

Figure 4-8. Schematic River System in and Around Study Area (West Banjir Canal)

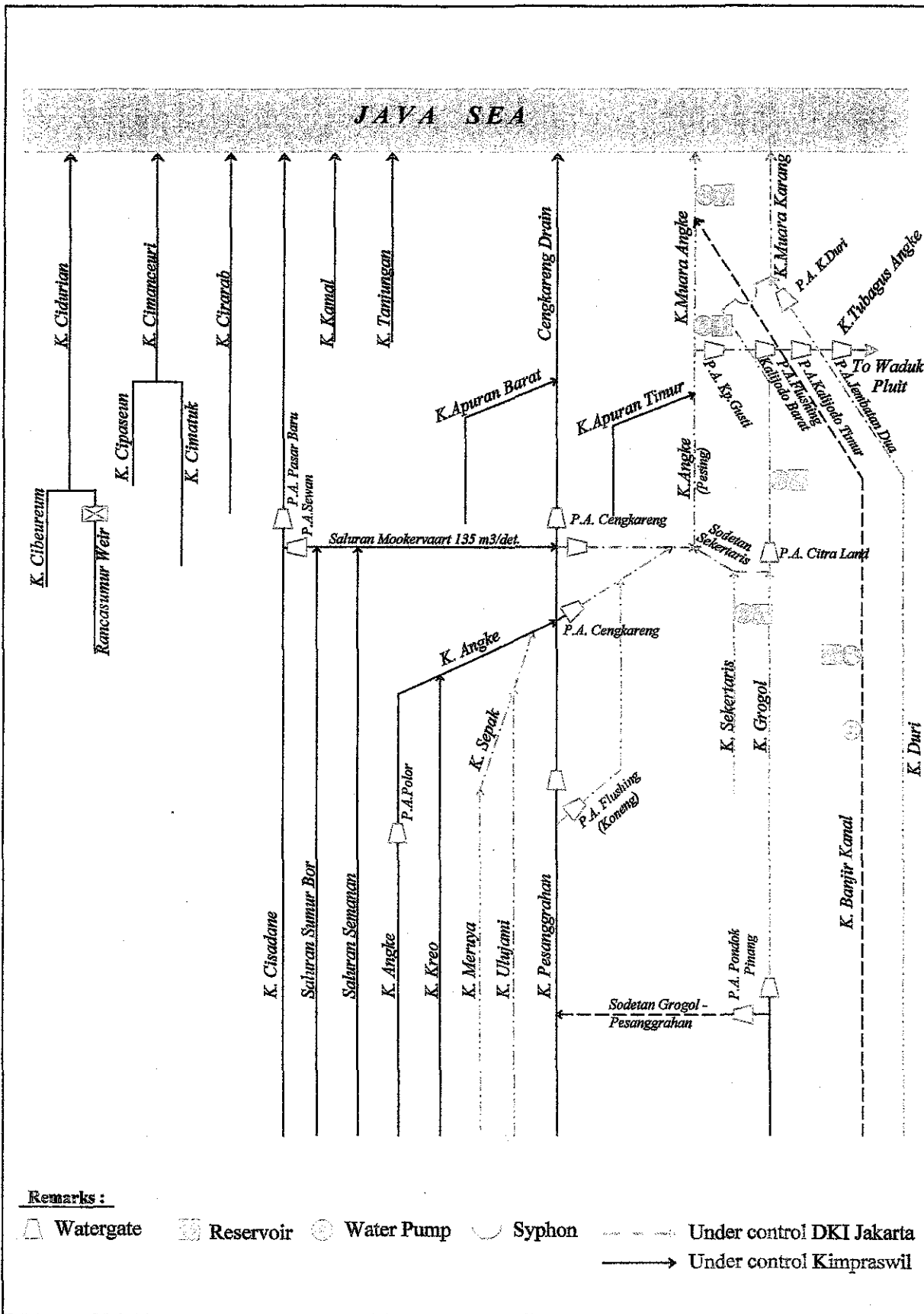


Figure 4-8. Schematic River System in and Around Study Area (Center Banjir Canal)

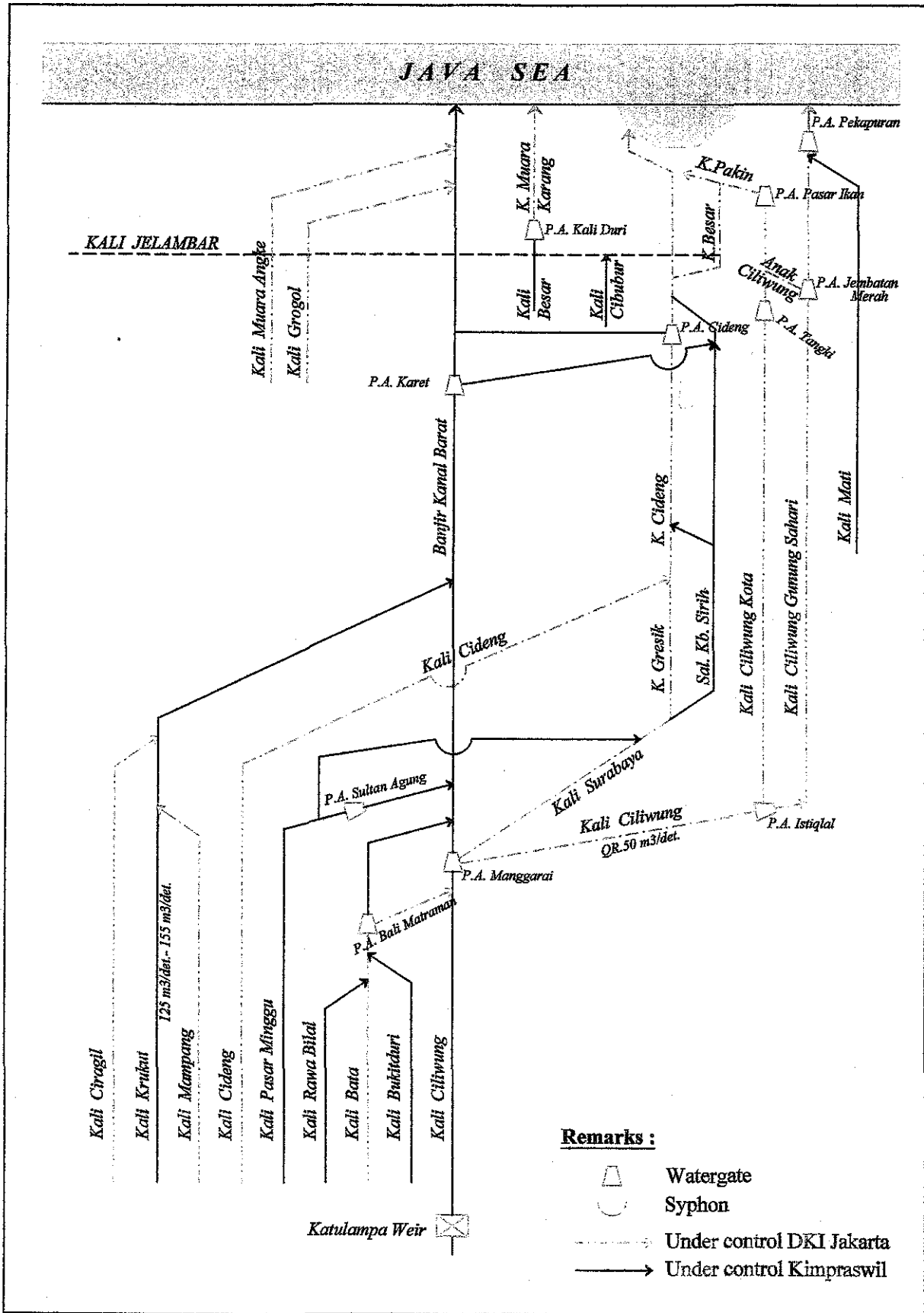


Figure 4-8. Schematic River System in and Around Study Area (East Banjir Canal)

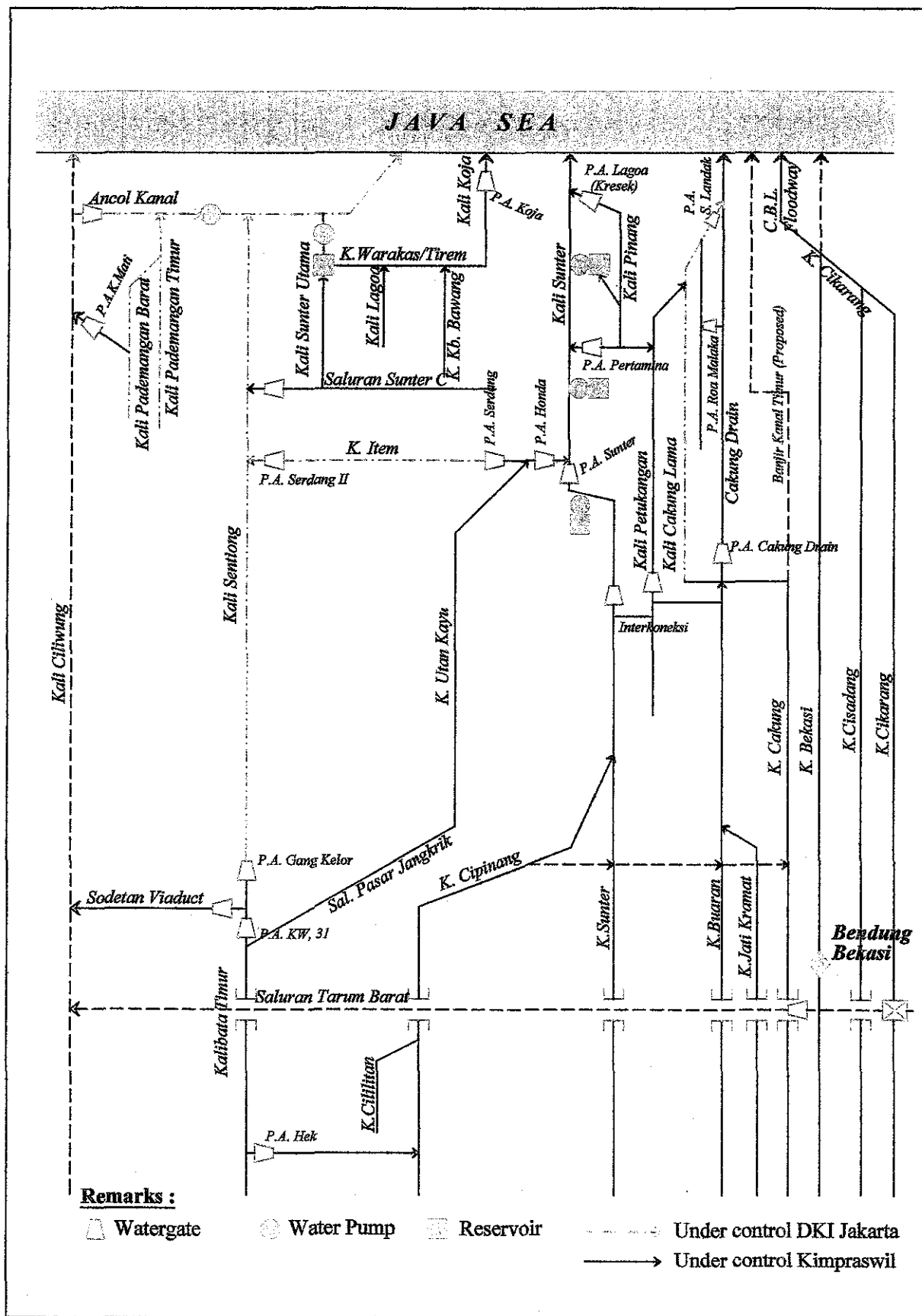


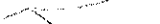

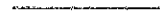
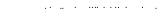
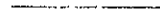


Figure 4-9.
River Management
By Respective Institution

Scale 1 : 500.000



LEGEND :

-  River control under DKI
-  River control under KIMPRASWIL
-  Boundary of Province
-  Boundary of Municipality
-  Boundary of District

Source : Agreement of area responsibility of river management between Department of Settlement and Infrastructure and DKI Jakarta ,1994

Bogor District and Municipal

Mayor river facilities in city and district is operate and under the responsibility of central government (Kimpraswil). Minor drainage facilities in middle reach which was used for irrigation, operated and maintained under Dinas PU – District and Municipal of Bogor.

Watershed development in upstream of Ciliwung, Cikarang, Sunter and Cipinang are managed by District authority. Large high density development in marginal area of hilly and mountain system are approved by District authority, although the guidelines for development in Bopunjur has been issued by Central Government through Presidential Decree with implementation procedure from West java Provincial (Governor decree).

The function of inter sectoral and inter region coordination

Using the umbrella of presidential decree (keppres) 123/2001, which promoting inter sectoral and interregional coordination for water resources development, Kimpraswil and State min. of Environment established inter sectoral and interregional coordination agency to support the program for integration of Ciliwung river basin management. This coordination body legislated through Ministerial Decree (Kimpraswil) 20/KPTS/2002, after learnt from Jabodetabek flood 2002 problem.

This coordination agency lead by steering chairman of each minister and governors of DKI Jakarta, West Java and Banten supported with chairman member as coordination team which included & Directorate General of Kimpraswil and Deputi II Ministry of Environment.

The coordination mechanism are activated through 3 working group which comprises of :

- Working group I (Spatial Planning and Environment), manage the task forces for :
 - Spatial planning program
 - Environment program
 - Legal and institution
- Working group II (Urban Settlement and Housing), manage the task forces for :
 - Housing development program
 - Urban infrastructure program
 - Community development
 - Poverty reduction program
- Working group III (Integrated river management), manage the task forces for :
 - Water resources management
 - River management
 - Water quality management

This inter sectoral agency is not a permanent and independent body with independent funding resources. Projects were implementing through mainly Kimpraswil budget (APBN) including some foreign grant (Netherlands) organized by the working groups collaborated with local government (DKI, West Java, and related District/Municipal).

This coordination body prepare strategic programs and project which including many agency and region, related to Ciliwung river basin development (program year 2002-2004) including :

- Institution and regulation study in watershed development (State Ministry of Environment)
- Integrated planning, guidelines and control of spatial plan (DG. Of Spatial Planning)
- Public campaign and socialization of environment regulation (DG. Of Spatial Planning)
- Study review of urban infrastructure development in DKI-Jakarta including some river and drainage normalization in DKI Jakarta (implemented by DKI).
- Review of basin water resources management planning (DG. Of Water Resources)
- Study for institutional in DAS Ciliwung (DG. Of Water Resources)
- Database development and system monitoring evaluation (BRLKT-Ministry of Forestry).

4.2.4 Disaster Management

a) Institutional Aspect

Present flood fighting management (disaster management for flood) still oriented more to emergency response, not effectively undertake of the preventive, preparedness and rehabilitative activities.

Under flood fighting task forces established from provincial level to Sub-district level (Posko), Kimpraswil is responsible for technical prevention and rehabilitation activities and set-up coordination with Bakornas (Central Coordination Team) at national level to handling national disaster.

The responsibility level of disaster management is structurally arranged (National, Province, District/ City) according to degree or scale of disaster including, its coordination level (Kimpraswil, dinas province, PU office district/city).

In DKI Jakarta, Dinas PU and PIPWSSC (Ciliwung - Cisadane river basin development main project) are responsible for flood monitoring, early warning system and technical support for evacuation and post flooding rehabilitation.

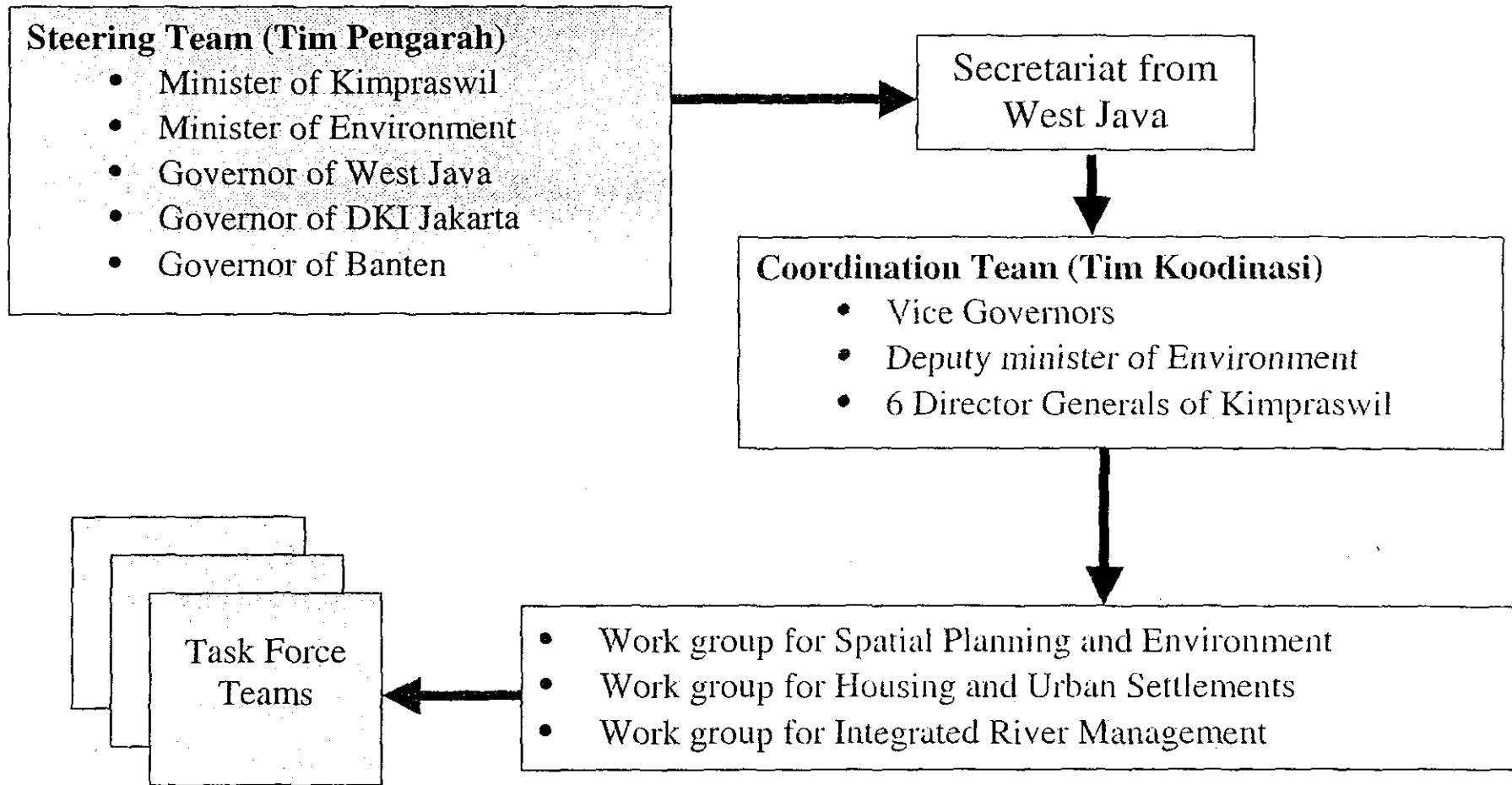
The coordination team for flood fighting organization is appeared in the following diagram. (Figure 4-11 and Figure 4-12).

This structure organization correlated with command structure from central authority level, provincial, district or city and village level.

Structurally from national level to city level Bakornas and Kimpraswil engage coordination for disaster management, Bakornas for repressive activities and Kimpraswil for technical prevention, flood fighting and rehabilitation.

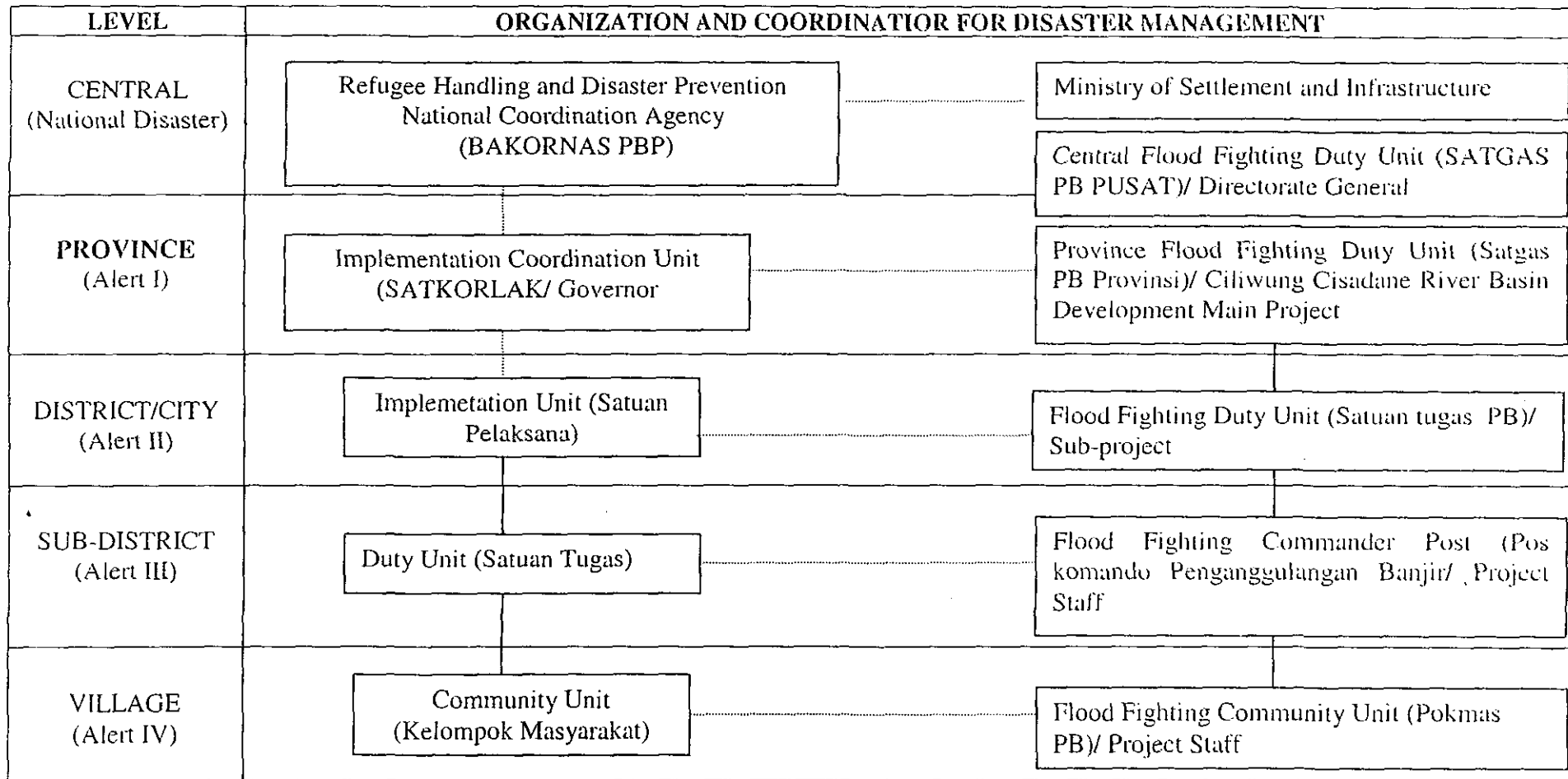
This command structure may not suite with present line authorities of decentralization, where district or cities plays important role.

Figure 4-10. Development Control Trial



Source : Kepmen no.20/KPTS/M/2002

Figure 4-11. Organization and Coordination for Disaster Management

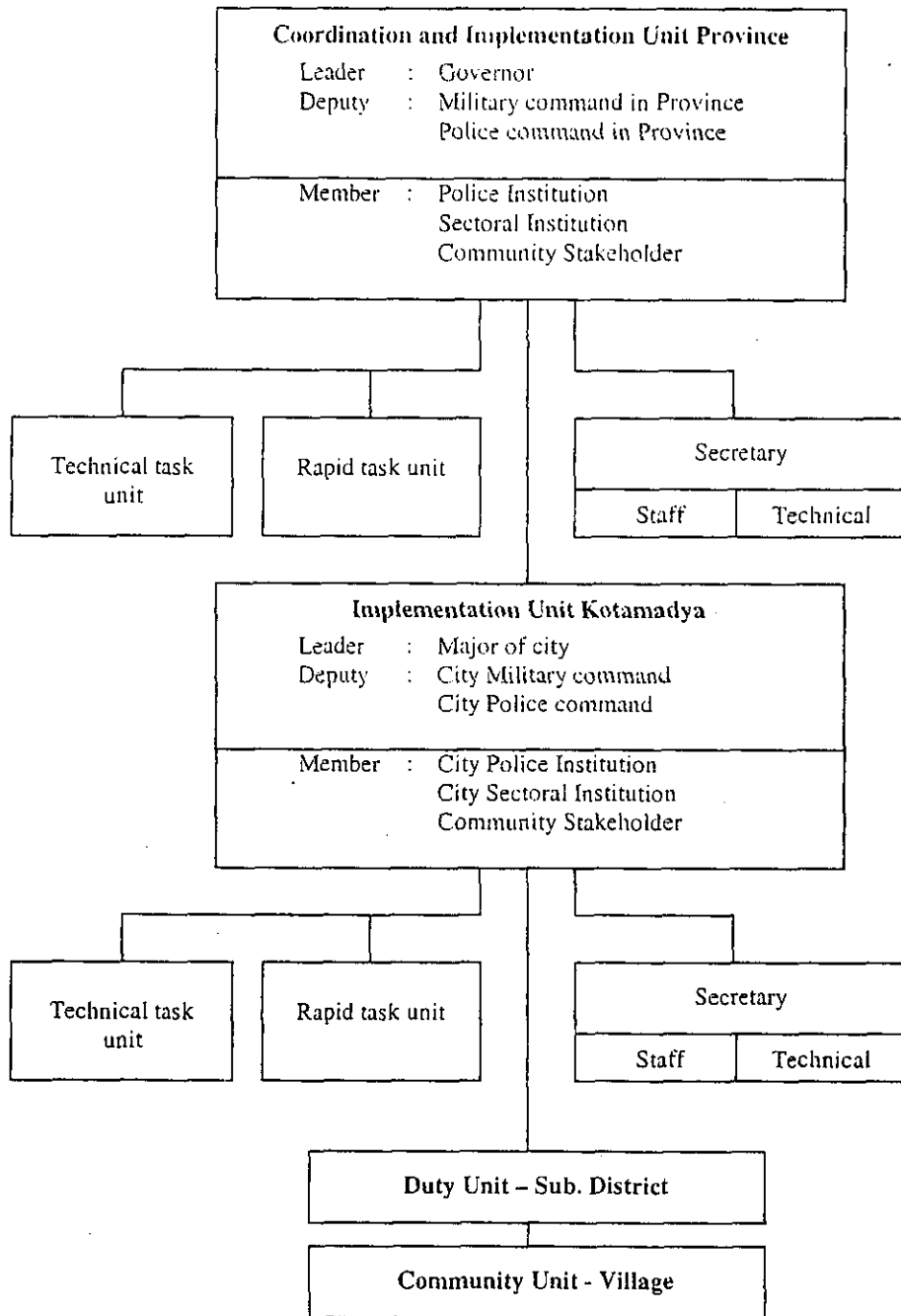


Source: Flood Alert Guideline of DKI Jakarta Provincial, Public Works Service of DKI Jakarta Provincial, Ciliwung-Cisadane River Basin Development Main Project, October 2002

Remarks:

————— Commando line
 Coordination line

Figure 4-12. Organizational Structure of Disaster Management
Province Level to Village Level



b) System Information Aspect

Telephone line network and single band radio communication are used for internal information transfer within disaster management organization from sub-district level to district/ city and province or central level.

Only limited village level (flood location) has equipped or accessible to information transmitted from single band radio communications. Telephone network is the only available system to access to the community in flooded areas with potential risk of close communication if the lines damaged by flood.

The information transfer scheme of warning system is exhibited in the following diagram as show on Figure 4-9 Operation procedure of flood Facilities.

Public broadcasting radio stations are very effective for general information transfer to community, but not in the capacity for early warning notice to location threaded by flood. In many locations, population has not enough allocated time for evacuation preparation due to lack of community access to the internal information network within Satkorlak (Bakornas) and Satgas (Kimpraswil task force) in district or city level.

Monitoring and evaluation system is provided by standard data format designed and developed by central coordination or provincial coordination team and transferred to district or cities to disseminate to flooded location (village level) and sending back for verification and evaluation.

In many locations, communities are not involved actively in data collection or providing accurate information. Practically monitoring and data collection in village level become compulsory duties of village officials instead of community participation.

Operational procedure

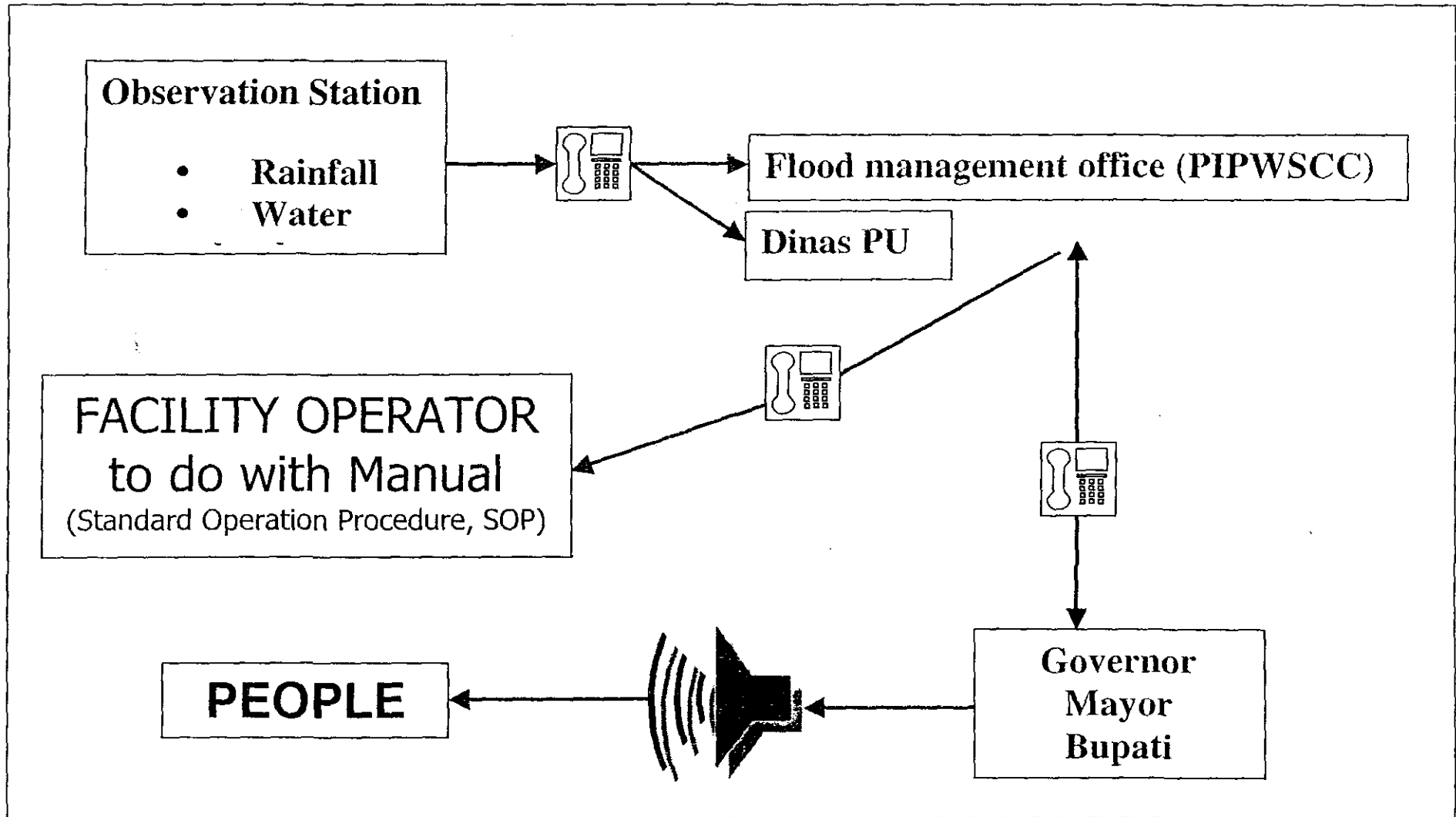
Based on the organizational structure, the present procedure for disaster management from the provincial to village level is described as follows (exhibition diagram of operation of flood facilities) :

1. Before Flood Disaster

Community Unit (Village Level)

- a) Data collected directly or non-directly from community and/or watchmen for gates, pumps, and reservoirs, which are under control of Public Work Service. Information data will distribute to all communities suffering flood disaster area through completion of Central Flood Prevention [(Pengendalian Banjir Pusat I (PBPI)) forms.

Figure 4-13. Operation procedure of flood Facilities



- b) Information should be submitted to Duty Unit, Implementation Unit, and Implementation Coordination Unit through communication unit such as walkie-talkie with special call sign, telephone, facsimile, a mail, etc. or fill up of PBP2 form.
- c) Preparation of Infrastructure and Mains of Central Flood Prevention.

Duty Unit of Central Flood Prevention (Sub-District Level)

- a) Duty unit must receive and collect report-using C.
- b) The information should be submitted to Implementation unit and Implementation Coordination Unit for central flood prevention.
- c) Preparation of infrastructure and associated work of Central Flood Prevention

Implementation Unit of Central Flood Prevention (District Level)

- a) Collect data from Duty Unit and Implementation Unit.
- b) Implementation Unit must encourage Duty Unit.
- c) Prepare recapitulation of PBP form and submitted results to Implementation of central flood prevention
- d) Prepare infrastructure and methods for central flood prevention

Implementation Coordination Unit (Provincial Level)

- a) Collect data from Community Unit, Duty Unit, and Implementation Unit.
- b) Data should be made available to Community Unit, Duty Unit, Implementation Unit and Refugee Handling and Disaster Prevention National Coordination Agency.
- c) Encourage Implementation Unit staff for alert.
- d) Prepare infrastructure and means of central flood prevention.

2. Flood Disaster

Community Unit

- a) Obtain information, monitor location and impact of disaster carry out first aid; encourage active Commando Station (POSKO), which takes in refugees and established emergency kitchen.
- b) Inventory and report disaster victims using PBP2 form and submit results to Community unit, Duty unit, Implementation Unit and Refugee Handling and Disaster Prevention National Coordination Agency.
- c) To request logistic aid, and rescue equipment for Duty Unit and Implementation unit of central flood prevention.
- d) Mobilize community potential and distribute material aid to disaster victim.

Duty Unit (sub-district)

- a) Distribute rescue equipment aid and logistic to Implementation unit.
- b) Monitor, and submit report of disaster condition to Implementation unit with using PBP2 form.
- c) Coordinate with community for rescuing and disaster prevention, collect and distribute aid to target areas.

Implementation Unit (district)

- a) Receive information and report from Duty Unit file; distribute aid and rescuing equipment and emergency supplies.
- b) To mobilize community potential, control disaster prevention and maintain responsible for aid with report to Refugee Handling and Disaster Prevention National Coordination Agency.
- c) Prepare inventory of victims and aid requirement with implementation of procurement aid.

Implementation Coordination Unit (Provincial Level)

- a) Receive information and report from Implementation Unit, file, distribute aid, and rescuing equipment and emergency supplies
- b) Mobilize community potential, control disaster prevention and responsibility for aid with reports to Refugee Handling and Disaster Prevention National Coordination Agency.
- c) Coordinate disaster prevention conditions.

3. Post Flood Disaster

Community Unit

- a) Prepare inventory, gather means and infrastructure damage such as residential, public facilities, etc.
- b) Submit damage report to Duty Unit with file Implementation Unit.
- c) Mobilize community participation in order to implement rehabilitation.

Duty Unit (sub-district)

- a) Make summary, reports damage, and submit to Implementation Unit with file to Implementation Coordination Unit.
- b) Mobilize community participation for implementation of rehabilitation.

Implementation Unit (district)

- a) Gather and evaluate Duty Unit report and submit to Implementation Coordination Unit.
- b) Prepare proposal and recommendation for construction and rehabilitation. It should be submitted to Implementation Coordination Unit.
- c) Carry out rehabilitation at disaster location.

Implementation Coordination Unit (Provincial Level)

- a) Prepare report about disaster victims, receiving aid, effort to prevent aid and estimate losses.
- b) Coordinate and implement rehabilitation facilities, infra structure and community society.

c) Community Participation

The community participation for flood fighting is not optimally accommodated in the structured mechanism of disaster management organization (Bakornas). Communities are more familiar with products oriented mechanism, while structured mechanism implemented a more rigid system procedure (process oriented).

In some abstract of disaster management approach (toward total disaster risk management approach Emmanuel M. de Guzman, February 2002 for Asian Disaster Reduction Center Commission) various targets, which are prevention and mitigation, preparedness and recovery should be accommodate with interrelated role play of government, community and private sector.

i) *Prevention and Mitigation*

Community and private sector activities:

- Develop the community awareness of living in flood danger: Flood is natural phenomenon, which could not be eliminated but can be managed. Understanding of community to prevent the flood is important to reduce or mitigate the damage impact.
- Community involvement in maintenance of drainage and flood protection micro system.
- Community and private sector commitment and support for clean environment of river and canals.
- Introduce building with flood proof construction to compensate inundation during flooding in vulnerable flood plain areas (elevated house).

Government :

- O&M of flood control facilities and major drainage.
- Structural improvement (normalization or raise-up the capacity of facilities)
- Database development of river water management.

ii) *Preparedness*

Community and private sector activities:

- Strengthen local empowerment organization of community to engage with flood emergency management.
- Establish networking with local facilities (private or public) for emergency support during and after disaster. (Health centre, police, food store and drug store, fire brigade, etc.).
- Evacuation facilities availability to use whenever required (school, sport centre, mosque, etc.).
- Training for evacuation and emergency management.
- Develop public access to early warning system and flood information system for more sufficient time allocation to the flood occurrence.

Government :

- Functioning a direct access or early warning system to the communities.
- Provision of equipments and facilities and manpower for emergency support.
- Development flood information, flood analysis database with annual updating for preparation early warning system.
- Evacuation facilities and health facilities support during emergency.

iii) *Recovery*

Community and private sector activities:

- Minor damage rehabilitation of houses/ residential including electricity, communication and water supply.
- Rehabilitation of drainage and micro system flood protection facilities (dykes).

Government :

- Improvement of infrastructures and public facilities.
- Improvement of heavy damage to the residential and utilities: water supply, electricity, communication (state company).
- Provided health services for post disaster to avoid outbreak or communicable disease.

Looking to above coverage of activities in the disaster management operation, community has plays an important role in mitigates the flood damage and prevents from the un-measurable damage impact.

Field survey has indicated that in many locations (Taman Ratu, Pinang Tanggul, Green Garden, Depok and Periuk Jaya) community has initiation to solve the problem by themselves without high dependency to government support and without facilitation from present disaster management organization.

This potential should be accommodate and empower by government within disaster management organization and mechanism.

Present condition

The present procedure and mechanism has low input to facilitate community participation.

Involvement and participation of community during flood disaster are mostly grown from spontaneous reaction organized by communities them self or village leader.

Pamphlet and brochure were distributed to village office but the system is not effective for public prevention and preparedness.

The existing procedure of flood fighting at community level will be described here under.

a) Before Flood

a 1. Data Collection

Commando Station staff (POSKO staff) should collect data at disaster prone area, report to Community Unit. Local post commando staff will raise flood Alert by walkie-talkie (if available).

Preparation means and infra structure of flood control.

Problem :

- Walkie-talkie is not available for each village.
- Report forms for data collection of prone disaster area are not standard for each village.
- Mechanism and procedure not accommodate active participate role of community. Most of communities are passive waiting instruction.

a 2. Training

Training for flood commando station (POSKO) has been carried out at the village level, which board of commando station administrative unit at the next-to-lowest level in city or neighborhood youth association involve in the training.

Training included: tent preparation on site, evacuation methods, and use of inflatable rubber boat, first aid, training SAR.

a 3. Monthly meeting

Community participation develops through regular informal meeting, to solve social and environmental problem.

Problem : Not all location can develop internal informal meeting of residence.

a 4. Self-supporting

In some location communities have active role in flood protection improvement; building, dykes and clarity the river and drainage environment.

Problem : Illegal settlers along river area as non-permanent, settler have low awareness to maintain the environment.

a 5. Campaign

Local Government has distributed leaflets for flood prevention. The leaflet has been displayed in every village office so that people will be able to understand and anticipate flood condition.

Problem : Leaflet did not reach members of society, as effect of top down instructional management.

b) Flood Condition

- Commando Station (POSKO) staff is monitoring condition of disaster location as well as taking care of first aid.
- Commando Station Staff assist with evacuating population and establishing general kitchen.
- Inventory and victim disaster record should be reported to Community Group and to other of societies in the surrounding area.
- Community group and member of society surrounding area request logistical aids, rescue facilities.
- Receive aid from sympathetic donors to distribute to disaster victims.
- Mobilize community potential and distribute material aid to disaster victims.

Problem :

Aid arrives too late :

Food, medicine as well as other means aid is rather late reach to victim disaster. Because information system report through structural system (bureaucracy) and Community Group have not Walkie-talkie for communicate with other related institution of flood aid.

c) Post Flood

- Commando Station staff will carry out inventory of infrastructure damage, and submit reports to Village office.
- Mobilize community participation for cleaning drainage canal, checking health, etc.

Problem :

Community participation is not effective for every village, because it is dependant on population characteristic such whether permanent or temporary. A temporary population is less likely to participated environmental issues.

Table 4-12. Survey Result of Disaster Management

Observations	Risk/ Problem	Mitigative Measures
<p>A. Organization</p> <p>The organizational structure is similar to the pyramid form. National Coordination Board is the highest-level institution to undertake national disaster.</p> <ul style="list-style-type: none"> • Layer of task organization from district/ city to province and central are correlated with the level or magnitude of disaster. • All reporting, monitoring and decision making procedures should follow structural line of organization ("Top-down"). • Kimpraswil through Flood Prevention Duty Unit of Ciliwung – Cisadane is responsible for flood monitoring, warning system and flood control operation. • Level of disaster management (alert I to alert IV) is determined from the water level conditions into certain level. 	<ul style="list-style-type: none"> • The structure is based on a rapid task emergency concept as direct response to the flood disaster, which is heavily controlled by top-down mechanism from provincial to village level. • Poor coordination and local initiative at field/ village level including weak of community involvement in disaster management. • Community not facilitated for prevention and preparedness to flood disaster became limitation to minimize the damage. • Lack of communication to the community organization in the flooding locations. No public access to flooding forecasting information. 	<ul style="list-style-type: none"> • Assess the possibility to integrate the organization by involving Bogor, Depok, Tangerang and Bekasi authorities in the same provincial Satkorlak (DKI). • Improve the field or village level organization, involving community in decision-making. • Facilitate community (local organization) from the earliest stage of disaster management: <ul style="list-style-type: none"> - Prevention and mitigation - Preparedness - Response (present function of Satlak) - Recovery
<p>B. Information System</p> <ul style="list-style-type: none"> • Database (questionnaire) was prepared by central unit and distributed to village level/ leader to be completed and reported to duty unit (kecamatan) and coordinator unit (city) before disaster and after disaster. • The form does not always cover actual conditions at flood location as community not involved in preparing the database. • Warning system links O&M of flood control facilities to Satlak. Village unit received 	<ul style="list-style-type: none"> • Standard Form may not provide accurate information at area conditions before flood damage. Misleading input can produce ineffective emergency measures. • Post damage evaluation does not accommodate the cause of inundation and expected request from community. • Heavier damage loss caused by late response of early warning system. Community equipment using single band channel, might 	<ul style="list-style-type: none"> • Stakeholder should be involved in preparing database with accurate information. More detailed guidelines are required, particularly for monitoring and damage evaluation. • Optimize information system by additional installment of early warning system in area vulnerable to flooding. Warning system not only for control monitoring also to access people for

Observations	Risk/ Problem	Mitigative Measures
<p>information from phone call and radio.</p>	<p>effective for monitoring and control by officials but close to the public access to information.</p>	<p>early warning.</p>
<p>C. Horizontal Coordination:</p> <ul style="list-style-type: none"> • Lack of horizontal coordination in village or sub-district level with stakeholder and private sector. • High dependency of village unit to receive support from duty unit or implementation unit (Satlak). 	<ul style="list-style-type: none"> • Low use of local referral network for emergency purpose (local Puskesmas, Police, private facilities, etc). • Degraded capacity of flood control facilities allows shorter time allocation for early warning and evacuation preparation. People has no alternative choice to react when disaster came. • Are centralize plan for disaster response including prevention effective to manage damage? 	<ul style="list-style-type: none"> • Facilitate the community with Satlak technical assistance to plan standard operation procedure for emergency management. • Community organization should develop networking with available local resources and facilities, which can provide emergency support during disaster.
<p>D. Community Development</p> <ul style="list-style-type: none"> • The present procedure and mechanism has low input to facilitate community participation. • Involvement and participation of community during flood disaster are mostly grown from spontaneous reaction organized by communities them self or village leader. • Pamphlet and brochure were distributed to village office but the system is not effective for public prevention and preparedness. 	<ul style="list-style-type: none"> • Absence of village community participation in prevention and preparedness toward flood disaster, will weaken the capacity in managing damage. Low involvement and limited public access to information (flood forecasting, warning system) leads to unprepared reaction facing disaster. 	<ul style="list-style-type: none"> • Develop public risk awareness through active participative appraisal. The community public campaign is not merely a tool to improve community awareness, but also a result of the product of community commitment in development • Improve the self-reliance of community on alert warning and emergency management by facilitating community organizer (LPM) or Dekel (Dewan Kelurahan) in village level.

CHAPTER 5
CAUSE OF INUNDATION

5. CAUSE OF INUNDATION

5.1 General

Information of inundation derived from available secondary data issued by Subdin PU Tata air DKI Jakarta, 2002; Perum Jasa Tirta II-Bekasi 2002; Dinas Sosial Tangerang Municipality and Dinas PU Tangerang district, 2002.

Inundation in the survey location collected from interviews and site observation in respected 31 locations.

Cause of inundation identified from the above information, after confirmation with parameter of inundation area, flood depth and duration, is shown in Table 5-1. The flood inundation in one location may happened from more than one cause as one and other cause may interrelated.

- a) Overflow from insufficient capacity of the river and drainage system due to sedimentation. Most of high sediment accumulated along river estuary (Kali Cakung, Kali Sunter, Kali Bekasi) including some river in midstream (Kali Cijantung, Kali Sugutama and Kali Batu/Cisadane).

<u>River</u>	<u>Location</u>
Sunter	Kelapa Gading Timur
Sunter	Jatinegara Kaum
Ancol	Papanggo
Cijantung	Cisalak
Sugutamu	Abadi Jaya
Sugutamu	Mekar Jaya
Bekasi	Jatirasa
Cimanceuri	Renged
Cisadane	Teluk Naga

- b) Inundation caused by damage of the dyke by human factor without progress to repair. Damage of dyke is spread over in river area of Pesanggrahan, K. Cipinang, K. Angke and K. Ciliwung.

<u>River</u>	<u>Location</u>
Pesanggrahan	Sawangan
Angke	Kedoya Utara
K. Laya/Cipinang	Perum Bukit Cengkeh II
Cakung Drain	Cakung Barat
Cipinang	Kebon Pala
Ciliwung	Bukit Duri & Pangadegan
Bekasi	Babelan

- c) Residential lies in the low elevation river plain with its ground level equal or lower than actual river flood level. This condition occurred mainly in northern flood plain Cengkareng drain, some segment also occurred in K. Pesanggrahan in Tangerang district low lying area locate in coastal plain of Cimanceuri.

<u>River</u>	<u>Location</u>
Cengkareng Drain	Kapuk Muara
Cengkareng Drain	Kamal Muara
Mookervart	Semanan
Pesanggrahan	Bintaro IKPN
Sugutamu	Abadi Jaya
Cimanceuri	Renged
Cisadane	Teluk Naga
Cisadane Barat	Periuk Jaya
Cipinang	Cipinang Besar Utara
Sunter	Rawa Badak Utara
Cijantung	Cisalak
Bambu Kuning	Sukabakti
Bekasi Tengah	Bintara
Bekasi	Pengasinan
Cimanceuri	Renged

- d) Inundation by bottleneck overflow resulting from solid waste and debris and shallow depth from sediment. This inundation mainly happened in high density populated area.

<u>River</u>	<u>Location</u>
Cengkareng drain	Kapuk Muara
Cengkareng drain	Kamal Muara
Mookervart	Semanan
Sekretaris	Kedoya Utara
Pesanggrahan	Bintaro
Angke	Gondrong
Cipinang	Cipinang Besar Utara
Cipinang	Cipinang Besar Selatan
Cipinang	Kebon Pala
Sunter	Rawa Badak
Sunter	Kelapa Gading Timur
K. Item	Sumur Batu
Sunter	Jatinegara Kaum
Sunter	Rawa Badak Selatan
Muara Karang	Penjaringan
Ancol	Papanggo
Ciliwung	Bukit Duri
Bekasi	Pantai Hurip
Bekasi	Hurip Jaya
Bambu Kuning	Sukabakti

- e) Decrease of retention area by building settlement in the river bank and lake.

<u>River</u>	<u>Location</u>
Cipinang	Kebon Pala
K. Item	Sumur Batu
Cisadane Barat	Periuk Jaya

- f) Backwater inundation from tidal influence during flood period. This happened mostly in the flood plain in estuary of K. Sunter, K. Bekasi, Cengkareng drain.

<u>River</u>	<u>Location</u>
Cengkareng Drain	Kapuk Muara
Sunter	Rawa Badak Utara
Bekasi	Babelan
Ciliwung	Tambelang

5.2 Community Expectation

The expectation of communities is collected from interview to the field officer, local leader, village leader or community prominent figures in surely locations.

The dominant expectation are appeared in Table 5-2.

Table 5-1. Cause of Flood from Interview and Observation

No	Location		River / River System	Flood Condition in February 2002			Causes of Flood Interviewed and Observed
	Village / Sub District	Region		Flood Depth (cm)	Flood Duration (Day)	Flood Area (Ha)	
1	Kapuk Muara / Penjaringan	North Jakarta	Cengkareng Drain / Pesanggrahan	50 - 200	14 - 30	67.8	<ul style="list-style-type: none"> - Trash/garbage blocked the river flow and sedimentation in Kali Angke - Tidal influence appeared in Kali Angke - Location are in the low lying area, dyke below flood level - Drainage in Jl. Kapuk Kamal not infuction by mud sediment
2	Kamal Muara / Penjaringan	North Jakarta	Cengkareng Drain / Pesanggrahan	50	7 - 30	1	<ul style="list-style-type: none"> - Trash/garbage and sediment blocked the river flow in Kali Kamal - Local drainage low maintenance - Location are in the low lying area
3	Semanan / Kalideres	West Jakarta	Sal. Mookervart / Pesanggrahan	50 - 220	7 - 50	64.3	<ul style="list-style-type: none"> - Trash/garbage and sediment blocked the river flow - Drainage blocked by garbage does not working to flow water - Some location are in the low lying area, with no dyke along secondary canal - Annual flooding
4	Kedoya Utara / Kebon Jeruk	West Jakarta	Kali Sekretaris / Pesanggrahan	80 - 160	30 - 40	40	<ul style="list-style-type: none"> - Trash/garbage and sediment blocked the river flow (K. Sekretaris)
5	Bintaro / Pesanggrahan	South Jakarta	Kali Pesanggrahan / Pesanggrahan	70 - 250	25 - 35	34	<ul style="list-style-type: none"> - Dyke below flood level - Mud sediment in Pesanggrahan river - Location are in the low lying area (IKPN housing)
6	Gondrong / Cipodoh	Tangerang Municipality	Kali Angke / Pesanggrahan	50 - 160	7 - 20	11.4	<ul style="list-style-type: none"> - Trash/garbage and sediment blocked the canal flow - Dyke was broken in some area - Improper local drainage to accommodate runoff
7	Cipinang Besar Utara / Jatinegara	East Jakarta	Kali Cipinang / Cipinang	50 - 250	15 - 30	34.8	<ul style="list-style-type: none"> - Sediment in Kali Cipinang watercourse decrease flow capacity and increase flood areas - Low maintenance of local drainage - Trash/garbage blocked the river flow
8	Cipinang Besar Selatan / Jatinegara	East Jakarta	Kali Cipinang / Cipinang	50 - 200	15 - 30	31.8	<ul style="list-style-type: none"> - Sediment in Kali Cipinang decrease flow capacity and increase flood areas - Trash/garbage blocked the river flow - The area elevation almost similar with river water surface in normal condition, suffers annual flooding
9	Kebon Pala / Makasar	East Jakarta	Kali Cipinang / Cipinang	80 - 200	7 - 20	51.9	<ul style="list-style-type: none"> - Trash/garbage and sediment blocked the river flow - High building density reduce retention capacity - Low maintenance of local drainage
10	Rawa Badak Utara / Koja	North Jakarta	Kali Sunter / Cipinang	50 - 70	7	26.7	<ul style="list-style-type: none"> - Trash/garbage and sediment blocked the drainage canal - Tidal influence in Kali Sunter - Local drainage are low maintained and only covered limited areas - Annual flooding in major areas
11	Kelapa Gading Timur / Kelapa Gading	North Jakarta	Kali Sunter / Cipinang	50 - 120	7 - 30	56.6	<ul style="list-style-type: none"> - Sediment accumulation in Kali Sunter and drainage canal - Dyke was broken - Drainage blocked by garbage cause backwater flooding
12	Sumur Batu / Kemayoran	Central Jakarta	Kali Item / Cipinang	50 - 70	7	102	<ul style="list-style-type: none"> - Open area as retention site has change to commercial development (Cempaka Mas Mall) - Mud sediment in Kali Sunter and Kali Item decrease flow capacity - Opening Kelapa Dua gate influenced the water flow capacity to Kali Sunter - Major area locates in lower river plain which flooded annually
13	Jatinegara Kaum / Pulo Gadung	East Jakarta	Kali Sunter / Cipinang	50 - 200	7	16.68	<ul style="list-style-type: none"> - Trash/garbage blocked the river flow - Riverbank is used for garbage collector - Dyke was broken in some areas
14	Rawa Badak Selatan / Koja	North Jakarta	Kali Sunter / Cipinang	50 - 100	7 - 30	16	<ul style="list-style-type: none"> - Sediment in Kali Sunter decrease flow capacity and increase flood areas - Drainage blocked by garbage caused backwater flooding - Major village area which flooded annually locate in lower river plain - Only limited area provided with dyke

Table 5-1. Cause of Flood from Interview and Observation

No	Location		River / River System	Flood Condition in February 2002			Causes of Flood Interviewed and Observed
	Village / Sub District	Region		Flood Depth (cm)	Flood Duration (Day)	Flood Area (Ha)	
15	Penjaringan / Penjaringan	North Jakarta	Kali Muara Karang / Ciliwung	50 - 150	15 - 30	230.8	- Sediment in Kali Krukut decrease flow capacity and increase flood areas - Drainage blocked by garbage cause backwater flooding - Local drainage is not properly prepared
16	Papanggo / Tanjung Priok	North Jakarta	Kali Ancol / Ciliwung	50 - 100	7	209	- Sediment in Kali Alam and Kali Tiram decrease flow capacity - Dyke was broken in some places - River use as garbage disposal, no garbage collector available in RW 08 / RT 07 - Local drainage not properly prepared (no side ditch along road)
17	Bukit Duri / Tebet	South Jakarta	Kali Ciliwung / Ciliwung	150 - 400	14 - 30	29.7	- Trash/garbage and sediment blocked the river flow - Flood were appeared in 1996 and 2002
18	Cisalak / Sukma Jaya	Depok Municipality	Kali Cijantung / Ciliwung	50 - 80	7	26.3	- Trash/garbage blocked in the river flow of Kali Cijantung - Improper drainage of settlements - Dyke was broken - Area located in lower river plain
19	Abadi Jaya / Sukma Jaya	Depok Municipality	Kali Sugutamu / Ciliwung	50 - 100	7	11.2	- Dyke was broken in some areas (along Sugutamu River) - Area located in lower river plain of Kali Sugutamu
20	Mekar Jaya / Sukma Jaya	Depok Municipality	Kali Sugutamu / Ciliwung	20 - 150	7	8.8	- Some dyke of Kali Sugutamu are broken - Area located in lower river plain of Kali Sugutamu
21	Pantai Hurip / Babelan	Bekasi District	Kali Bekasi / Cikarang	50 - 200	15 - 60	551	- Mud sediment occupies estuary and along Cikarang Bekasi Laut canal - Trash/garbage blocked the drainage canal - Area located in lower river plain
22	Hurip Jaya / Babelan	Bekasi District	Kali Bekasi / Cikarang	50 - 150	30 - 60	1281	- Mud sediment occupies estuary and along Cikarang Bekasi Laut canal - Trash/garbage blocked the drainage canal - Area locates in lower river plain - Limited dyke established along CBL canal
23	Sukabakti / Tambelang	Bekasi District	Kali Bambu Kuning / Cikarang	50 - 100	16	136	- Area originated from drained swamp area which receives excess runoff from south region (Sukarahayu) - Drainage (irrigation canal) is not functioning and shallow and used for garbage disposal
24	Kranji / Bekasi Barat	Bekasi Municipality	Saluran Bekasi Tengah / Cikarang	50 - 100	7	38.1	- Trash/garbage and sediment blocked in the river flow (Kali Cakung and Kali Baru)
25	Bintara / Bekasi Barat	Bekasi Municipality	Saluran Bekasi Tengah / Cikarang	50 - 100	7	20.9	- Trash/garbage and sediment blocked the river flow - Improper drainage from settlement areas
26	Pengasinan / Rawalumbu	Bekasi Municipality	Kali Bekasi / Cikarang	50 - 60	7	44	- Sediment blocked the canal in RW 24 and RW 26 - Drainage blocked by garbage cause backwater flooding - Improper drainage from settlement area (Pondok Hijau Permai)
27	Jatirasa / Jatiasih	Bekasi Municipality	Kali Bekasi / Cikarang	50 - 300	7	62.5	- Trash/garbage and sediment blocked the Bekasi river - Dyke was broken in RT 08
28	Sukadaya / Sukawangi	Bekasi District	Kali Cikarang / Cikarang	50 - 100	7 - 15	448.7	- Drainage (formerly irrigation) canal is rotatable to flow excess water from settlement in Tambelang, Sukatani and Sukakarya in upper area
29	Renged / Kresek	Tangerang District	Kali Cimanceuri / Cimanceuri	50 - 100	7 - 14	115.9	- Dyke was broken by people from Patrasana village - Location are in the lower river plain of Cidurian river - Improper drainage provided in settlement area
30	Teluk Naga / Teluk Naga	Tangerang District	Kali Cisadane / Cisadane	50 - 100	7 - 15	70.9	- Location are in the lower river plain of Cisadane river - Dyke was broken in some area
31	Periuk Jaya / Periuk	Tangerang Municipality	Sal. Cisadane Barat / Cisadane	50 - 200	7 - 10	38	- Sediment in Kali Sabi decrease flow capacity - Dyke was lower than flood level - Location are in the low lying area, existing pump operates below capacity required - Lake in the Periuk Jaya area as retention has less capacity to keep the runoff

Table 5-2 2002 Flood Problem and Community Expectations

No.	Village	Sub-district	Problem	Expectation of Community
1.	Semanan	Kalideres	<ul style="list-style-type: none"> • Cisadane River is shallow in some areas • Overflow of Taman Semanan Indah • No dyke along Secondary Canal • Several RW are full of garbage 	<ul style="list-style-type: none"> • Dyke should be constructed along Seconder canal • Cisadane River should be dredged
2.	Kedoya Utara	Kebun Jeruk	<ul style="list-style-type: none"> • Overflow of water diversion of Sekretaris and Mookevart river 	<ul style="list-style-type: none"> • Water diversion of Sekretaris and Mookevart river should be dredged • Water diversion of Sekretaris should be constructed dyke embankment along the canal.
3.	Sumur batu	Kemayoran	<ul style="list-style-type: none"> • Located in depressed area • Overflow from Sunter and Item Rivers • Due to the opening of Kelapa Dua gate the waterflow to Sunter river has been affected. • Open space area as retention basin has been change Cempaka Mas Mall. 	<ul style="list-style-type: none"> • Dredging mud in Sunter river • Procurement of pump for each administrative unit (RW) which has influence flooding, existing pump is available at RW 4,5 and 7.
4.	Bintaro	Pesanggrahan	<ul style="list-style-type: none"> • IKPN settlement in depressed area • Pesanggrahan River is shallow, because of mud sedimentation and garbage. • Existing of dyke is too to low • Capacity of river is not enough to get flood from Bogor district 	<ul style="list-style-type: none"> • Dredging downstream of Pesanggrahan river • River improvement with higher dykes
5.	Bukit Duri	Tebet	<ul style="list-style-type: none"> • Overflow Ciliwung River • No dyke • Flood were appeared hold on 1996 and 2002 	<ul style="list-style-type: none"> • Construction dyke
6.	Jatinegara Kaum	Pulogadung	High rainfall intensity, so capacity of river is not enough and water over flows and inundates to the village	Location of garbage collect should be prepared by local government
7.	Cipinang Besar Utara	Jatinegara	<ul style="list-style-type: none"> • Overflow of Kali Cipinang • River is narrow and shallow 	<ul style="list-style-type: none"> • Kali Cipinang should be dredged • Rehabilitation of road • Improvement of drainage system • Normalization of river
8.	Cipinang Besar Selatan	Jatinegara	<ul style="list-style-type: none"> • Overflow of Kali Cipinang • Low lying land 	<ul style="list-style-type: none"> • Kali Cipinang should be dredged • Dyke embankment should be constructed

No.	Village	Sub-district	Problem	Expectation of Community
			<ul style="list-style-type: none"> Floods annually River is very narrow 	
9.	Kebon Pala	Makasar	<ul style="list-style-type: none"> Overflow of Kali Cipinang There is no green space for absorption of water River is shallow 	<ul style="list-style-type: none"> Kali Cipinang should be dredged Dyke should be constructed
10.	Rawa Badak Utara	Koja	<ul style="list-style-type: none"> Kali Sunter overflow due to tide influence during rainy Annual flood Due to lock of garbage along drainage canal and low capacity of drainage 	<ul style="list-style-type: none"> Construction of dyke embankment along the river Improvement of drainage canal
11.	Rawa Badak Selatan	Koja	<ul style="list-style-type: none"> Overflow of Kali Sunter during rainy Annual flood Depressing area or low land The depth of inundate area approximately 1 meter 	<ul style="list-style-type: none"> Kali Sunter should be dredged Construction of dyke along the river
12.	Kelapa Gading Timur	Kelapa Gading	<ul style="list-style-type: none"> Overflow of Kali Sunter during rainy Annual flood Drainage canal condition is narrow 	<ul style="list-style-type: none"> Kali Sunter should be dredged Improvement of drainage canal to connect with the river
13	Penjaringan	Penjaringan	<ul style="list-style-type: none"> Kali Krukut overflow Drainage system is not running properly. 	<ul style="list-style-type: none"> Normalization of drainage canal Rehabilitation of road due to flood disaster
14	Papango		<ul style="list-style-type: none"> Overflow due to of limited capacity river of Kali Alam and Kali Tiram RW 08/RT 10 is not available for garbage collection, so community throw garbage into the river. No Drainage canal 	<ul style="list-style-type: none"> Kali Alam and Kali Tiram should be dredged Garbage location should be prepared by local government Drainage canal should be constructed by local government
15	Kapuk Muara	Penjaringan	<ul style="list-style-type: none"> Kali Angke overflow River is narrow and shallow Kali Angke overflows due to tide influence during rainy No control gate Dyke is low North drainage canal Jl. Kapuk Kamal does not functioned South drainage canal Jl. Kapuk Kamal is full mud. 	<ul style="list-style-type: none"> Kali Angke should be dredged and sheet pile of side slope Control gate should be constructed 5 units along Kali Angke Drainage canal should be connected to Cengkareng drain Normalization of drainage canal for north and south Jl. Kapuk Kamal Pump is required
16	Kamal Muara	Penjaringan	<ul style="list-style-type: none"> Kali Kamal does not yet connect with sea Decrease in green space due to manufacturing Lack of drainage canal specially at RT 03/ RW 02 	<ul style="list-style-type: none"> Kali Kamal improvement should be connected to the sea Drainage canal system should constructed Gate control should be constructed Additional pumping equipment is required anticipate flood

No.	Village	Sub-district	Problem	Expectation of Community
17	Pantai Hurip	Babelan-Bekasi District	<ul style="list-style-type: none"> • Overflow of Bekasi river due to overflow of Cikarang Bekasi Laut (CBL) 	<ul style="list-style-type: none"> • Estuary and along CBL should be dredged • Rehabilitation of irrigation canal
18	Hurip Jaya	Babelan, Bekasi District	<ul style="list-style-type: none"> • Bekasi River overflow • Cikarang-Bekasi-Sea (CBL) overflow • CBL has got sedimentation at estuary 	<ul style="list-style-type: none"> • Dredging mud in the river • River is enlarged to estuary • Rehabilitation of road • Construction dyke embankment along river to estuary
19	Sukadaya	Sukawangi-Bekasi District	<ul style="list-style-type: none"> • Overflow of drainage canal due to excess water of Tambelang, Sukatani and Sukakarya region 	<ul style="list-style-type: none"> • Rehabilitation of irrigation canal • Rehabilitation of road, 3 km length
20	Sukabakti	Tabelang-Bekasi District	<ul style="list-style-type: none"> • Swampy area • Drainage canal is not functioning and shallow • Location receives excess water from Sukarahayu region (south of village) 	<ul style="list-style-type: none"> • Rehabilitation of irrigation canal • Rehabilitation of road, 6 km length, to Ki Hajar Dewantara, and 3 km length to Sukabakti region, Tambelang sub-district
21	Kranji	Bekasi Barat-Kota Bekasi	<ul style="list-style-type: none"> • Overflow of Kali Cakung and Kali Baru 	<ul style="list-style-type: none"> • Normalization and dredging of river
22	Bintaro	Bekasi Barat-Kota Bekasi	<ul style="list-style-type: none"> • Low land • Drainage canal is not function 	<ul style="list-style-type: none"> • Improvement to urban drainage system
23	Pengasinan	Rawa Lembu	<ul style="list-style-type: none"> • Taman Narogon Indah drainage canal is enough capacity • Pondok Hijau Permai drainage canal is narrow and causes bottleneck • Sedimentation in canal of RW 24 and RW 26, if one hour rain capacity drainage will overflow. 	<ul style="list-style-type: none"> • Sedimentation in along canal RW 12 need dredging (near Toll Cikampek) • Canal improvement in Pondok Permata Hijau.
24	Jatirasa	Jati asih	<ul style="list-style-type: none"> • High intensity rainfall • Flood from Bogor district • Overflow of Bekasi river • Dyke embankment damage at RT 08. • Flood period in 1996 and 2002 	<ul style="list-style-type: none"> • Rehabilitation of road damage due to flooding.
25	Periuk Jaya	Jati Uwung	<ul style="list-style-type: none"> • Overflow of Kali Sabi • Low land area • Reservoir as retention water is not able to keep water 	<ul style="list-style-type: none"> • Dyke along the river should be made higher • Pump required

No.	Village	Sub-district	Problem	Expectation of Community
26	Gondrong	Cipondohj	<ul style="list-style-type: none"> • Overflow of Kali Angke 	<ul style="list-style-type: none"> • Dyke should constructed along the river • Remove water hyacinth (eceng gondok) from Cipondoh lake
27	Renged	Kresek	<ul style="list-style-type: none"> • Overflow of Cidurian river • Dyke damage by people of Prtrasana Village 	<ul style="list-style-type: none"> • Dyke embankment should be constructed along Cidurian river • Rehabilitation of irrigation system and drainage system
28	Cisalak	Sukmajaya	<ul style="list-style-type: none"> • Overflow of Cijantung river • Improper drainage of settlement 	<ul style="list-style-type: none"> • Normalization of Cijantung River & improvements to drainage canal system of settlement
29	Abadi Jaya	Sukmajaya	<ul style="list-style-type: none"> • Dyke along of Sugutamu River damaged • Overflow of Baru Lake as resource of Sugutamu river 	<ul style="list-style-type: none"> • Dyke rehabilitation
30	Mekar Jaya	Sukmajaya	<ul style="list-style-type: none"> • Some part of dyke Sugutamu River damaged • Overflow of Baru Lake as resource of Sugutamu River 	<ul style="list-style-type: none"> • Dyke rehabilitation

CHAPTER 6
ESTIMATE OF LOSSES
DUE TO FLOOD IN 2002

6. ESTIMATE OF LOSSES DUE TO FLOOD IN 2002

6.1 Physical Condition of Damages

Occurred flood 2002 has made a lot of infrastructure damage especially for private as well as public facilities. The total of inundate area has obtained from BPS and map district report of Jakarta, Bekasi, Tangerang and Depok are found of 8,706 ha, 25,801 ha, 2,783 ha and 68 ha, respectively. Estimation of damage loss through analysis has obtained value of hectare per each region as shown in table damage loss of flood 2002 in Jabodetabek.

Observation was made in 31 locations, which suffered from annual flooding and severe flood damage during 2002, total damage loss of flood 2002 (version A), and total damage loss of flood 2002 (version B) as shown in Table 6-1, Table 6-2 and Table 6-3, respectively.

6.2 Damage loss

According to survey result, damages loss is calculated using method and formula as appeared in the diagram Figure 6-1 and Figure 6-2 (calculation of damage impact at village/ Kelurahan base).

The estimation of damage loss is guided by damage average rates per, which are established in 2 versions as shown in the Table 6-4 (version A) and Table 6-5 (version B). This version is only influence the value of direct damage due to different value of construction price to be used. The version A use lowest construction cost per sqm. in the construction market and version B uses moderate construction cost as appeared in the market.

The damage loss in version A for DKI Jakarta, Tangerang district and city, Bekasi district and city and Depok city estimated reach a sum of total Rp. 5.316 trillions, and with version B the total sum achieved Rp. 7.310 trillions, as shown in the Table 6-6 and Table 6-7, respectively. This total damage loss has includes direct loss, indirect loss plus 20% of both losses for contingencies.

I) Direct Loss

1.a) Inundation in Residential area

Residential buildings are classified as permanent, semi-permanent and temporary. Building damage is classified as heavy, partial and low damage.

Permanent houses classified from its structure (wall, floor and roofing construction), which made by concrete or masonry. Semi-permanent structure is built with partially masonry with wooden or bamboo woven wall and clay tiles or corrugated metal material of its roofing. Temporary houses are made of non-permanent materials and structures (plywood or cardboard).

The impact of inundation in survey locations to residential houses consist of permanent, semi permanent and non-permanent houses, has recorded numbers of

total house, consist of 24.648 permanent unit, 15.380 semi-permanent unit and 2,321 temporary unit.

1.b) Inundation in Commercial area

The commercial facilities are included commercial building, shop house units and traditional market.

a) Damage to building

The values of each type of building (e.g. shop, restaurant, supermarkets, department stores, hotels and banks) is estimated by classifying into two categories, i.e. large and medium/small scale with heavy damage, partial or low damage. The damage rates to commercial building and traditional market are estimated as equal with rates of permanent houses construction.

b) Damage to local market facilities

The location of inundate area to traditional market are Semanan (West Jakarta), Bukit Duri (South Jakarta), Penjaringan (North Jakarta), Pantai Hurip, Hurip Jaya, Sukadaya and Sukabakti (Bekasi District), which has area of 800 m², 800 m², 1,500 m², 600 m², 1,300 m², 800 m², and 500 m², respectively. The inundation area in Kapuk Muara and industry in Periuk Jaya are affected 136 units of shop and 8 units of mid and small-scale industries.

1.c) Damage to Public Facilities

Damage impact of inundation caused by flood 2002 in survey locations has affected public facilities, which included 84 units school, 2 units health center and 41 units mosque. Heavy damage, flood hit to 3 units of school and 1 unit of mosque, which required rehabilitation and new facilities.

1.d) Inundation in Agriculture area

Survey result of damage to the agriculture area is occurred in 6 out of 31 locations, mainly in Tangerang and Bekasi districts, Tangerang and Bekasi districts suffered agriculture damage area from flooding 2002 area of 110 ha and 1,458 ha, respectively. Damage to the fishpond or inland aquaculture is included in the number areas of agriculture land inundation.

1.e) Damage to the Infrastructure

1) Damage to roads

The damages are classified as heavy damage if all pavement and sub-structure including kerbs to be rehabilitated. Moderate or partial damage is estimated as new pavement to be constructed. Light damage is estimates for small-scale in pavement, which require repaved of the road. Total damage to road infrastructures resulted from field survey in 31 inundated locations are 63,400

square meter made of asphalt road and 3,500 square meter made of concrete road.

2) Damage to railway and bridges

Including damage to railway foundations, disruption of transportation services, damage to facilities.

3) Damage to river and flood control facilities

Most river and flood control facilities such as dykes, riverbanks, weirs, gates, levees, and pumping stations are still functioning well. Some riverbank is damaged due to slope sliding and erosion and some pump equipment has insufficient capacity. The damaged riverbank needs to be rehabilitated using revetments and retaining walls. Additional pumping equipment is required to increase the capacity. (Setiabudhi and Sunter).

1.f) Damage of Public Utilities

1) Damage to electricity supply (PLN)

- a) Damage to equipment and repairing of equipment
- b) Loss due to disruption of supply

2) Damage to water supply (PDAM)

- a) Damage to equipment and treatment facilities
- b) Cleaning of pipe
- c) Additional equipment for water supply during flooding

3) Damage to telephone network (Telkom)

- a) Damage to equipment and instrument
- b) Repairing to telephone lines

Calculation damage loss of flood can be shown in Table 6-4 of damage ratio estimation.

1.g) Affection to Public Health and Social Securities

1) Effect to social securities covers:

- Health and danger from outbreak and communicable disease including risks of hospitalized cost
- Food supply and securities before and after flood inundation
- Fatal injuries and loss of life during flood inundation 2002

II) Indirect Loss

2.a) Loss of Land Value

Another impact of inundate area is loss of land value, because no guarantee that peoples living secure of flood. The loss of land value is summarized from interviews

undertaken to REI (Real Estate Association) Jakarta and some of property agents. Significant value degradation of land price in the market is happened due to environment condition of the area from flooding. Calculation damage loss of flood can be shown in item loss of land value.

2.b) Affection to economic activities

Loss of transportation and communication estimated as number of days where working population has difficulties to access the transportation and communication facilities. Loss of income implemented to labor due to absence works.

Calculation of indirect loss:

- Lost income from absence of working 35 %, working population affected.
- Lost of transportation and communication
- Land value depreciation due to heavy and medium damage.

Total damage loss:

- Direct and indirect loss + 20 % contingency for inconvenience and intangible damage.

Figure 6-1. Flowchart of Direct Loss Calculation

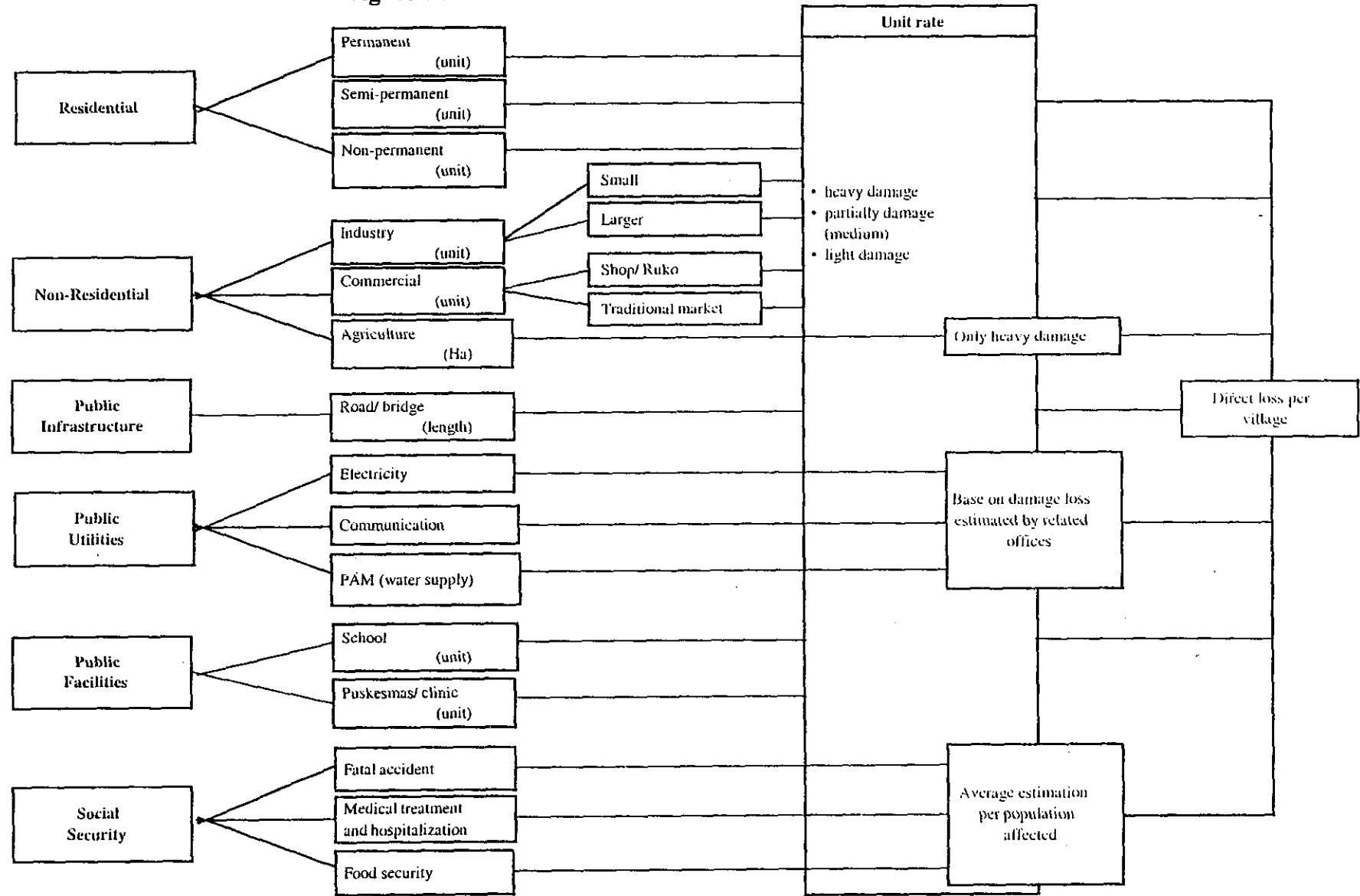
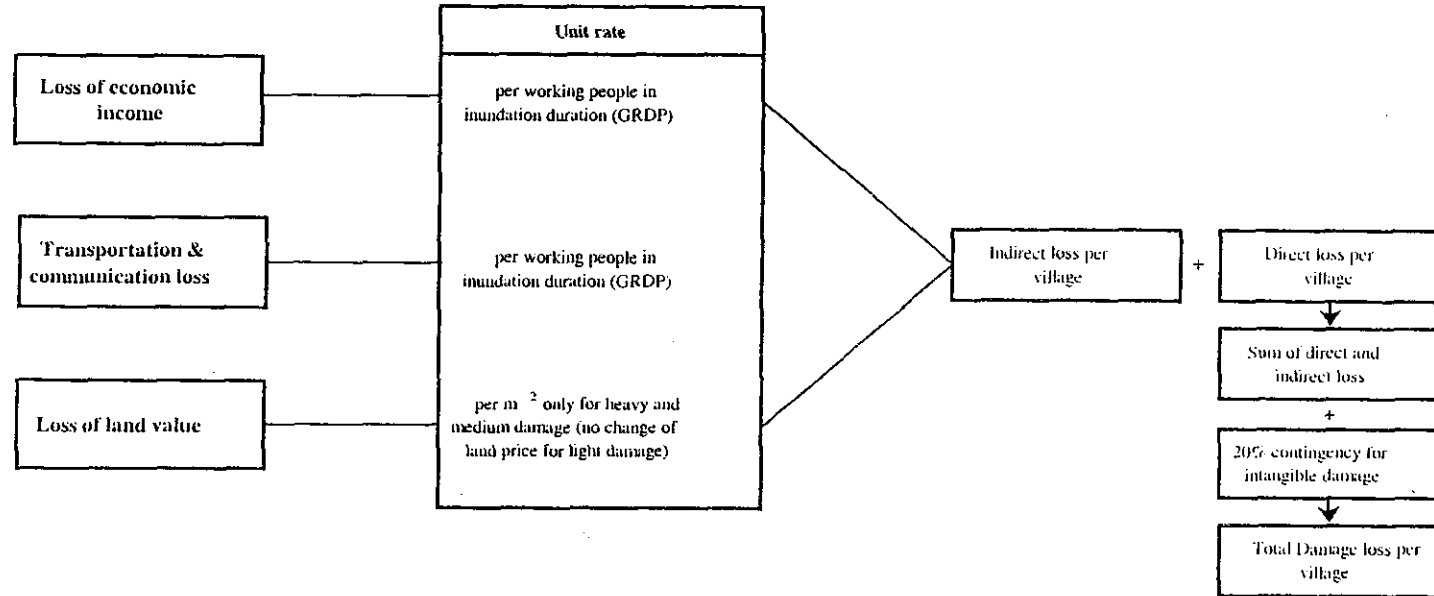


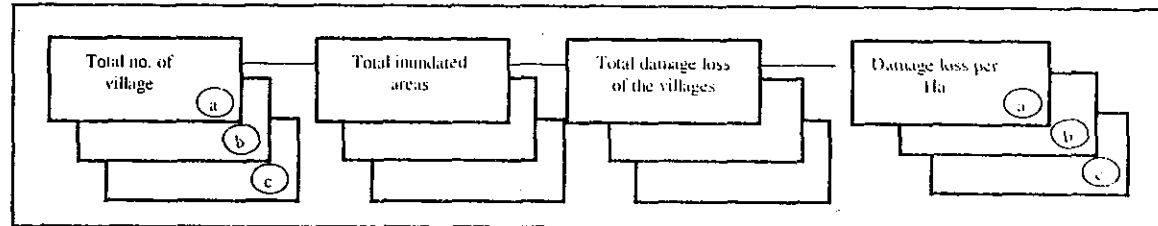
Figure 6-2. Method Calculation of Indirect Loss Total Loss in Jabodetabek area



Rating value in urban and non-urban area base to population density

Density, derived from total damage loss in each site/village.

- a) High density (>150 population/ha) populated urban
- b) Low density (<150 population/ha) populated urban
- c) Low density rural area including agriculture



Calculation of damage in DKI Jakarta, Tangerang District and Municipality, Bekasi District and Municipality and Depok Municipality, is use the damage loss rating multiplerto total hectare of flooded area according to BPS data (DKI Jakarta) or district and municipal record (out side DKI Jakarta).

Table 6-1. Value Ratio of Damages (Version A)

Version A : Alternative Ratio with a lowest assumption of construction cost

	Type	Characteristic	Average damage loss		
			Heavy damage	Medium/ Partially damage	Light damage
A. Direct Loss: (a) Residential:	- Permanent houses	- Floor area 70-100m ² lowest construction cost in market Jabodetabek Rp. 500,000/m ² *	- More than 50% construction damage - Average Rp. 20 mill/house	- More than 20% - 50% construction damage - Average Rp. 10 mill/house	- Less than 20% construction damage - Average Rp. 4 mill/house
	- Semi-permanent houses	- Floor area 40-70m ² lowest construction cost in market Jabodetabek Rp. 300,000/m ² *	- More than 50% damage - Average Rp. 14 mill/house	- More than 20% - 50% damage - Average Rp. 6 mill/house	- Less than 20% damage - Average Rp. 2 mill/house
	- Temporary/ Non-permanent houses	- Floor area 25-40m ² lowest construction cost in market Jabodetabek Rp. 100,000/m ² *	- 100% damage (loss) - Average Rp. 6 mill/house	- More than 50% damage - Average Rp. 2.4 mill/house	- Less than 50% damage - Average Rp. 1 mill/house
(b) Business Commercial:	- Occurred mainly to small size shops or ruko	- Floor area below 100m ² (ground) construction cost Rp. 500,000/m ² *	- Average Rp. 20 mill/unit	- Average Rp. 10 mill/unit	- Average Rp. 4 mill/unit
	- Traditional market	- Floor area 500-1500m ² construction cost Rp. 100,000/m ²	- Average Rp. 100 mill/market	- Average Rp. 40 mill/market	- Average Rp. 20 mill/market
(c) Industry:	- Small industry	- Lots less than 5000m ²	- Average Rp. 40 mill/unit	- Average Rp. 20 mill/unit	- Average Rp. 10 mill/unit
	- Larger industry	- Lots larger than 5000m ²	- Average Rp. 80 mill/unit	- Average Rp. 40 mill/unit	- Average Rp. 20 mill/unit
(d) Irrigation and Agriculture:	- Estimated from construction cost of land preparation and tertiary irrigation	- Damage to the land, irrigation and some production average Rp. 12 mill/Ha	None	None	None

	Type	Characteristic	Average damage loss		
			Heavy damage	Medium/ Partially damage	Light damage
(e) Public Infrastructure:	- Road/ bridge estimated from cost construction Rp. 300,000/sqm*		- More than 50% damage to pavement and substructure - Average Rp. 200,000/m ²	- Less than 50% damage to pavement and substructure - Average Rp. 100,000/m ² for asphalt road - Average Rp. 30,000/m ² for cement road	- Only less than 50% of pavement - Average Rp. 50,000/m ²
(f) Public Utilities:	- Electricity (PLN) and Communication (Telkom)		Based to the PLN and Telkom damage loss estimation		
	- Water Supply (PDAM)		Based to the PDAM estimation of damage loss		
(g) Public Facilities:	- School	- Semi permanent to permanent construction - Floor area ranging 500-1500 m ² - Construction cost Rp. 400,000/m ² *	- Average loss Rp. 20 mill/unit	- Average loss Rp. 10 mill/unit	- Average loss Rp. 4 mill/unit
	- Puskesmas	- Permanent construction - Floor area ranging 100-150m ² - Construction cost Rp. 500,000/m ² *	- Average Rp. 20 mill/unit	- Average Rp. 10 mill/unit	- Average Rp. 4 mill/unit
(h) Social Security:	- Fatal accident	- Loss equal to life insurance compensation with premium less than Rp. 50,000/ month	- Average Rp. 20,000,000 for loss life - Average Rp. 10,000,000 for disable		
	- Medical treatment	- 1 to 2 weeks of medical treatment and medicines with around 15% hospitalized	- Average Rp. 200,000/ person		

	Type	Characteristic	Average damage loss		
			Heavy damage	Medium/ Partially damage	Light damage
	- Food security	- 1 to 2 weeks for food and clean water supplies	- Average Rp. 200,000/ person		
B. Indirect Loss:					
(a) Loss of economic income	- Number of days of flood inundation x Per capita Gross Regional Domestic Product (GRDP) at Current Market Prices per day X employed population (35% from affected population)				
(b) Transportation and Communication Loss	- Number of days of flood inundation X 50% from Per-capita Gross Regional Domestic Product (GRDP) at Current Market Prices per day X employed population (35% from affected population) - Number of days of flood inundation x loss in Airport and Seaport services (Data collected from Angkasa Pura and Pelindo)				
(c) Loss of Land Value	- Market prices of land and building indicate 5-12% value decrease due to annual flooding. Assumes land coverage per house equal 100m ² , exclude infrastructure	- Unit housing x Average building area x 10% market price	- Unit housing x Average building area x 5% market price	- No loss land value in light damage areas	
(d) Contingency Loss	(base upon formulation of) Nedeco – Quick Reconnaissance Study-2002	Approximate at a sum of 20% from total number of direct and indirect loss			

* : Estimated from price unit construction DKI Jakarta, 2000

Source: MCI field survey and analysis, 2003

Table 6-2. Value Ratio of Damages (Version B)

Version B: Alternative Ratio with a higher assumption of construction cost

	Type	Characteristic	Average damage loss		
			Heavy damage	Partially damage	Light damage
A. Direct Loss: (a) Residential:	- Permanent houses	- Floor area 70-100m ² moderate construction cost in market Jabodetabek Rp. 800,000/m ² *	- More than 50% construction damage - Average Rp. 36 mill/house	- More than 20% - 50% construction damage - Average Rp. 18 mill/house	- Less than 20% construction damage - Average Rp. 8 mill/house
	- Semi-permanent houses	- Floor area 40-70m ² moderate construction cost in market Jabodetabek Rp. 600,000/m ² *	- More than 50% damage - Average Rp. 20 mill/house	- More than 20% - 50% damage - Average Rp. 10 mill/house	- Less than 20% damage - Average Rp. 5 mill/house
	- Temporary/ Non-permanent houses	- Floor area 25-40m ² moderate construction cost in market Jabodetabek Rp. 400,000/m ² *	- 100% damage (loss) - Average Rp. 12 mill/house	- More than 50% damage - Average Rp. 6 mill/house	- Less than 50% damage - Average Rp. 2 mill/house
(b) Business Commercial:	- Occurred mainly to small size shops or ruko	- Floor area below 100m ² (ground) construction cost Rp. 800,000/m ² *	- Average Rp. 36 mill/unit	- Average Rp. 18 mill/unit	- Average Rp. 8 mill/unit
	- Traditional market	- Floor area 500-1500m ² construction cost Rp. 400,000/m ²	- Average Rp. 200 mill/market	- Average Rp. 80 mill/market	- Average Rp. 40 mill/market
(c) Industry:	- Small industry	- Lots less than 5000m ² Exclude machinery	- Average Rp. 80 mill/unit	- Average Rp. 40 mill/unit	- Average Rp. 20 mill/unit
	- Larger industry	- Lots larger than 5000m ² Exclude machinery	- Average Rp. 150 mill/unit	- Average Rp. 80 mill/unit	- Average Rp. 40 mill/unit
(d) Irrigation and Agriculture:	- Estimated from construction cost of land preparation and tertiary irrigation		- Damage to the land, irrigation and some production average Rp. 12 mill/Ha	None	None

	Type	Characteristic	Average damage loss		
			Heavy damage	Partially damage	Light damage
(e) Public Infrastructure:	- Road/ bridge estimated from cost construction Rp. 300,000/sqm*		- More than 50% damage to pavement and substructure - Average Rp. 200,000/m ²	- Less than 50% damage to pavement and substructure - Average Rp. 100,000/m ²	- Only less than 50% of pavement - Average Rp. 50,000/m ²
(f) Public Utilities:	- Electricity (PLN) and Communication (Telkom)		Based to the PLN and Telkom damage loss estimation		
	- Water Supply (PDAM)		Based to the PDAM estimation of damage loss		
(g) Public Facilities:	- School	- Semi permanent to permanent construction - Floor area ranging 500-1500 m ² - Construction cost Rp. 400,000/m ² *	- Average loss Rp. 100 mill/unit	- Average loss Rp. 80 mill/unit	- Average loss Rp. 40 mill/unit
	- Puskesmas	- Permanent construction - Floor area ranging 100-150m ² - Construction cost Rp. 800,000/m ² *	- Average Rp. 40 mill/unit	- Average Rp. 20 mill/unit	- Average Rp. 10 mill/unit
(h) Social Security:	- Fatal accident	- Loss equal to life insurance compensation with premium less than Rp. 50,000/ month	- Average Rp. 20,000,000 for loss life - Average Rp. 10,000,000 for disable		
	- Medical treatment	- 1 to 2 weeks of medical treatment and medicines with around 15% hospitalized	- Average Rp. 200,000/ person		
	- Food security	- 1 to 2 weeks for food and clean water supplies	- Average Rp. 200,000/ person		

	Type	Characteristic	Average damage loss		
			Heavy damage	Partially damage	Light damage
B. Indirect Loss:					
(a) Loss of economic income		- Number of days of flood inundation x Per capita Gross Regional Domestic Product (GRDP) at Current Market Prices per day X employed population (35% from affected population)			
(b) Transportation and Communication Loss		- Number of days of flood inundation X 50% from Per-capita Gross Regional Domestic Product (GRDP) at Current Market Prices per day X employed population (35% from affected population) - Number of days of flood inundation x loss in Airport and Seaport services (Data collected from Angkasa Pura and Pelindo)			
(c) Loss of Land Value		- Market prices of land and building indicate 5-12% value decrease due to annual flooding. Assumes land coverage per house equal 100m ² , exclude infrastructure	- Unit housing x Average building area x 10% market price	- Unit housing x Average building area x 5% market price	- No loss land value in tight damage areas
(d) Contingency Loss		(base upon formulation of) Nedeco – Quick Reconnaissance Study-2002	Approximate at a sum of 20% from total number of direct and indirect loss		

* : Estimated from price unit construction DKI Jakarta, 2000
 Source: MCI field survey and analysis, 2003

Table 6-3. Total Damage Loss of Flood 2002 from 31 Survey Sites in Jabodetabek Region
(Version A, lowest assumption of construction cost)

No	Village / Sub District	Region / Wilayah	River / River System	Flood Area (Ha)	Flood Period (Day)	Affected Persons	Indirect Damage (in million Rp)	Direct Damage (in million Rp)	Contingency Loss (in million Rp)	Total Damage Loss (in million Rp)
1	Semanan / Kalideres	West Jakarta	Sal. Mookervart / Pesanggrahan	64.3	50	3,000	9,297	15,176	3,664	28,137
2	Kedoya Utara / Kebon Jeruk	West Jakarta	Kali Sekretaris / Pesanggrahan	40.0	40	3,020	8,829	10,359	3,664	22,851
3	Sumur Batu / Kemayoran	Central Jakarta	Kali Item / Cipinang	102.0	3	19,504	1,887	14,785	3,664	20,337
4	Bintaro / Pesanggrahan	South Jakarta	Kali Pesanggrahan / Pesanggrahan	34.0	35	1,000	1,642	5,153	3,664	10,459
5	Bukit Duri / Tebet	South Jakarta	Kali Ciliwung / Ciliwung	29.7	30	11,075	17,672	19,220	3,664	40,555
6	Jatinegara Kaum / Pulo Gadung	East Jakarta	Kali Sunter / Cipinang	16.7	3	4,916	1,101	9,249	3,664	14,013
7	Cipinang Besar Utara / Jatinegara	East Jakarta	Kali Cipinang / Cipinang	34.8	30	24,224	33,101	28,007	3,664	64,772
8	Cipinang Besar Selatan / Jatinegara	East Jakarta	Kali Cipinang / Cipinang	31.8	30	5,004	6,212	5,261	3,664	15,137
9	Kebon Pala / Makasar	East Jakarta	Kali Cipinang / Cipinang	51.9	20	10,338	13,949	17,227	3,664	34,840
10	Rawa Badak Utara / Koja	North Jakarta	Kali Sunter / Cipinang	26.7	7	11,831	4,903	16,726	3,664	25,294
11	Rawa Badak Selatan / Koja	North Jakarta	Kali Sunter / Cipinang	16.0	30	3,574	5,494	7,617	3,664	16,776
12	Kelapa Gading Timur / Kelapa Gading	North Jakarta	Kali Sunter / Cipinang	56.6	30	24,208	23,726	22,344	3,664	49,734
13	Penjaringan / Penjaringan	North Jakarta	Kali Muara Karang / Ciliwung	230.8	30	15,680	32,876	37,025	3,664	73,565
14	Papanggo / Tanjung Priok	North Jakarta	Kali Ancol / Cipinang	209.0	7	7,850	8,696	11,797	3,664	24,157
15	Kapuk Muara / Penjaringan	North Jakarta	Cengkareng Drain / Pesanggrahan	67.8	30	12,664	14,747	16,790	3,664	35,201
16	Kamal Muara / Penjaringan	North Jakarta	Cengkareng Drain / Pesanggrahan	1.0	30	500	484	394	3,664	4,542
17	Pantai Hurip / Babelan	Bekasi District	Kali Bekasi / Cikarang	551.0	60	2,263	4,472	11,505	3,664	19,642
18	Hurip Jaya / Babelan	Bekasi District	Kali Bekasi / Cikarang	1,281.0	60	2,731	5,022	10,685	3,664	19,371
19	Sukadaya / Sukawangi	Bekasi District	Kali Cikarang / Cikarang	448.7	15	472	416	5,587	3,664	9,667
20	Sukabakti / Tambelang	Bekasi District	Kali Bambu Kuning / Cikarang	136.0	16	575	428	2,728	3,664	6,820
21	Kranji / Bekasi Barat	Bekasi Municipality	Saluran Bekasi Tengah / Cikarang	38.1	7	6,615	2,183	11,616	3,664	17,463
22	Bintara / Bekasi Barat	Bekasi Municipality	Saluran Bekasi Tengah / Cikarang	20.9	7	4,750	1,776	8,478	3,664	13,917
23	Pengasinan / Rawalumbu	Bekasi Municipality	Kali Bekasi / Cikarang	44.0	2	7,630	2,025	9,844	3,664	15,534
24	Jatirasa / Jatiasih	Bekasi Municipality	Kali Bekasi / Cikarang	62.5	2	11,285	6,973	28,363	3,664	38,999
25	Renged / Kresek	Tangerang District	Kali Cimanceuri / Cimanceuri	115.9	14	203	104	3,932	3,664	7,700
26	Teluk Naga / Teluk Naga	Tangerang District	Kali Cisadane / Cisadane	70.9	15	4,450	1,463	2,200	3,664	7,326
27	Periuk Jaya / Periuk	Tangerang Municipality	Sal. Cisadane Barat / Cisadane	38.0	10	4,400	3,426	10,793	3,664	17,882
28	Gondrong / Cipondoh	Tangerang Municipality	Kali Angke / Pesanggrahan	11.4	20	785	1,578	2,496	3,664	7,738
29	Cisalak / Sukma Jaya	Depok Municipality	Kali Cijantung / Ciliwung	26.3	6	11,200	860	2,507	3,664	7,031
30	Abadi Jaya / Sukma Jaya	Depok Municipality	Kali Sugutamu / Ciliwung	11.2	5	5,600	358	2,571	3,664	6,593
31	Mekar Jaya / Sukma Jaya	Depok Municipality	Kali Sugutamu / Ciliwung	8.8	2	9,600	246	1,520	3,664	5,430
TOTAL							215,947	351,953	113,580	681,481

Note : Damage Loss Value in Million Rupiah
Flood period indicates the longest period of flood at respective site

Table 6-4. Total Damage Loss of Flood 2002 from 31 Survey Sites in Jabodetabek Region
(Version B, higher assumption of construction cost)

No	Village / Sub District	Region / Wilayah	River / River System	Flood Area (Ha)	Flood Period (Day)	Affected Persons	Indirect Damage (in million Rp)	Direct Damage (in million Rp)	Contingency Loss (in million Rp)	Total Damage Loss (in million Rp)
1	Semanan / Kalideres	West Jakarta	Sal. Mookervart / Pesanggrahan	64.3	50	3.000	9,297	24,410	5,005	38,712
2	Kedoya Utara / Kebon Jeruk	West Jakarta	Kali Sekretaris / Pesanggrahan	40.0	40	3,020	8,829	15,605	5,005	29,438
3	Sumur Batu / Kemayoran	Central Jakarta	Kali Item / Cipinang	102.0	3	19,504	1,887	29,100	5,005	35,993
4	Bintaro / Pesanggrahan	South Jakarta	Kali Pesanggrahan / Pesanggrahan	34.0	35	1,000	1,642	7,983	5,005	14,630
5	Bukit Duri / Tebet	South Jakarta	Kali Ciliwung / Ciliwung	29.7	30	11,075	17,672	28,658	5,005	51,335
6	Jatinegara Kaum / Pulo Gadung	East Jakarta	Kali Sunter / Cipinang	16.7	3	4,916	1,101	12,165	5,005	18,270
7	Cipinang Besar Utara / Jatinegara	East Jakarta	Kali Cipinang / Cipinang	34.8	30	24,224	33,101	44,913	5,005	83,019
8	Cipinang Besar Selatan / Jatinegara	East Jakarta	Kali Cipinang / Cipinang	31.8	30	5,004	6,212	8,250	5,005	19,467
9	Kebon Pala / Makasar	East Jakarta	Kali Cipinang / Cipinang	51.9	20	10,338	13,949	25,801	5,005	44,756
10	Rawa Badak Utara / Koja	North Jakarta	Kali Sunter / Cipinang	26.7	7	11,831	4,903	25,348	5,005	35,257
11	Rawa Badak Selatan / Koja	North Jakarta	Kali Sunter / Cipinang	16.0	30	3,574	5,494	12,841	5,005	23,341
12	Kelapa Gading Timur / Kelapa Gading	North Jakarta	Kali Sunter / Cipinang	56.6	30	24,208	23,726	34,988	5,005	63,719
13	Penjaringan / Penjaringan	North Jakarta	Kali Muara Karang / Ciliwung	230.8	30	15,680	32,876	61,087	5,005	98,968
14	Papango / Tanjung Priok	North Jakarta	Kali Ancol / Cipinang	209.0	7	7,850	8,696	18,250	5,005	31,951
15	Kapuk Muara / Penjaringan	North Jakarta	Cengkareng Drain / Pesanggrahan	67.8	30	12,664	14,747	26,685	5,005	46,438
16	Kamal Muara / Penjaringan	North Jakarta	Cengkareng Drain / Pesanggrahan	1.0	30	500	484	695	5,005	6,184
17	Pantai Hurip / Babelan	Bekasi District	Kali Bekasi / Cikarang	551.0	60	2,263	4,472	15,542	5,005	25,019
18	Hurip Jaya / Babelan	Bekasi District	Kali Bekasi / Cikarang	1,281.0	60	2,731	5,022	13,482	5,005	23,509
19	Sukadaya / Sukawangi	Bekasi District	Kali Cikarang / Cikarang	448.7	15	472	416	6,841	5,005	12,262
20	Sukabakti / Tambelang	Bekasi District	Kali Bambu Kuning / Cikarang	136.0	16	575	428	3,592	5,005	9,025
21	Kranji / Bekasi Barat	Bekasi Municipality	Saluran Bekasi Tengah / Cikarang	38.1	7	6,615	2,183	19,028	5,005	26,216
22	Bintara / Bekasi Barat	Bekasi Municipality	Saluran Bekasi Tengah / Cikarang	20.9	7	4,750	1,776	14,254	5,005	21,034
23	Pengasinan / Rawalumbu	Bekasi Municipality	Kali Bekasi / Cikarang	44.0	2	7,630	2,025	18,494	5,005	25,525
24	Jairasa / Jatiasih	Bekasi Municipality	Kali Bekasi / Cikarang	62.5	2	11,285	6,973	52,757	5,005	64,734
25	Renged / Kresek	Tangerang District	Kali Cimanceuri / Cimanceuri	115.9	14	205	104	4,544	5,005	9,653
26	Teluk Naga / Teluk Naga	Tangerang District	Kali Cisadane / Cisadane	70.9	15	4,450	1,463	2,698	5,005	9,166
27	Periuk Jaya / Periuk	Tangerang Municipality	Sal. Cisadane Barat / Cisadane	38.0	10	4,400	3,426	15,823	5,005	24,253
28	Gondrong / Cipondoh	Tangerang Municipality	Kali Angke / Pesanggrahan	11.4	20	785	1,578	4,171	5,005	10,754
29	Cisalak / Sukma Jaya	Depok Municipality	Kali Cijantung / Ciliwung	26.3	6	11,200	860	4,183	5,005	10,048
30	Abadi Jaya / Sukma Jaya	Depok Municipality	Kali Sugutamu / Ciliwung	11.2	5	5,600	358	4,607	5,005	9,970
31	Mekar Jaya / Sukma Jaya	Depok Municipality	Kali Sugutamu / Ciliwung	8.8	2	9,600	246	3,040	5,005	8,291
						TOTAL	215,947	559,834	155,156	930,937

Note : Damage Loss Value in Million Rupiah
Flood period indicates the longest period of flood at respective site

Table 6-5. Average Damage Loss per Ha Urban and Rural Area
(Version A, lowest assumption of construction cost)

No	Location			Inundation Area (Ha)	Total Damage Loss (in million Rp)	Average Loss (in million Rp/Ha)
	Village/Kelurahan	District / Kecamatan	Region / Wilayah			
A. Inundation in High Density Urban Area (more than 150 population/ha)						
1	Sumur Batu	Kemayoran	Central Jakarta	102.0	20.337	
2	Bukit Duri	Tebet	South Jakarta	29.7	40.555	
3	Jatinegara Kaum	Pulo Gadung	East Jakarta	16.7	14.013	
4	Cipinang Besar Utara	Jatinegara	East Jakarta	34.8	64.772	
5	Cipinang Besar Selatan	Jatinegara	East Jakarta	31.8	15.137	
6	Kebon Pala	Makasar	East Jakarta	51.1	34.840	
7	Rawa Badak Utara	Koja	North Jakarta	26.7	25.294	
8	Rawa Badak Selatan	Koja	North Jakarta	16.0	16.776	
9	Kelapa Gading Timur	Kelapa Gading	North Jakarta	56.6	49.734	
10	Penjaringan	Penjaringan	North Jakarta	230.8	73.565	
Total				597.0	355.022	594.7
B. Inundation in Low Density Urban Area (less than 150 population/ha)						
1	Semanan	Kalideres	West Jakarta	64.3	28.137	
2	Kedoya Utara	Kebon Jeruk	West Jakarta	40.0	22.851	
3	Bintaro	Pesanggrahan	South Jakarta	34.0	10.459	
4	Papanggo	Tanjung Priok	North Jakarta	209.0	24.157	
5	Kapuk Muara	Penjaringan	North Jakarta	67.8	35.201	
6	Kamal Muara	Penjaringan	North Jakarta	1.0	4.542	
7	Kranji	Bekasi Barat	Bekasi Municipality	38.1	17.463	
8	Bintara	Bekasi Barat	Bekasi Municipality	20.9	13.917	
9	Pengasinan	Rawalumbu	Bekasi Municipality	44.0	15.534	
10	Jatirasa	Jatiasih	Bekasi Municipality	62.5	38.999	
11	Periuk Jaya	Periuk	Tangerang Municipality	38.0	17.882	
12	Gondrong	Cipondoh	Tangerang Municipality	11.4	7.738	
13	Cisalak	Sukma Jaya	Depok Municipality	26.3	7.031	
14	Abadi Jaya	Sukma Jaya	Depok Municipality	11.2	6.593	
15	Mekar Jaya	Sukma Jaya	Depok Municipality	8.8	5.430	
Total				677.3	255.933	377.9
C. Inundation in Rural Area						
1	Pantai Hurip	Babelan	Bekasi District	551.0	19.642	
2	Hurip Jaya	Babelan	Bekasi District	1,281.0	19,371	
3	Sukadaya	Sukawangi	Bekasi District	448.7	9,667	
4	Sukabakti	Tambelang	Bekasi District	136.0	6,820	
5	Renged	Kresiek	Tangerang District	115.9	7,700	
6	Teluk Naga	Teluk Naga	Tangerang District	70.9	7,326	
Total				2,603.5	70,525	27.1

Source: MCI field survey, 2003

Table 6-6. Average Damage Loss per Ha Urban and Rural Area
(Version B, higher assumption of construction cost)

No	Location			Inundation Area (Ha)	Total Damage Loss (in million Rp)	Average Loss (in million Rp/Ha)
	Village/Kelurahan	District / Kecamatan	Region / Wilayah			
A. Inundation in High Density Urban Area (more than 150 population/ha)						
1	Sumur Batu	Kemayoran	Central Jakarta	102.0	35,993	
2	Bukit Duri	Tebet	South Jakarta	29.7	51,335	
3	Jatinegara Kaum	Pulo Gadung	East Jakarta	16.7	18,270	
4	Cipinang Besar Utara	Jatinegara	East Jakarta	34.8	83,019	
5	Cipinang Besar Selatan	Jatinegara	East Jakarta	31.8	19,467	
6	Kebon Pala	Makasar	East Jakarta	51.9	44,756	
7	Rawa Badak Utara	Koja	North Jakarta	26.7	35,257	
8	Rawa Badak Selatan	Koja	North Jakarta	16.0	23,341	
9	Kelapa Gading Timur	Kelapa Gading	North Jakarta	56.6	63,719	
10	Penjaringan	Penjaringan	North Jakarta	230.8	98,968	
Total				597.0	474,125	794.2
B. Inundation in Low Density Urban Area (less than 150 population/ha)						
1	Semanan	Kalideres	West Jakarta	64.3	38,712	
2	Kedoya Utara	Kebon Jeruk	West Jakarta	40.0	29,438	
3	Bintaro	Pesanggrahan	South Jakarta	34.0	14,630	
4	Papanggo	Tanjung Priok	North Jakarta	209.0	31,951	
5	Kapuk Muara	Penjaringan	North Jakarta	67.8	46,438	
6	Kamal Muara	Penjaringan	North Jakarta	1.0	6,184	
7	Kranji	Bekasi Barat	Bekasi Municipality	38.1	26,216	
8	Bintara	Bekasi Barat	Bekasi Municipality	20.9	21,034	
9	Pengasinan	Rawalumbu	Bekasi Municipality	44.0	25,525	
10	Jatirasa	Jatiasih	Bekasi Municipality	62.5	64,734	
11	Periuk Jaya	Periuk	Tangerang Municipality	38.0	24,253	
12	Gondrong	Cipondoh	Tangerang Municipality	11.4	10,754	
13	Cisalak	Sukma Jaya	Depok Municipality	26.3	10,048	
14	Abadi Jaya	Sukma Jaya	Depok Municipality	11.2	9,970	
15	Mekar Jaya	Sukma Jaya	Depok Municipality	8.8	8,291	
Total				677.3	368,179	543.6
C. Inundation in Rural Area						
1	Pantai Hurip	Babelan	Bekasi District	551.0	25,019	
2	Hurip Jaya	Babelan	Bekasi District	1,281.0	23,509	
3	Sukadaya	Sukawangi	Bekasi District	448.7	12,262	
4	Sukabakti	Tambelang	Bekasi District	136.0	9,025	
5	Renged	Kresek	Tangerang District	115.9	9,653	
6	Teluk Naga	Teluk Naga	Tangerang District	70.9	9,166	
Total				2,603.5	88,634	34.0

Source: MCI field survey, 2003

Table 6-7. Damage Loss Of Flood 2002 In Jabodetabek (Version A, lowest assumption of construction cost)

Region	Flooding Area According to BPS (ha)	Flooding Area Base to District Report and Derived from District Map (ha)	Average Rate of Damage Loss / ha (million Rp.)*	Total Damage Loss (billion Rp.)
North Jakarta	4,149.00		377.87	1,567.79
East Jakarta	454.00		377.87	171.55
South Jakarta	731.00		377.87	276.23
Tangerang City	350.00		377.87	132.26
Bekasi City	1,101.00		377.87	416.04
Depok City	68.00		377.87	25.70
West Jakarta		2,482.00	594.70	1,476.04
Central Jakarta		890.00	594.70	529.28
Tangerang District		2,433.00	27.09	65.91
Bekasi District		24,200.00	27.09	655.54
			Total	5,316

* : Value extracted from MCI field survey, 2003

As comparison Gross Regional Product (GRDP) current price of DKI Jakarta, 2000 = Rp. 188,036 (in billion)

Table 6-8. Damage Loss Of Flood 2002 In Jabodetabek (*Version B, higher assumption of construction cost*)

Region	Flooding Area According to BPS (ha)	Flooding Area Base to District Report and Derived from District Map (ha)	Average Rate of Damage Loss / ha (million Rp.)*	Total Damage Loss (billion Rp.)
North Jakarta	4,149.00		543.60	2,255.39
East Jakarta	454.00		543.60	246.79
South Jakarta	731.00		543.60	397.37
Tangerang City	350.00		543.60	190.26
Bekasi City	1,101.00		543.60	598.50
Depok City	68.00		543.60	36.96
West Jakarta		2,482.00	794.21	1,971.22
Central Jakarta		890.00	794.21	706.84
Tangerang District		2,433.00	34.04	82.83
Bekasi District		24,200.00	34.04	823.87
			Total	7,310

* : Value extracted from MCI field survey, 2003

As comparison Gross Regional Product (GRDP) current price of DKI Jakarta, 2000 = Rp. 188,036 (in billion)

CHAPTER 7
RECOMMENDATION

7 RECOMMENDATION

7.1 Structural Improvement

For short-term (urgent action) priorities are focusing into drainage and facilities within district / cities authorities :

- Drainage plan for re-functioning of flood facilities (normalization) including rivers, drainage and sediment control.
- As for flood damage mitigation, establishing basin wise flood control manual covering O&M of flood facilities and warning system is considerable to implement at district level.

Mid-term and long-term are more oriented for increase or raising-up capacity of flood facilities in major rivers and drainage.

- Selected projects for implementation are oriented for the central and, provincial (DKI Jakarta), level of implementation. Private investment opportunities and community participation are also considered.
- Countermeasure for land and water environment management, particularly in upstream area are include in medium term (retention ponds, infiltration wells and possibility of sabo dam development).

For long-term target a continuation program would be considered to implement the previous master plan reviewed 1997 with budget optimization (*Central Government*).

The detailed recommendation of structural improvement is appeared in the Table 7.1.

7.2 Non-Structural Improvement

Short-term recommendation are oriented to the improvement of management at district and cities level, include development of database and information system.

a) Institution and capacity building

- Strengthen the institution and develop capacity building base to the uniform vision of river basin development particularly in District Public Work Level to improve sector and inter-regional coordination in the planning, monitoring and implementation.
- Review the existing authorities and share of responsibilities of institution involved in river, drainage and storm water drain system management at district and provincial level (PU district, PIPWSCC, Badan SDA, Otorita Jatiluhur, etc.)
- Develop capacity of river basin management at district / cities level for preparing drainage plan or master plan including Operation and Maintenance which periodically to be review and update. The planning process should be able to accommodate various stakeholder input (agriculture, water supplies, other infrastructures).
- Develop the district level commitment to prepare annual budget planning for operation and maintenance of drainage and facilities under district authority

management. Improvement the existing field unit for Operation and Maintenance by activating Sub District (Kecamatan) Technical implementation unit.

b) Database development and information network

This is a recommendation of the tool for future river/drainage management.

Improve the information network between district / cities for effective usefulness of existing network between central or provincial to the district / cities.

Database development of flood information database should be continuous in annual updating, accommodating river basin development, river management and flood information in GIS application and accurate mapping system. The database should be accessible to all stakeholder include autonomic authorities, sector offices, privates and communities.

The database is used for planning implementation and monitoring purpose for all related provinces, district and cities. This database will provide valuable input for:

- Flood damage database to be completed and to be updated every year (*by community and village unit to district/ municipal*).
- Control of land use is required to avoid further potential of flood. Establish accurate data inventory of physical damage in flood-inundated area with detailed guidelines to be filled (*by community and village unit*).
- Develop building regulation in annual flood inundated area (flood proofing, building) within floodplain regulated zone area (*by Central Government : DGWR*).
- Land consolidation is required to preserve flood facility space (reservoir, pump house, etc.) particularly in flood plain Jakarta (*by municipal*).

c) Flood manual and flood information system

Use the database for further development of flood manual and warning system includes pre-flood and post-flood information which are important for prevention measures and recovery program. Annual hydrologic review are undertaken to update hydrograph feature and designated flood analysis to setup warning pattern. Within this warning system also to be designed or developed the technical command line within mechanism of disaster management which include the community participation.

Table 7-1. Recommendation of Structural Improvement

	River System					
	Cidurian and Cimanceuri	Cisadane	Pesanggrahan	Ciliwung	Cipinang	Cikarang
<p>1. Short-term program prioritized for District level drainage and facilities</p> <p>a. Normalization of river and drainage</p> <ul style="list-style-type: none"> • Dyke Rehabilitation 			<ul style="list-style-type: none"> - K. Pesanggrahan (Sawangan-Depok) - K. Angke (Kedoya Utara-DKI Jakarta) 	<ul style="list-style-type: none"> - K. Ciliwung (Bukit Duri-DKI Jakarta) - K. Ciliwung (Pengadegan-DKI Jakarta) 	<ul style="list-style-type: none"> - K. Laya (Cimanggis-Depok) - K. Cipinang (Kebon Pala-DKI) - Cakung drain (Cakung Barat-DKI Jakarta) 	<ul style="list-style-type: none"> - K. Bekasi (Babelan-Bekasi)
<ul style="list-style-type: none"> • Dredging the sediment and solid waste in the river course 		<ul style="list-style-type: none"> - K. Baru (Kebon Pedes-Bogor) 	<ul style="list-style-type: none"> - K. Pesanggrahan (Bintaro-DKI Jakarta) - Cengkareng drain (Kapuk muara and Kamal Muara-DKI Jakarta) 	<ul style="list-style-type: none"> - K. Ciliwung (Bukit duri-DKI Jakarta) - K. Sugutamu (Mekarjaya-Depok) 	<ul style="list-style-type: none"> - K. Petukangan (Rawa Terate-DKI Jakarta) - K. Cakung (Rawa Terate-DKI Jakarta) - Cakung Drain (Cakung Barat-DKI Jakarta) - K. Sunter (Pulogadung-DKI Jakarta) 	<ul style="list-style-type: none"> - K. Bekasi (Jatirasa, Pantai Jurip, Jurip Jaya-Bekasi)
<ul style="list-style-type: none"> • Slope protection of the river bank 	<ul style="list-style-type: none"> - K. Cidurian (Pasirampo-Tangerang) 	<ul style="list-style-type: none"> - K. Cisadane (Paledang-Bogor) 	<ul style="list-style-type: none"> - K. Pesanggrahan (Depok) 	<ul style="list-style-type: none"> - K. Ciliwung (Pengadegan-DKI Jakarta) 		<ul style="list-style-type: none"> - K. Bekasi (Babelan-Bekasi)
<ul style="list-style-type: none"> • Relocation of dumping area of garbage 		<ul style="list-style-type: none"> - Cisadane Barat drainage (Koang-Tangerang) 	<ul style="list-style-type: none"> - Cengkareng drain (Kapuk Muara-DKI Jakarta) 		<ul style="list-style-type: none"> - K. Sunter (Cipinang Muara-DKI Jakarta) - K. Cipinang (Cimanggis-Depok) 	
<ul style="list-style-type: none"> • Urban drainage Improvement 			<ul style="list-style-type: none"> - Cengkareng drain (Kapuk Muara-DKI) - Mookervart Canal (Semanan-DKI) 	<ul style="list-style-type: none"> - K. Ciliwung (Penjaringan-Papanggo-DKI Jakarta) 		<ul style="list-style-type: none"> - K. Cikarang (Sukabakti, Pengasinan-Bekasi)

	River System					
	Cidurian and Cimanceuri	Cisadane	Pesanggrahan	Ciliwung	Cipinang	Cikarang
<p><i>b. Re-functioning the flood control facilities</i></p> <ul style="list-style-type: none"> • Rehabilitation of gate 		<ul style="list-style-type: none"> - West Cisadane drainage (<i>Koang-Tangerang</i>) - Pintu 10 (<i>Koang-Tangerang</i>) - Simpang 7 gate (<i>Mekarsari-Tangerang</i>) 				
<ul style="list-style-type: none"> • Repair and replacement of pump and pump house 		<ul style="list-style-type: none"> - Lake Priuk Jaya (<i>Tangerang</i>) 			<ul style="list-style-type: none"> - K. Iem (<i>Cipinang</i>) 	
<p><i>c. Normalization of lake and reservoir</i></p> <ul style="list-style-type: none"> • Dredging the sediment in the reservoir and gate 			<ul style="list-style-type: none"> - Situ Kelapadua (<i>Tangerang</i>) - Situ Pamulang (<i>Pamulang-Tangerang</i>) - Situ Ciledug (<i>Ciledug-Tangerang</i>) - Situ Cipondoh (<i>Cipondoh-Tangerang</i>) 		<ul style="list-style-type: none"> - Situ Jatijajar (<i>Depok</i>) - Situ Citayam (<i>Depok</i>) - Situ Pedongkelan (<i>Depok</i>) 	

	River System					
	Cidurian and Cimanceuri	Cisadane	Pesanggrahan	Ciliwung	Cipinang	Cikarang
<p>2. The mid and long-term program is oriented to increase or raising up the capacity of flood facilities in main river and drainage with consideration of priority scale of the project due to budget optimization This program will refer to the Master Plan (Nedeco, 1973) with latest review by Nikken 1997 including available programme prepared by Kimpraswil, such as :</p> <p>a. Dam in upstream area to reduce peak flow: Ciliwung upstream (Ciawi, Bogor district)</p> <p>b. Dyke construction: Pesanggrahan downstream (DKI Jakarta)</p> <p>c. Main river/canal improvement : - Ciliwung river downstream (DKI Jakarta) - West canal (DKI Jakarta) - East canal (DKI Jakarta-Bekasi) - Cisadane river downstream (Tangerang) - Bekasi river (Bekasi district) - Cikarang-Bekasi-Laut/CBL (Bekasi)</p> <p>d. Installation of warning system : - Ciliwung river (DKI Jakarta and Bogor), Cisadane river (DKI Jakarta and Tangerang)</p>						

Mid and longer term recommendation are proposed for institutional development in term of one basin one management and community participation.

a) Inter regional basin management

An independent inter regional basin management at either central or provincial level is a long term target to minimize intersectoral and interregional problems in management of river basin within related autonomy of the districts.

The following recommendation can be implemented under present coordination team of integrated Ciliwung management (Kimpraswil and State Ministry of Environment, Kepmen 20/KPTS/M/2002) with its multi sectoral working group.

Assessment for inter regional basin management to accommodate a fully integrated one basin one management which involving all stakeholder includes community is required to obtain :

- Uniform database information
- Consistent inter-regional and inter-sector policy and planning and monitoring
- Effective regulation and legal implementation

The function could covers activities for river management, drainage, erosion and sediment control, flood information warning system and evacuation management. There are various model of river basin management to be established in implementation level and coordination level, base to the role share between central, province and districts.

Table 7-2 show the process of establishment including related responsibilities of central, provinces and districts in autonomy frameworks.

Assessment should taking various aspect into consideration:

- Sharing of authorities in various related sector and inter-regional management.
- Potential condition of incentive and disincentive (mainly between upstream and downstream).
- Legal support availability from Law (Undang-undang) and central regulation at national level and district regulation (Perda) at autonomy level.
- Alternative of establishing new set-up of institution or making synergy of available organization (merger)
- Determining the scope of function of the new body (institution) including their authorities.

The inter region flood management and control body as part of inter regional basin management, to be established by all stakeholder to streamline “who to do what for whom” by involving :

- Asset holder [Electricity Power Supply (PLN), Water Supply (PDAM), Telecommunication (Telkom), Road Service (Jasa Marga), etc)

- Kelurahan (village), Kabupaten (district) and Province.
- Settlement and Infrastructure Regional (Kimpraswil).
- Forestry
- Police, etc.

The flood management covered the interaction of various role of present independent body as shown in Figure 7-1 Flood Management.

Table 7-2. Role of Responsibilities for River Basin Management establishment in Autonomy Framework

Components	Central	Provincial	District	Remarks
• Review of Regulation (UU, PP, Keppres) related to water resources level, environment and autonomy	•			- To obtain consistency of existing regulations
• Inter-sectoral coordination in basin water resources development at ministerial level	•			- Utilizing existing Keppres as umbrella legislation
• Inter-regional coordination between Provinces or Districts toward inter-regional cooperation organization	•	•		- Coordination at central if more than one province involved - Coordination at province level if more than one district involved
• Policy development in river basin management	•			- Basic policy covers inter-sectoral and inter-regional issues, includes role sharing and responsibilities
• Establishment of technical standard or guidelines for river basin development	•			- With participation input from province, district and stakeholders
• Development of performance indicator (minimum standard services performance at district implementation)	•			- For public service performance, SPM (Standard Pelayanan Minimum)
• Socialization and advocacy of policy, legislation and standards for district river basin management	•	•		- To province and district executives and legislative in development of river basin management
• Capacity building and technical assistance	•	•		- To improve commitment and capability and performance in management (planning, O & M, monitoring and control)
• Establishment of Perda (District legislation) as sub-ordinate of UU, PP or Keppres (act, Government regulation or Presidential Decree) in establishment of District river basin management			•	- Confirmation at district/ local legislation to inter sectoral and inter-regional policy

Components	Central	Provincial	District	Remarks
• Database development and information system	•	•		- To provide uniform information and effective dissemination (information network)
• Planning and organizing for implementation			•	- District level as management implementation unit
• Annual budgeting preparation			•	- District level as management implementation unit
• Control management of river basin development			•	- District level as management implementation unit
• Community empowerment			•	- Involving community in planning and operational
• Monitoring and supervision of performance in river basin management		•		- Task of province as representative central government in inter-region (district) development-
• Evaluation of performance of river basin management	•			- Review the effectiveness UU. PP. Keppres and its mechanism

Sources: (MCI), various input from decentralization and institutional expert

Note:

1. The above scheme is based to the autonomy framework where development action became the responsibility of District, under Provincial supervision.
2. Other scheme can be proposed using special condition under UU-25: Decentralization, where Central Government can appointed Province to take over the responsibilities with special reason (related to inter district issues or other exceptional issues e.g. land right, etc.)
3. Scheme which setting vertical command line direct from central body to implementation unit at district level is un-consistence with the spirit of autonomy.

b) Community Participation

Development of public campaign and educated the people :

- To avoid illegal construction in river area
- To keep clean of river environment, free from dumping the garbage in river-bank and using as disposal area.
- The campaigns should involving community local leader (formal or non formal) and collaborate with NGO with local (district or provincial) government facilitation.

Regulation and Community Participation :

- Involving community and stakeholders in establishment of local or district regulation in river management.
- Involving community and stakeholder in the planning and formulating of building regulation for area in the flood plain.
- Government at central or province and district should facilitate the mechanism in involving the stakeholder in implementation level (sub districts and villages).

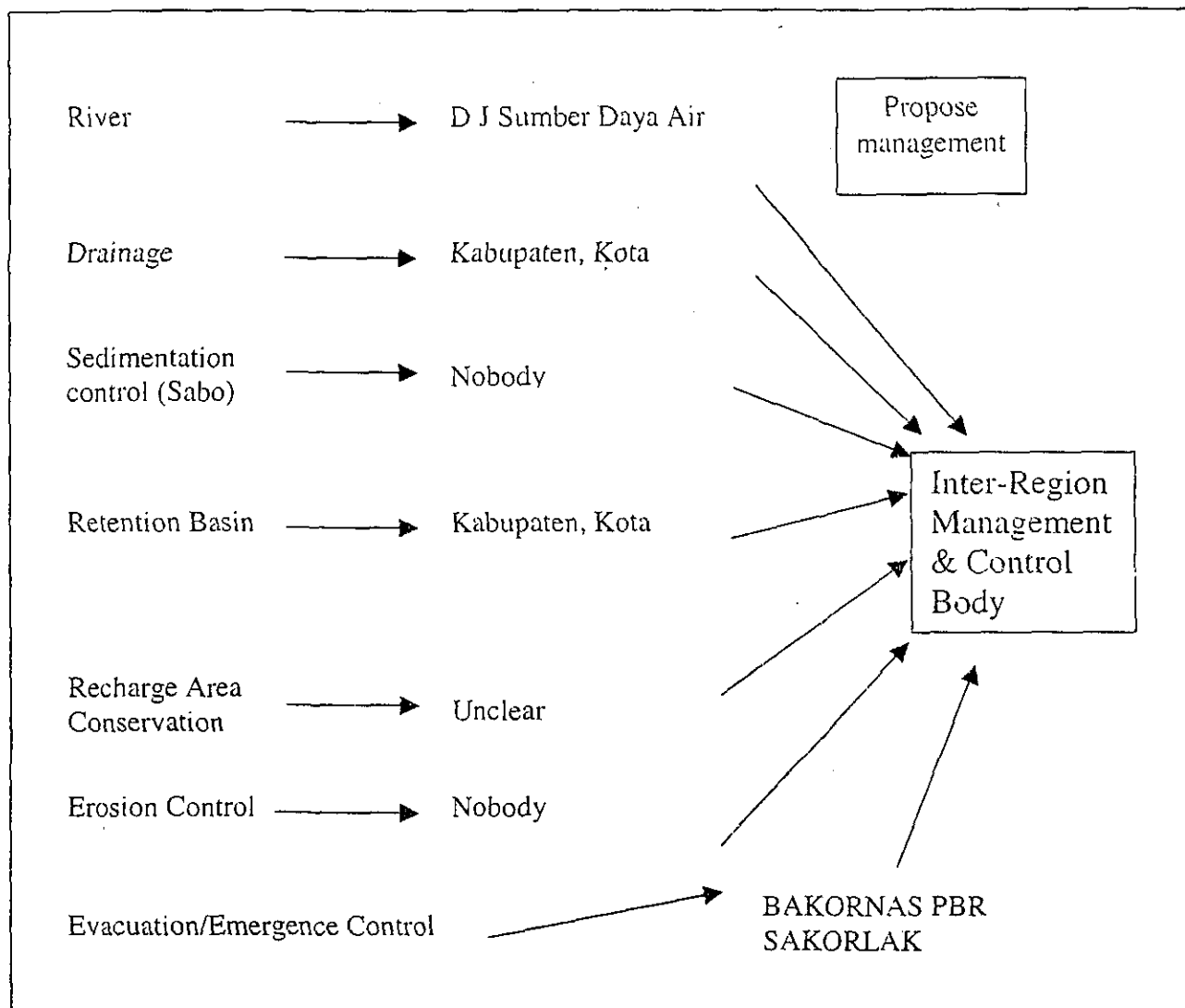
Management and Community Participation :

- Involving stakeholder (including community) in setting up the river basin management, which is cover: river and drainage, sedimentation and erosion, land use and environment, flood control and flood protection.
- Central government, province or district should facilitate the mechanism in involving the stakeholder at village or kecamatan / sub district project level.

Community role in Disaster Management :

- By involving community in vertical mechanism, disaster management should facilitate also community in prevention activities, preparedness, and response to disaster management also recovery. Horizontal coordination can strengthen vertical mechanism for better effective result.

Figure 7-1. Present Flood Management



The integrated basin flood control and management has task to :

1. Advice to regional development plan
2. River management
3. Drainage management
4. Sediment & erosion control (Sabo)
5. Retention basin management
6. Recharge area conservation
7. Legislation arrangement
8. Fund arrangement and disbursement control.

7.3 Summary of Proposal to Mitigate Damage

In the previous page, the damage loss has been calculated base to the field observation and interview to obtain number or volume of damage to the location, which include direct damage and indirect damage. The damage loss was calculated in two-version (A and B) base to different assumption of unit construction prices.

Considering the limitation of field study, the identification concerning river and drainage facilities was not support with magnitude as volume of damage.

In the following table, summary of proposal project is developed, considering the priority development explained in general recommendation.

Cost values of the project are estimated base to the assumed cost value appeared in similar project item within KIMPRASWIL (Implementation Program 2000 – 2002).

Table 7-3. Summary of Proposal to Mitigate Damage

Aspects	Problem	Mitigate Measures and On-going Progress	Evaluation and Recommendation	Activity	Programme (in million Rp.)				
					Short-term 1-2 years	Mid-term 2-5 years	Long-term 5-10 years		
<p>A. River Basin :</p> <ul style="list-style-type: none"> - Cidurian and Cimanceuri - Cisadane - Ciliwung - Pesanggrahan - Cipinang - Cikarang 	<p>River basin development :</p> <p><u>Cause:</u> <u>Increase of settlement area by development of housing and structure.</u></p> <ul style="list-style-type: none"> • High-density settlement from property and a continuing supply to the market in upstream area, extended the inconsistency with the regulation of building coverage ratio (<i>upstream Ciliwung and Bopunjur</i>) • Large land allocation (12,000 ha) for residential and industries (less than 30 % developed) in Jagorawi toll road (<i>upstream Cikeas, Cileungsi rivers</i>). • Clustered development and large extension area (23,000 ha) of township development and industrial city along east-west toll road Merak-Jakarta-Cikampek Un-integrated city infrastructure and improper city drainage in fringe areas are occurred. (<i>midstream of Cimanceuri, Cisadane, and Cikarang</i>). <p><u>Effect</u></p> <ul style="list-style-type: none"> - Run off coefficient will raise up and peak flow increase. - Will rise up the flood potential. <p><u>Change of Landuse:</u></p> <p><u>Cause: decrease of non-settled area including forest, plantation and lakes and pond.</u></p> <ul style="list-style-type: none"> • Land use change and conversion from forestry, plantation and wetland agriculture into settlement development (<i>upstream Ciliwung, Cisadane, Cikarang rivers</i>). • Many lakes and natural basin have changed into development area (<i>midstream of Pesanggrahan and Cisadane</i>). <p><u>Effect:</u></p> <ul style="list-style-type: none"> - Peak flow increase and erosion increase. - Retention decrease and peak flow increase - Flood potential will raise up <p><u>Institution and regulation:</u></p> <p><u>Cause: ineffective regulation</u></p> <ul style="list-style-type: none"> • Impact of development occurred from ineffective regulation in autonomy mechanism, which leads to inconsistency implementation of regulation. • Poor coordination of land use and infrastructure planning in upstream and downstream to anticipate large accumulation of development in future. • Development in restricted zone of the river and use of river as for disposal area by communities (<i>downstream Cisadane, Ciliwung, Angke and Cipinang rivers</i>). 	<p>Structural Improvement :</p> <ul style="list-style-type: none"> • Propose countermeasure for retention ponds and retention wells including elevated house (panggung) in established allocation of property development in Bopunjur (<i>Bogor, Cianjur districts</i>). • Evaluate of existing large-scale property plan (along Jagorawi) to spare suitable retention lake or pond in their future development (<i>Central Government</i>). Bogor district is reviewing the planning and no outcome is issued. Lake and Situ rehabilitation in Gn. Putri, Cileungsi, Cibinong and Cimanggis completed DGWR – 2003. • Evaluate existing and proposed drainage plan in new development along East – West toll road correlated with existing flood control management and facilities (<i>Central Government</i>). Tangerang and Bekasi have informed, no follow-up. Flood control detailed design for Tangerang and Bekasi is under progress DGWR – 2003. • Urban drainage improvement in fringe areas between large properties development. Tangerang has proposed drainage masterplan APBD 2002 – 2003. <p>Non Structural:</p> <p>a. Inter sector coordination:</p> <ul style="list-style-type: none"> • Inventory of all legal products in water and land conservation and develop uniform vision of River basin development To bridge the gap of water management policy in upstream and downstream and establish the legal umbrella. (<i>Kimpraswil and Ministry of Environment - 2002</i>) Working group for Ciliwung river basin management covers 3 sector projects: <ul style="list-style-type: none"> - Spatial planning, conservation and legal aspect - Urban housing and economic development - Integrated river management • Integrated river management Confirming water as limiting factor in spatial planning process. Determine related indicators in land use planning and guidelines for development in watershed (<i>Central Government: DGWR, DGSP</i>) Building the consensus between related district/ municipality of Jabodetabek and Puncur. Guidelines for watershed development with water management consideration currently being established under DGSP with Bogor district and Depok municipal. • Develop interregional cooperation agreement for Basin Water Resources Management (UU 22/1999) in Jabodetabek and Punjur using uniform database. Advocacy from Central Government (DGWRD and DGSP) to related DPRD for further establishment into Perda is recommended. <p>b. Institution:</p> <ul style="list-style-type: none"> • Database development in GIS application of Jabodetabek and Punjur within 6 major River basins; accommodate river basin development, zonal and river management, drainage and flood information. The database will be updated annually use as basic information for coordinative (sectoral and inter region) planning and monitoring. DG.TR being prepared base map and integrated thematic map for planning use (2004). Database and river basin monitoring evaluation currently prepared by BLRKT (Ministry of Forestry) year 2003. 	<p>Structural Improvements :</p> <p>Priorities are made to reconditioning the facilities, which includes normalization of river and flood protection facilities in DKI Jakarta, Tangerang and Bekasi district and Depok city.</p> <p>Non Structural focusing in:</p> <p>Short term</p> <ul style="list-style-type: none"> • Strengthen the present coordination team of integrated Ciliwung management by broaden its stakeholders for land and water conservation in upstream area and for river basin management (<i>Central Government</i>). • Development of Flood Information Database with continue annual updating assisted by Central Government and use for all provincial and District/ Kotamadya including other stakeholder and communities. • Assessment for establishment of Lembaga or body of Basin Management (short and mid-term) for one basin, one management involving all stakeholders includes communities. The functions are for river management, drainage, erosion sediment control, evacuation management, warning system and flood information (<i>Central Government</i>). Assessment should considered: <ul style="list-style-type: none"> - Sharing of authorities of related sector - Incentive and dicentive 	<p>Structural :</p> <p>The structural activities are including in the program of Kimpraswil, DKI, Bogor and Tangerang explained in summary of Flood control and protection.</p> <p>Non-Structural:</p> <ol style="list-style-type: none"> 1. a. Update the land use planning of Jabodetabek and Bopuncur referred to available regulation in water (and land) conservation. b. Develop spatial planning guidelines based upon related indicators of water and conservation management (conservation index). (<i>DGSP, District</i>) 2. Integrated Database development using GIS application for flood information areas and River basin development in Jabodetabek for planning and monitoring use. (<i>DGWR, Stakeholders</i>) 3. Establish a monitoring and controlling system for River basin development including inter-sector capacity building for related Jabodetabek officials. (<i>DGWR, BMG, LAPAN</i>) 4. Establish regulation to obtain consistent and coordinated management between upstream and downstream. (<i>DGSP, KLH, Stake holders</i>) 5. a. Community awareness and public campaign in water conservation, flood risks and regulation. b. Community participatory program for clean environmental of river and drainage within system of Jabodetabek solid waste management (<i>KLH, DGWR, NGO</i>) 	10,000	5,500	7,500	5,750	6,250

Aspects	Problem	Mitigate Measures and On-going Progress	Evaluation and Recommendation	Activity	Programme (in million Rp.)		
					Short-term 1-2 years	Mid-term 2-5 years	Long-term 5-10 years
	<p><u>Effects :</u></p> <ul style="list-style-type: none"> - Uncontrolled development carry potential to raise-up flood damage. 	<ul style="list-style-type: none"> • Law enforcement against illegal development and consistent use of regulation in flood plain area. Environment analysis as pre-requisite condition for large development (more than 100 ha) or development in high-risk areas. No Amdal were provided in present property development in Bopunjur, the latest implemented for Safari Garden and Mega Indah (Bogor) in 1985. DKI Jakarta, Bogor district and Depok municipal are preparing operation procedure for law enforcement (DGSP - 2002-2004). • High compensation rate for excessive ground water implemented for more than 40m depths extraction. <i>Authorities of DKI, Bogor, Depok, Tangerang and Bekasi.</i> • Establish solid waste management system involving potential private and community self support in waste collections to temporary disposal. <i>Municipality: DKI, Tangerang, Bekasi, Bogor, Depok.</i> Review been made by DKI toward 1987 solid waste masterplan (2002). <p>c. Community Development:</p> <ul style="list-style-type: none"> • Building community awareness in environment management including risk awareness of flooding. Empower LPM in village level and community forum in district/ municipality level for environment and water management. Public campaign for community awareness in river basin development and management was currently undertaking by DGWRD. Community empowerment for spatial development is proceeding in DGTR (2003). 	<ul style="list-style-type: none"> - Legal support (Undang-Undang and Perda) - New institution set-up or synergy of available organization (merger) - Scope of new function and authorities <p><u>Short term:</u> Establish project to empower local community (in particular river area surrounding) for clean river and drainage environment and minor flood protection.</p>				

DGWRD : Directorate General of Water Resources Development
 DGSP : Directorate General of Spatial Planning
 DGURD : Directorate General of Urban and Rural Development

Aspects	Problem	Mitigate Measures and On-going Progress	Evaluation and Recommendation	Activity	Programmed (in million Rp.)		
					Short-term 1-2 years	Mid-term 2-5 years	Long-term 5-10 years
B. Flood Control & Protection Facilities :	<p>Rivers :</p> <ul style="list-style-type: none"> Increase the sediment in watercourse (<i>downstream Pesanggrahan, Cisadane, Ciliwung, Cipinang, and Cikarang rivers</i>). Effects to increase of flood area and flood frequency, decrease flow capacity. Damages of dykes (<i>downstream Cidurian, Cisadane, Ciliwung, Angke, Cipinang and Cikarang river</i>). Structure over the river too low (<i>Bintaro, Angke, Ciliwung, Grogol</i>). Effects: increase of flood area and flood frequency, decrease flow capacity. <p>Flood control:</p> <ul style="list-style-type: none"> Insufficient of pump and function of floodgates to control water and low maintenance in outside DKI Jakarta.. Aging and malfunction of equipment in 14 locations during 2002 flooding. (<i>Kp. Gusti – Angke, K. Sabi – Cikarang, Tengate – Cisadane, B. Jago – Cipinang, Mangga Dua Abdad – Ciliwung</i>). Effects to increase flood area and decrease flow capacity. Sediment in reservoir reduces retention capacity (<i>Sunter Utara, Pulomas, Setiabudi, etc.</i>). Sedimentation also occurred in front of floodgates, in upstream area, (<i>Pasar Baru, Cisadane, Kalibaru Cibuluh and Kali Hem Sunur Baru</i>). Effects to increase of unnatural flood. Absence of flood monitoring to indicate flood conditions, telemetric equipment is not effectively operated (DKI Jakarta – PU). <p>Operation and Maintenance:</p> <ul style="list-style-type: none"> Non-interrelated O&M manual of flood facilities (<i>Pump station Ancol, floodgate Sunter and D. Sunter Selatan</i>). Effects to increase unnecessary flood. Warning system is operated with no direct access to communities, no provision for community regarding timely flood information areas (<i>Bukit Duri, Kedoya, Cipinang, Kelapa gading, etc.</i>). Effects to increase unnecessary flood damage. Low community awareness to involve in operation and maintenance of minor system (<i>Penjaringan, Kapuk Muara, Kamal Muara, Sukadaya, etc.</i>). Illegal waste dumping to watercourse has effect to increase of flood. 	<p>Structural Improvement :</p> <ul style="list-style-type: none"> Continuing the masterplan reviewed 1997 and optimizes development within financial capacity (<i>Government budget and loans</i>). No progress at Eastern Banjir Canal, land acquisition by DKI Jakarta reached 13% year 2003. Require river normalization including recondition of pumps and gates, dredging and slope protection in priority areas as indicated in problem locations. Normalization of Ciliwung. Sunter, Cipinang, Buaran, Bekasi, Angke, Ciputat and Cimanceuri, Cicarab, Sugutamu and Cijantung are proceeding 2002 – 2003 (DGWR). Prioritize urban drainage improvement in North <i>Cipinang, Rawa Badak, East Kelapa Gading, Cisalak, Lembah Griya (Depok)</i>. Require supporting facilities in floodgates and pump facilitation for optimum operation (level scale, roofing, staff house) in <i>Kali Sunter, Ciliwung, K. Hitam, and Kali Baru</i>. Make optimal use of equipment for flood monitoring and warning system to the community base on results of flood analysis. Planning for warning system in Ciliwung – Cisadane river area accomplished 2002. <p>Non-structural</p> <ul style="list-style-type: none"> Extend the joint agreement between Central Government (DGWRD) with Tangerang, Bekasi and Depok, similar to the agreement implemented with DKI Jakarta. The district has funding resources limitation, so remain under Central Government. Assessment feasibility institutions for O&M flood control and drainage within river basin management as profit or non-profit organization with sustainable funding resources (<i>basin management organization</i>). Study on institution (role sharing) for land use management being prepared by DGSP (2003). Facilitate public awareness and community participation for flood risk and emergency management including minor maintenance of river in vulnerable flood areas through village community organization (<i>district/ municipal</i>). Present mechanism of disaster management oriented heavily to response not prevention at community level. 	<p>Structural :</p> <ul style="list-style-type: none"> For short-term (urgent action) priorities are focusing into: <ul style="list-style-type: none"> re-functioning of flood facilities (normalization) including rivers, drainage and sediment control include short-term priorities: <ul style="list-style-type: none"> As for flood damage mitigation, establishing basin wise flood control manual covering O&M of flood facilities and warning system is considerable (DGWR). Mid-term and long-term more oriented for increase on capacity-up of flood facilities. To continue the master plan reviewed 1997 with budget optimize (Central Government). <p>Non-structural:</p> <ul style="list-style-type: none"> For short term: <ul style="list-style-type: none"> All authorities and stakeholders should jointly evaluate all proposed water river management projects. Indicate the urgency and priority with largest sustainable impact to lessen the damage within budget constraints. Selected projects to be undertaken are distinguished for the central, provincial (DKI Jakarta), district and Municipality level. Private investment opportunities and community participation are also considered. Strengthening the basin wise flood control organization including community organization related to flood plain management (DGWR). Preparation of flood manual with warning system to avoid disoperation of flood facilities. Warning system should links not only to Bakornas/ Satkorlak also to community information system (mass media). 	<p>Structural Improvement :</p> <p>The activities are derive from on-going propose of Kimpraswil, DKI Jakarta, Tangerang and Bogor district and municipality, and Depok municipal. (DGWR, District / Municipality).</p> <p>DKI Jakarta and Kimpraswil:</p> <ol style="list-style-type: none"> Ciliwung river Improvement/Normalization (12 km) – Central government project. 165,000 165,000 Western banjir canal (17 km) and Cengkareng drain (8 km) Improvement/normalization – Central government project. 13,000 660,000 Improvement big rivers: (25 km) Angke, Pesanggrahan, Krukut, Cipinang, Sunter, Buaran and Cakung (Central Government Project). 200,000 2,900,000 Improvement/normalization of small rivers (lump sum) 32,000 32,000 Urban drainage improvement (Central Government Project). 204,200 700,590 1,504,530 Development and rehabilitation Polder system (Central Government Project). 197,780 497,740 896,470 <p>Bogor District and Municipality:</p> <ol style="list-style-type: none"> Ciliwung Cisadane Tunnel (900 m) – Central government project. 692,000 Ciawi (100 ha) and Cisadane River Dam/ reservoir – Central government project. 300,000 750,000 Rehabilitation of lakes (Central Government Project). 7,500 27,000 <p>Tangerang District and Municipality (drainage master plan 2001):</p> <ol style="list-style-type: none"> Cisadane downstream Normalization (15 km) 200,000 445,000 Rehabilitation of lakes 20,000 28,000 Angke river normalization and flood protection 2,150 Cantiga, Sabi and Cirarab normalization and river flood protection 8,960 30,000 30,000 Cipondoh swamp dyke and gate rehabilitation and dredging (long term) proposed for central government funding. 240 35,480 76,200 <p>Depok:</p> <p>Improvement urban drainage and lake/ swamp 12,000</p> <p>Bekasi:</p> <ol style="list-style-type: none"> Eastern banjir canal improvement (23 km), proposed under loan. Central government funding. 2,714,000 Improvement/Normalization Bekasi River 200,000 130,000 <p>Non Structural:</p> <ul style="list-style-type: none"> capacity building in operation and maintenance of flood facilities. Facilitate by Central government for Jabodetabek related institution. Empowerment of communities settling in river areas for clean environment and maintenance of micro system drainage 			

	Aspects	Observation	Damage loss	Monetary value of Impact (in mil. Rp.)	Recommendation	Activity	Programme (in million Rp.)																																		
							Short-term 1-2 years	Mid-term 2-5 years	Long-term 5-10 years																																
C.	Damage Impact and Damage Loss	<p>Estimation is based to field survey result in 31 heavily inundated areas in 6 river basins (see attached data).</p> <p>Direct loss</p> <ul style="list-style-type: none"> - To residential area: 42,350 houses of permanent, semi permanent and temporary construction. - Non-residential area: including 16,300 sqm. of traditional market. - Agriculture: 1,350 ha irrigated padi field. - Road and infrastructure: 63,300 sqm asphalt and 3,400 sqm concrete. - Public utilities: report from PLN Jabodetabek and drinking water supply Bekasi, Bogor, Tangerang, Jaya. - Public facilities: 75 schools, 2 Puskesmas and 41 mosque. - Fatal accident medical treatment and food security base estimated compensation. 	<p>Damage loss includes direct damage and indirect damage and contingency for intangible damage</p> <p>Version A (with lowest estimated construction cost equal to RSS) and version B (moderate construction cost equal to BTN)</p> <ul style="list-style-type: none"> - Average loss in high-density urban area Rp. 464.5 mil. /ha (version A) and Rp. 749 mil/ha (version B) - Average loss in low-density urban area Rp. 333 mil. /ha (version A) and Rp. 544 mil/ha (version B). - Average loss in rural area included agricultural area Rp. 23 mil. /ha (version A) and Rp. 34 mil/ha (version B). 	<p>Total damage loss is sum of direct damage, indirect damage and contingency loss (20%)</p> <table border="1"> <thead> <tr> <th>Version</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>North Jakarta</td> <td>Rp. 1.568</td> <td>2,255</td> </tr> <tr> <td>Central Jakarta</td> <td>Rp. 529</td> <td>707</td> </tr> <tr> <td>East Jakarta</td> <td>Rp. 172</td> <td>247</td> </tr> <tr> <td>West Jakarta</td> <td>Rp. 1,476</td> <td>1,971</td> </tr> <tr> <td>South Jakarta</td> <td>Rp. 276</td> <td>397</td> </tr> <tr> <td>Tangerang District</td> <td>Rp. 66</td> <td>83</td> </tr> <tr> <td>Tangerang City</td> <td>Rp. 132</td> <td>190</td> </tr> <tr> <td>Bekasi District</td> <td>Rp. 656</td> <td>824</td> </tr> <tr> <td>Bekasi City</td> <td>Rp. 416</td> <td>599</td> </tr> <tr> <td>Depok City</td> <td>Rp. 26</td> <td>37</td> </tr> </tbody> </table> <p>Total damage loss version A Rp. 5,316 Total damage loss version B Rp. 7,310</p>	Version	A	B	North Jakarta	Rp. 1.568	2,255	Central Jakarta	Rp. 529	707	East Jakarta	Rp. 172	247	West Jakarta	Rp. 1,476	1,971	South Jakarta	Rp. 276	397	Tangerang District	Rp. 66	83	Tangerang City	Rp. 132	190	Bekasi District	Rp. 656	824	Bekasi City	Rp. 416	599	Depok City	Rp. 26	37	<p>Non Structural :</p> <ul style="list-style-type: none"> • Flood damage data based shall be completed and to be updated every year (<i>community and village unit to district/ municipal</i>). • Control of land use is required to avoid further potential of flood. Establish accurate data inventory of physical damage in flood-inundated area with standard guidelines (<i>community and village unit</i>). • Develop building regulation in annual flood inundated area (flood proofing) within floodplain regulated zone area (<i>Central Government: DGWR</i>). • Land consolidation is required to preserve flood facility space (reservoir, pump house, etc) (<i>district/ municipal</i>). 			
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	Aspects	Problem	Recommendation and on-going Progress	Recommendation	Activity	Programme (in million Rp.)			
						Short-term	Mid-term	Long-term	
D.	Disaster Management	<p>In direct loss :</p> <ul style="list-style-type: none"> - Lost of income from absence of working 35 %, working population affected estimate loss Rp. 87,8 bill. - Lost of transportation and communication estimated from UMP 2001 of Rp. 10,8 bill. - Land value depreciation due to heavy and medium damage; 5 % as estimated REI and property agent of Rp. 84,2 bill. <p>Total damage loss :</p> <ul style="list-style-type: none"> - After 20 % contingency for inconvenience, threat of accident and security estimated of Rp. 681,481 bill. 	<ul style="list-style-type: none"> - Organization of National Coordination Board for Disaster Management is base on a in Top-down structure (Province to village level) - Lack of horizontal coordination at field/ village level - Poor facilitation for community participation include absence of local/ community input for database development 	<p>Non Structural :</p> <ul style="list-style-type: none"> • Extends the organization by involving related district/ municipalities of Bogor, Depok and Tangerang authorities in Satlak PBP under Satkorlak Province (DKI) as one basin have one flood disaster management organization. • Basin wise integrated flood manual for river, drainage sediment controls to be provided (<i>District/City authorities</i>). • Establish village level evacuation and emergency manual by village task force and community assisted by Satlak. • Improve the mechanism and standard operational procedure at field level to accommodate community participation for self-support (<i>Central Government</i>). <p>Present disaster management oriented to response concept to disaster. Prevention and mitigation preparedness and respond also not appeared in projects under Ciliwung basin inter sectoral management (2002).</p> <p>Community Participation :</p> <ul style="list-style-type: none"> • Build community awareness in flood risk management to reduce and control the damage impact. Facilitate LPM (community empowerment organization) or Dekel (village representative in DKI) at village level for database planning and monitoring including early warning: <ul style="list-style-type: none"> - Flood damage database to be completed and updated every year. - Develop referral networking with facilities surroundings for emergency support (police office, Puskesmas or hospital, mosque, school or other available private facilities). - Training for emergency evacuation. • Facilitate community and village unit commitment for prevention and mitigation, preparedness, response and recovery in disaster management which not covered by Satkorlak task (only response to disaster). <p>Structural Improvement</p> <ul style="list-style-type: none"> • Full basin wise flood analysis is required to indicate warning. • Provide an early warning system in vulnerable areas (DKI and district/ Municipality), base on result of flood analysis. • Improve public access to communication facilities provided to coordinating unit, duty unit and village unit. 					
						Amount of Non-structural Improvement in River basin development (A)	35.000		
						Amount of Structural Improvement in Flood Control & Flood Protection Facilities (B)	497.830	2.415.810	10.963.200

	Aspects	Problem	Recommendation and on-going Progress	Recommendation	Activity	Programme (in million Rp.)		
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		<i>Damage loss (Version A)</i>	Rp. 5,316,400	<i>Total Amount of Proposed Project</i>		532,830	2,415,810	10,963,200
		<i>Damage loss (version B)</i>	Rp. 7,310,000					