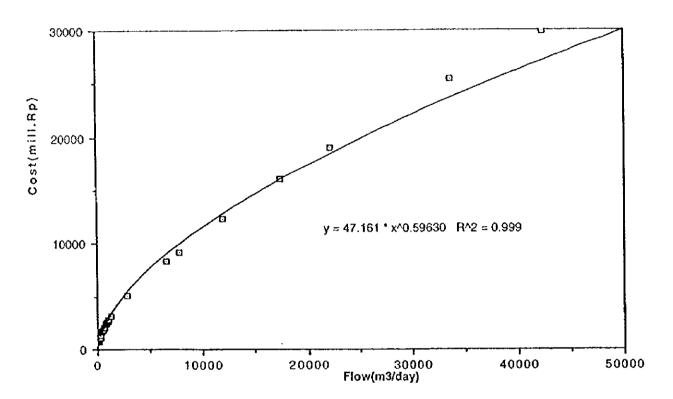
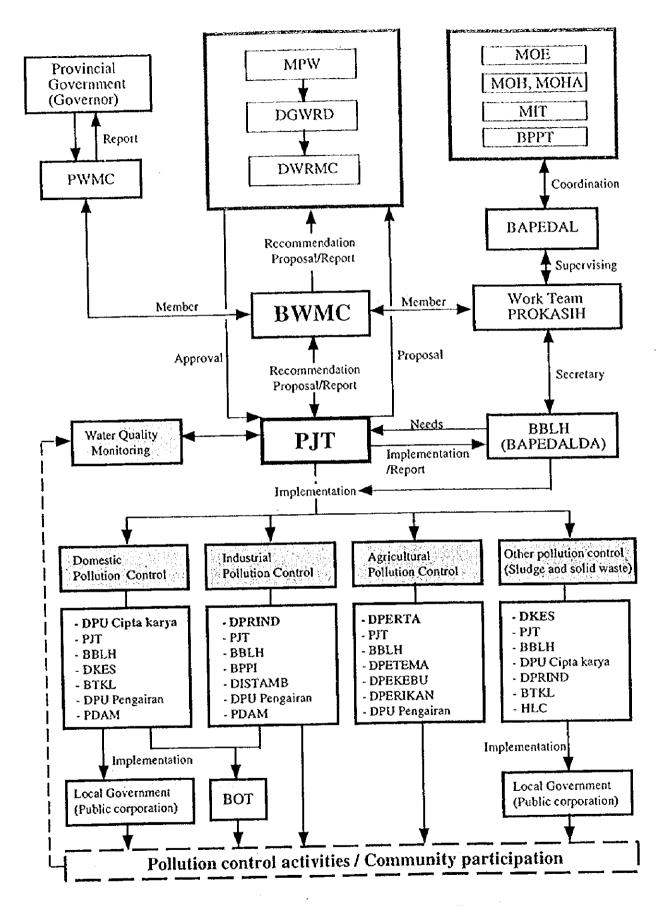


Figure A3-14 Secondary Treatment Cost

Source:Water quality management sector project, appendix, june 1990 (Agency for research and development ministry of public works)



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Figure A3-15 Proposed Organization of Water Quality Management

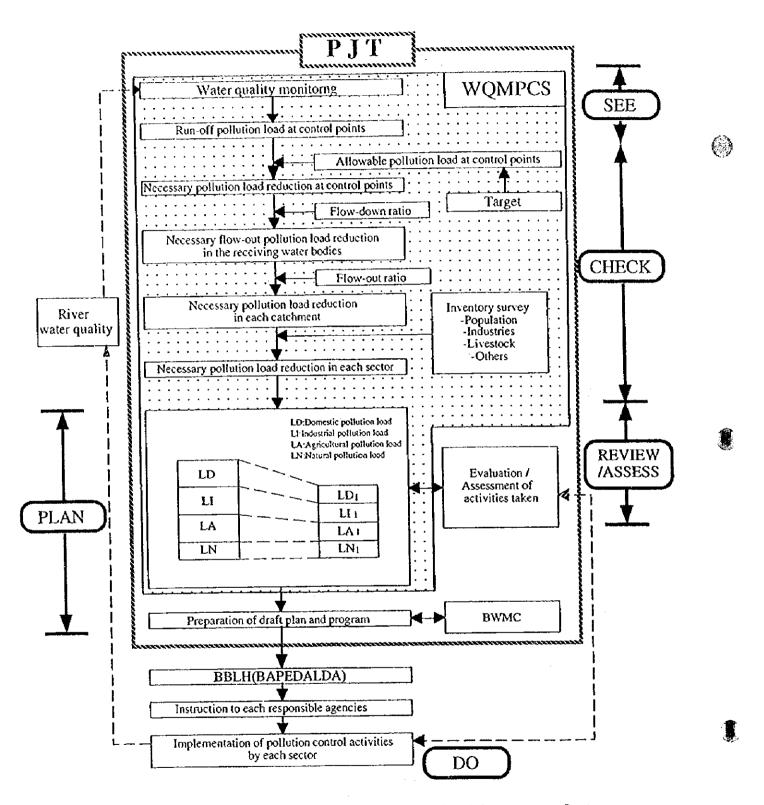
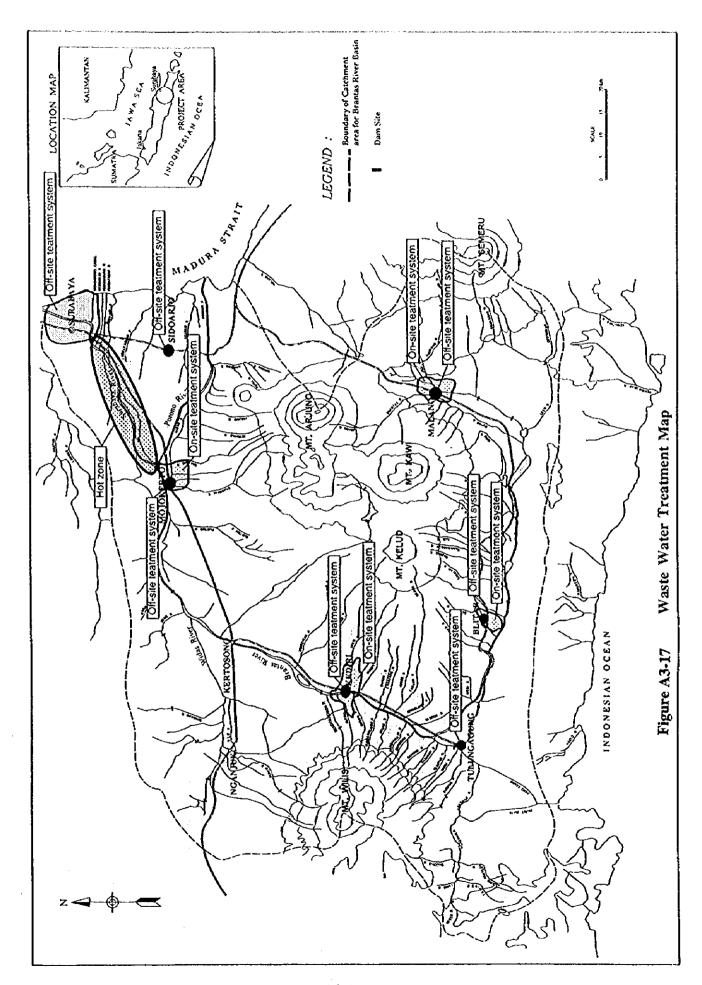


Figure A3-16 Continuous Water Quality Management System



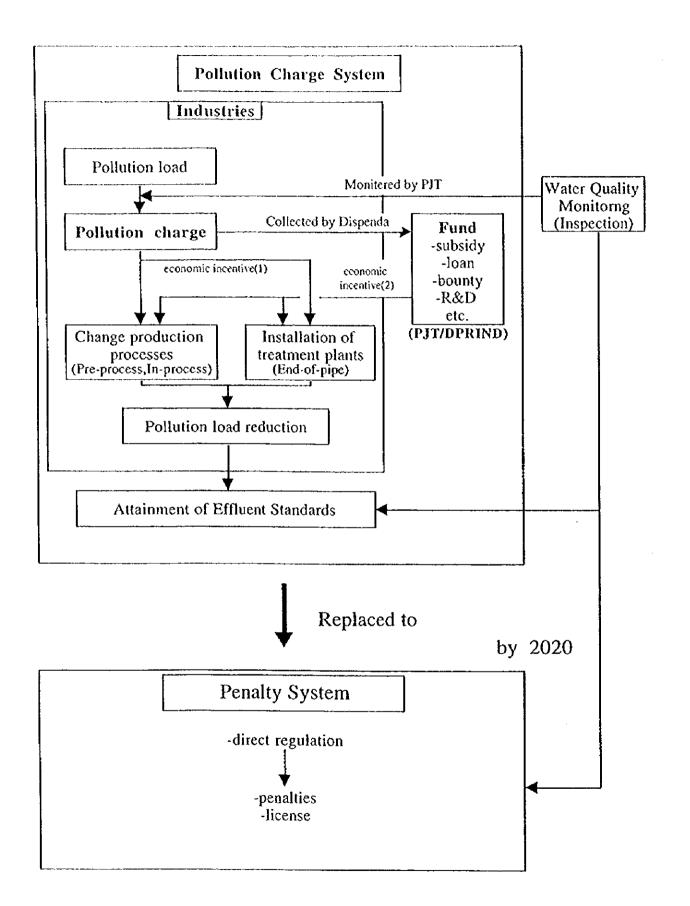


Figure A3-18 Recommended Pollution Charge System
A3-112