2.2 洪水と貧困（マニラ）

Opening Remarks
Activities of JICA on Poverty Alleviation and Flood Disaster Mitigation
Mr. Kenjiro Izumi

Opening Remarks
Conference Organization and Announcements
Mr. Hidetomi OI

Opening Remarks
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Rural Development Focusing on Flood Proofing in Bangladesh
Md. Zahangir Alam

Session 1-3
TC Hazard Mapping Project and Practice in Japan
Mr. KIKUCHI Ryosuke

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OSKAR D. CRUZ

Session 1-5
The Flood and Flood Forecasting in Yangtze River
Cheng Lin

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Mr. Hidetomi OI

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A Comprehensive Approach to Break the Vicious Cycle in Arid and Semi-Arid Region
Forood Sharifi, ME., Ph. D

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Integrated River Management in Japan
Toshihiro Sonoda

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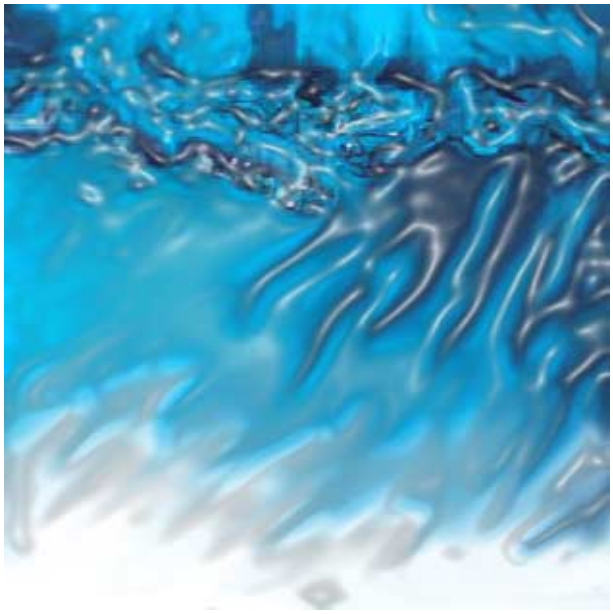
Background of proposal for establishing network Contents
and tentative schedule of IFNet
Akira Sasaki

洪水と貧困（マニラ）Opening Remarks

Activities of JICA on Poverty Alleviation and Flood Disaster Mitigation

Mr. Kenjiro Izumi

Vice President,
Japan International Cooperation Agency (JICA),
Japan



第 2 次水資源プロジェクト研究計画調査

Japan International Cooperation Agency

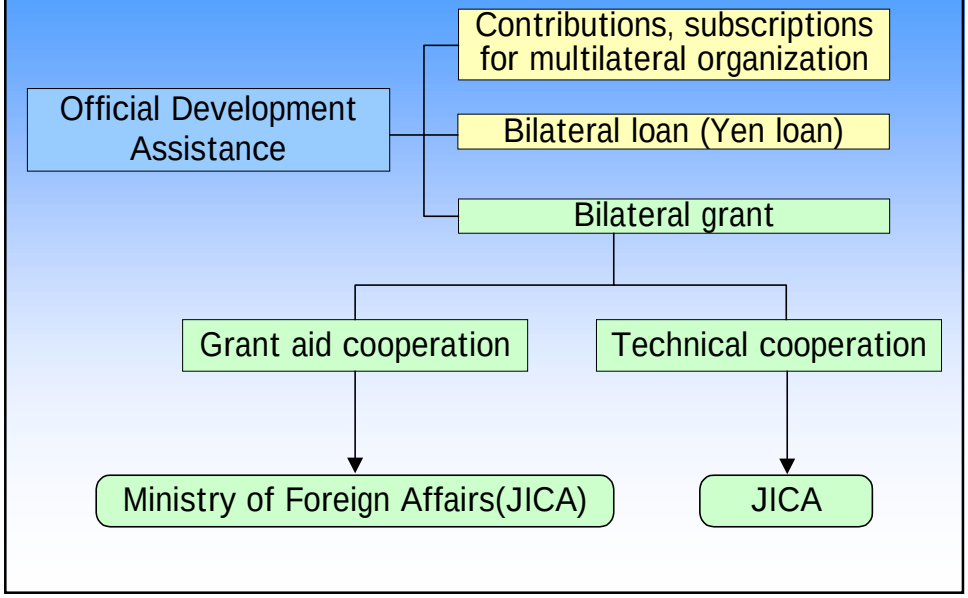
Activities of JICA on Poverty Alleviation and Flood Disaster Mitigation

Kenjiro Izumi
Vice President

Japan International Cooperation Agency

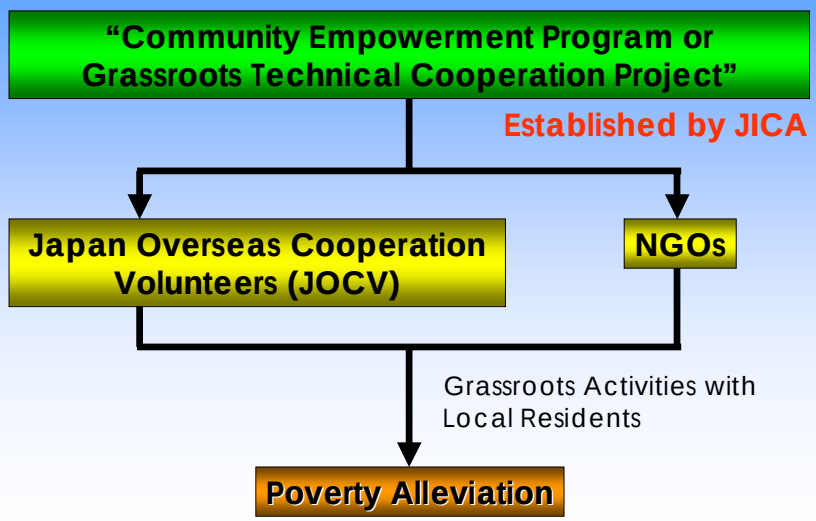
Poverty and Floods

Japan International Cooperation Agency

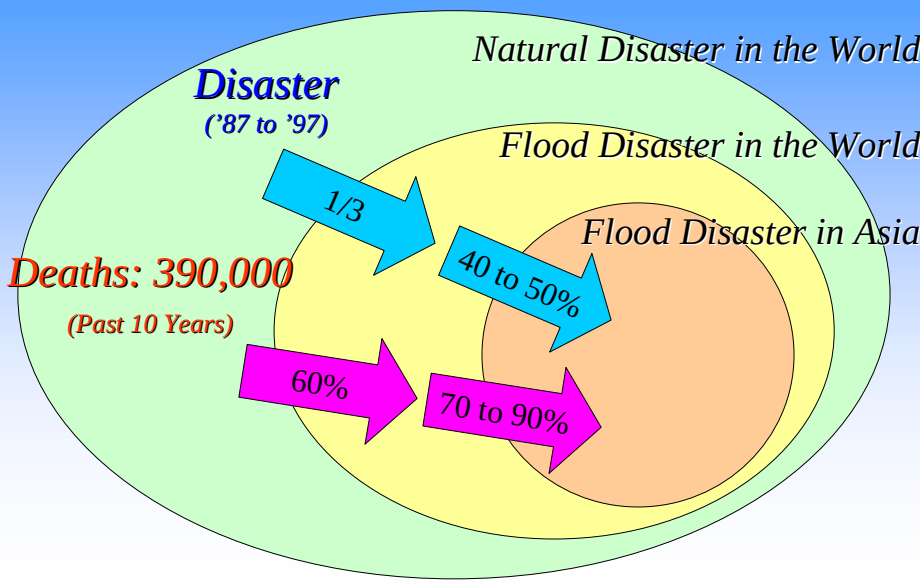


Poverty in the World

Poverty Alleviation



Flood Disaster in the World



Flood Disaster in the World
Why Asia is dominant in Flood Damage

(1)Unstable Geological Conditions

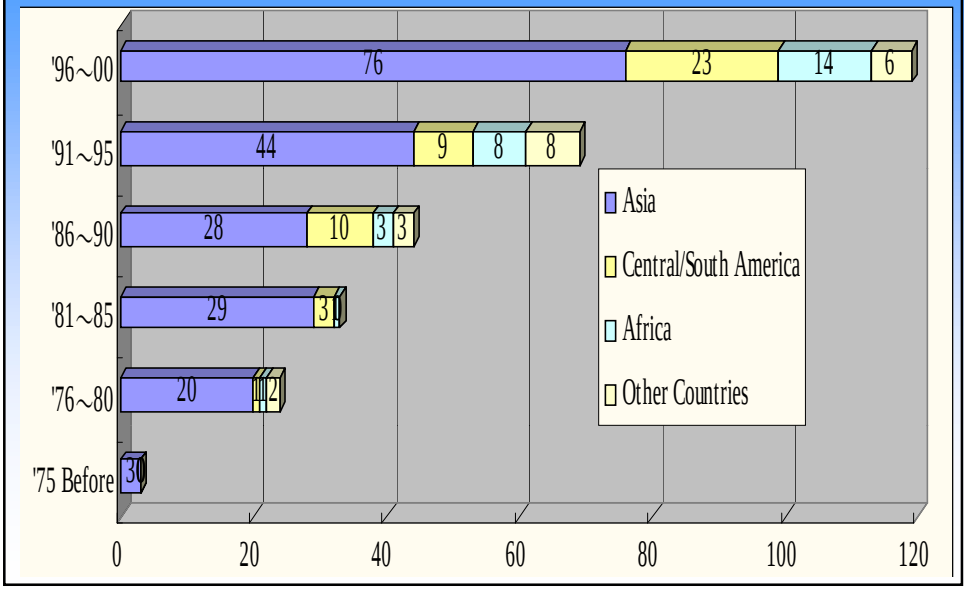
(2)Monsoon and Typhoon Rains

(3)Short and Steep Rivers

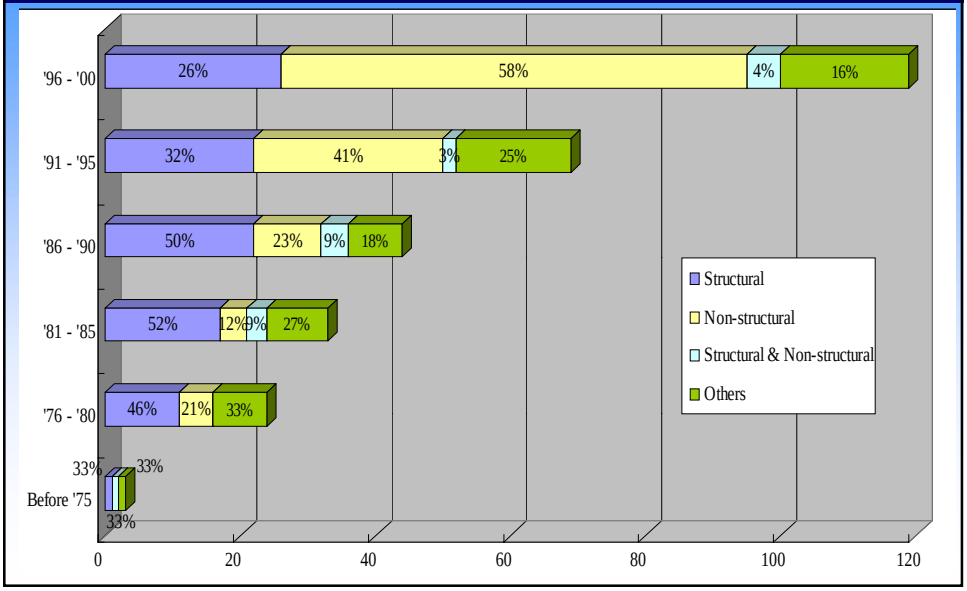
(4)Rapid Urbanization

(5)Increase and Concentration of Population in Flood Prone Areas

Flood Disaster Mitigation (Studies/Projects by Region)



Trend of Non-Structural Flood Control Measures



Case-1: Comprehensive River Basin Development

Case-1: Comprehensive River Basin Development

Brantas River Basin

Lodoyo Irrigation Canal

Case-2: Post-Disaster Restoration Project

Flood Situation

River Improvement

Case-3: Flood Disaster Mitigation Focusing on Poverty

Rural Development Project

1. Small Scale Flood Mitigation
2. Social Approaches
   (1) Support of Income
   (2) Improvement of Living Condition
   (3) Self-Reliance and Participation

Sustainability of Project

(1) Participatory Approach
(2) Self Managed Savings and Credit Program
(3) Cost Sharing
(4) Institutional Building

Case-3: Flood Disaster Mitigation Focusing on Poverty

Bank Protection by Bamboo

Case-3: Flood Disaster Mitigation Focusing on Poverty

Bank Protection by Bamboo

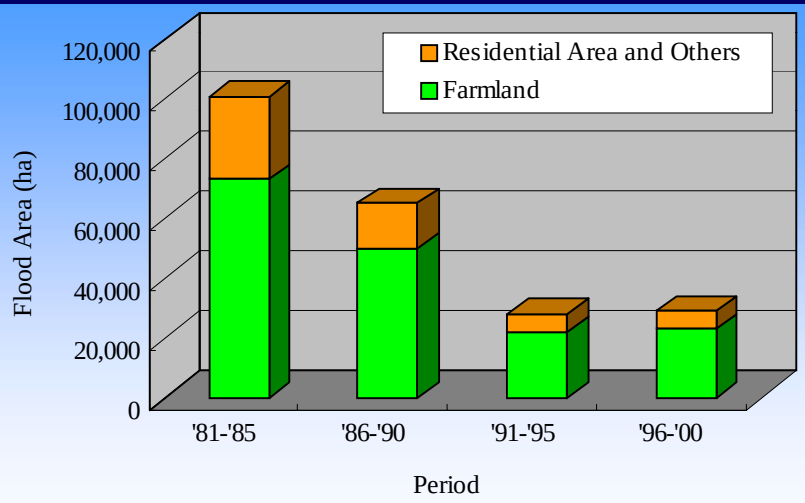
Case-3: Flood Disaster Mitigation Focusing on Poverty

Participatory Approach in Rural Development Projects

Goal of Flood Disaster Mitigation Program

- Economic Development
- Living Condition Improvement for The People

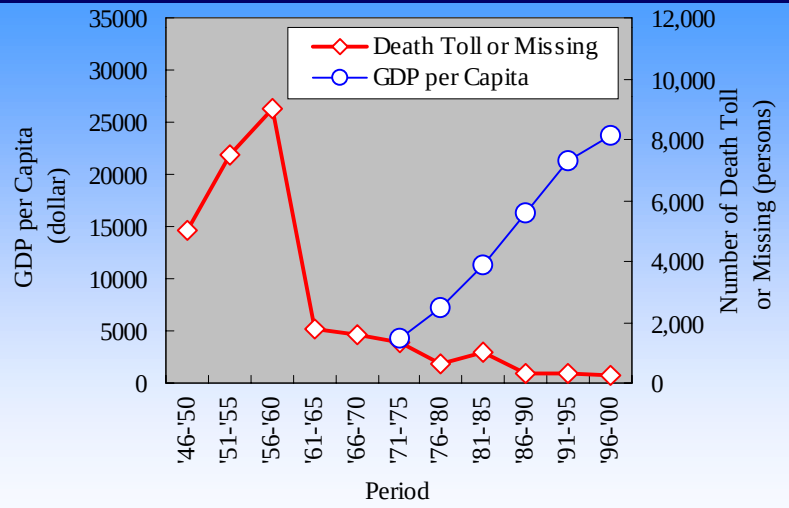
Flood Disaster in Japan



Trend of Flood Area

Source: Statistics of Floods, Ministry of Land, Infrastructure and Transport, Japan, 2001

Flood Disaster in Japan



Trend of Number of Death or Missing and GDP per Capita

Source: Statistics of Floods, Ministry of Land, Infrastructure and Transport, Japan, 2001

Implementation Methods of Flood Disaster Mitigation Program

- Comprehensive River Basin Development
- Structural Flood Control Measures
- Effective Combination of The Structural and Non-Structural Flood Control Measures

Challenge to New Type of Flood Disaster Mitigation Method

- Integrated Small-Scale Flood Control and Poverty Alleviation Project
- Participation of Local People
- Assisting the Poor on Livelihood

(1) Demand-Drive Approach
(2) Participatory Approach
(3) Partnerships
(4) Equity with A Gender Focus
(5) Well Planned Investment
(6) Development of Institutional Capacity
(7) Transparency of Information and Shared Understanding

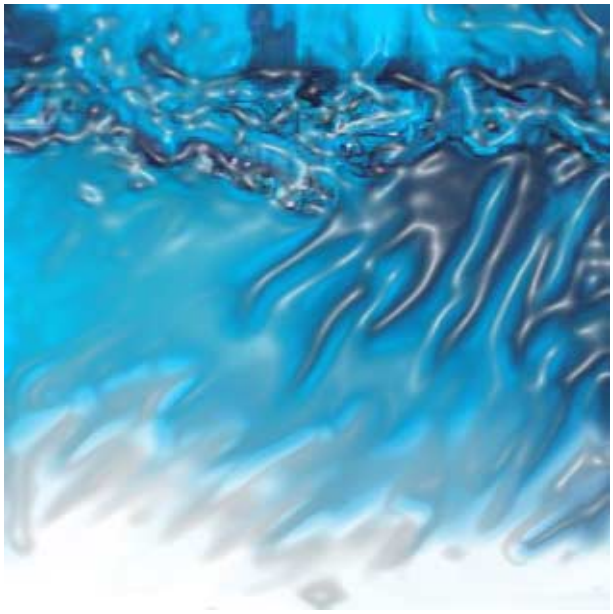

Japan International Cooperation Agency
Regional Consultation Workshop on
Poverty and Floods
You Are Welcome !
Mabuhai !
MLIT / ADB / JICA

洪水と貧困（マニラ）Opening Remarks

Conference Organization and Announcements

Mr. Hidetomi OI

Senior Advisor,
Japan International Cooperation Agency (JICA),
Japan



第 2 次水資源プロジェクト研究計画調査

Regional Consultation Workshop on

Poverty and Floods

17-19 October 2002, Manila Philippines

Conference Organization and Announcements

Hidetomi Oi

Senior Advisor, JICA

Organized and Sponsored by:
The Ministry of Land, Infrastructure and Transport, Japan (MLIT)
Japan International Cooperation Agency (JICA)
Asian Development Bank (ADB)

MLIT

Objective of Workshop

(1) To build a better understanding of the linkages between floods and poverty in the Asia-Pacific region

(2) To highlight good practices for flood mitigation and management

(3) To make proposals on more pro-poor approaches in implementation of flood mitigation and managemer projects

(4) To strengthen the regional network of development agencies working on various facets of flooding and poverty alleviation

Poverty and Floods

1. HAPPENING

(1) In upstream catchments

Degradation of water sheds

(2) In downstream flood plains

Riverbank erosion/ flooding

2. COPING

(1) Satisfactory

- Emergency operation in case of major disaster

(2) Unsatisfactory

- Emergency operation in minor disasters
- Reconstruction
- Preparedness
- Mitigation

3. AS A RESULT

- Vicious cycle of *poverty-culnerability-disaster-poverty*
- Majority of flood victims is the poor

Point of Discussion in Workshop

(1) Softer non-structural flood control measures

(2) Participatory approach for project and program success

(3) Institutional and human capacity building

(4) Partnership with all stakeholders

(5) Equity, with a gender sensitive in project

Structure of Workshop

October 17 and 18

Session 1
Non-structural Flood Disaster Mitigation

Session 2
Structural Flood Disaster Mitigation

Session 3
Information & Indigenous Technology

Session 4
Comprehensive Flood Management

Plenary Session: Report and Summarize 4 sessions

October 19

Field Visits in Metro Manila

Expected Outcomes

(1) Humanitarian aspect of flood mitigation and management projects to alleviate poverty will be duly recognized.

(2) Flood mitigation and management projects will be improved qualitatively by incorporating pro-poor approaches as much as possible

(3) Flood mitigation and management projects will be increased quantitatively so as to contribute more to poverty alleviation

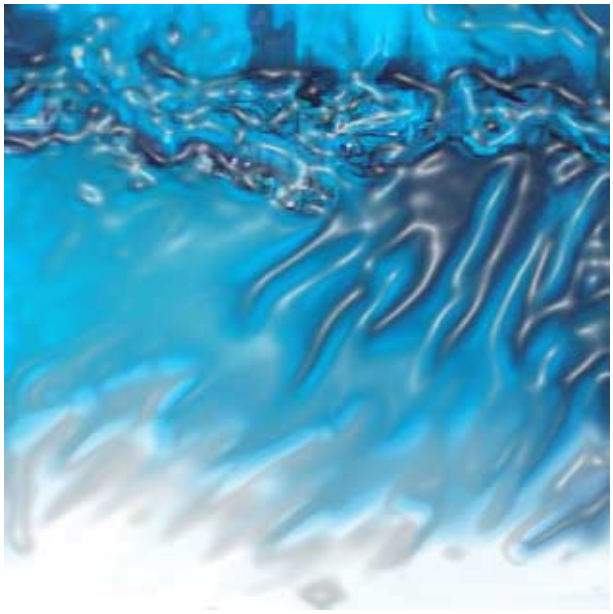

Conclusion
“Moving from rhetoric to action”
Thanks

洪水と貧困（マニラ）Opening Remarks

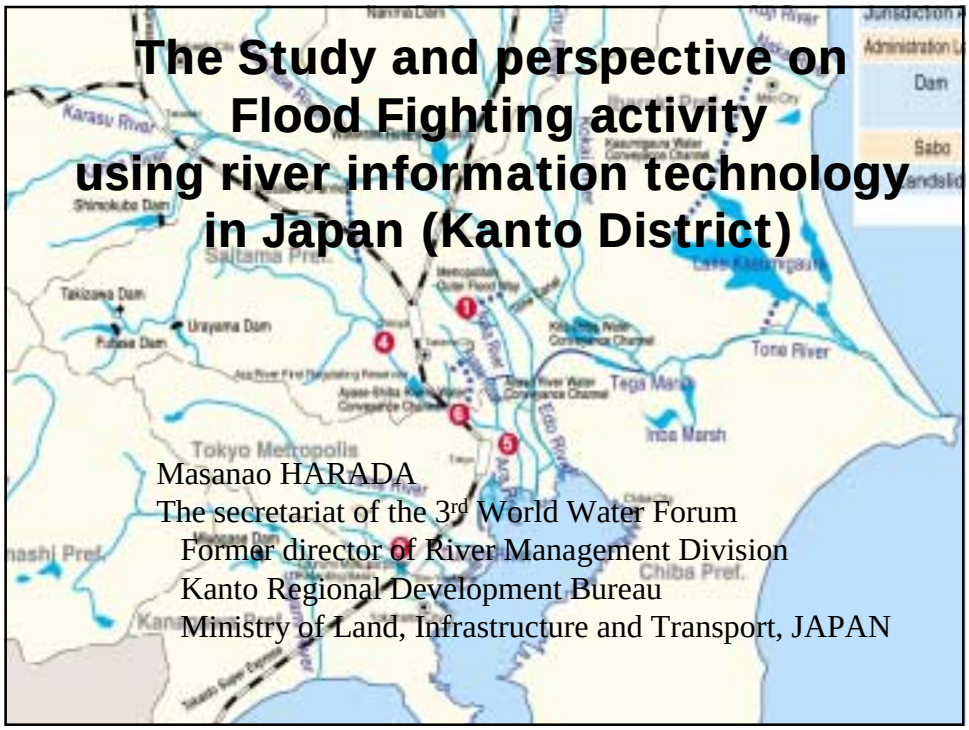
The Study and perspective on Flood Fighting activity using river information technology in Japan (Kanto District)

Mr. Masanao HARADA

The secretariat of the 3rd World Water Forum,
Former director of River Management Division, Kanto Regional Development Bureau,
Ministry of Land, Infrastructure and Transport,
JAPAN



第２次水資源プロジェクト研究計画調査



The Study and perspective on Flood Fighting activity using river information technology in Japan (Kanto District)

Masanao HARADA
The secretariat of the 3rd World Water Forum
Former director of River Management Division
Kanto Regional Development Bureau
Ministry of Land, Infrastructure and Transport, JAPAN

Flood Fighting in Japan

・Performed independently by regions
→ since about 400 years ago
・Flood Fighting Law was enacted 1949
→ to provide legal foundations for flood fighting activities formerly done by cooperative groups formed spontaneously by people of each region.

Issues of Flood Fighting
・Reducing of new members
・Aging
・Only about 10% of the personal who carry out flood fighting personal

Kamadanko in Tone River
12/09/2001

Hooping in Tone River
12/09/2001

Piling sandbags in Ono river
10/10/2001


http://i.river.go.jp/

The Merit of Information Technology for Flood Fighting

- Sharing up-to-the-minute accurate information during disasters

←The construction of information networks of optical fiber circuits

←Offering rainfall and water level information collected in real time by MLIT through internet

River Disaster Protection Station

Planned River Disaster Protection Station
in Kanto Region

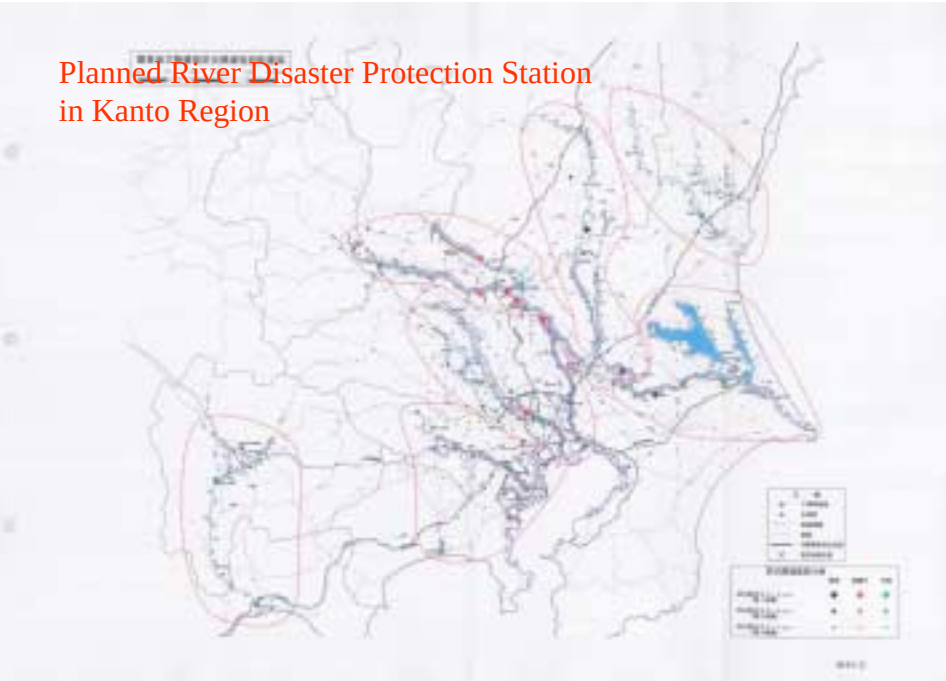


Image of the introduction of IT in a disaster protection
-River information management using advanced technology-

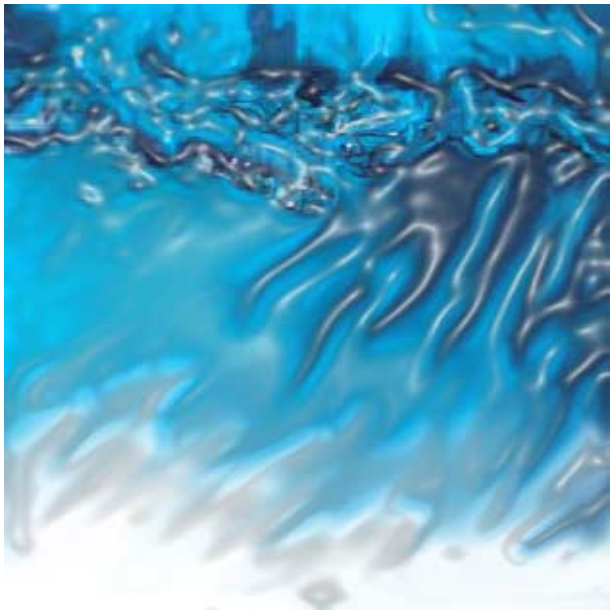
①Quickly clarifying and transmitting information from the field
②Operating gates by remote control
③Automatic detection of levee problems
④Early detection of inundation conditions

洪水と貧困（マニラ）Session 1-2

Rural Development Focusing on Flood Proofing in Bangladesh

Md. Zahangir Alam

Project Director
Local Government Engineering Department.
Bangladesh



第 2 次水資源プロジェクト研究計画調査

RURAL DEVELOPMENT FOCUSING ON FLOOD PROOFING IN BANGLADESH

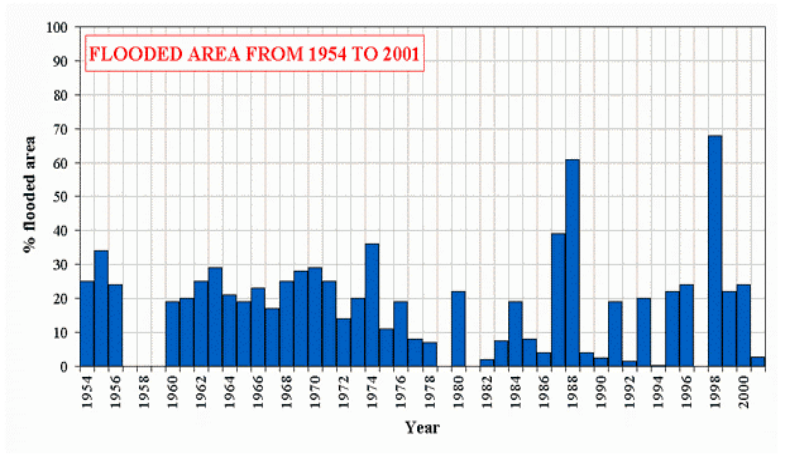
By

Md. Zahangir Alam
Project Director
Local Government Engineering Department.
Bangladesh

GEOGRAPHICAL LOCATION

- **The country is bordered by India on the west, north and the … northeast, Myanmar on the southeast and the Bay of Bengal on the south.**
- **It has a landmass of 148,393 sq. km.**

Overview of Flood in Bangladesh



Floods are a recurrent phenomenon in Bangladesh. Nearly 20 percent of its area is inundated even in a year of normal precipitation. About two-thirds of the country could be affected in a year of severe flooding.

RIVER NETWORK OF BANGLADESH

257 major rivers in Bangladesh out of which 57 are transboundary rivers.

CAUSES OF FLOOD

- Bangladesh carry entire monsoon flood flows generated in the vast ....catchments of three international rivers 1.75 million sq. km in all ....which is more than 10 times bigger than the area of Bangladesh.
- 80% of the total annual rainfall in these catchment occurs within ....just 100 days between June and September.

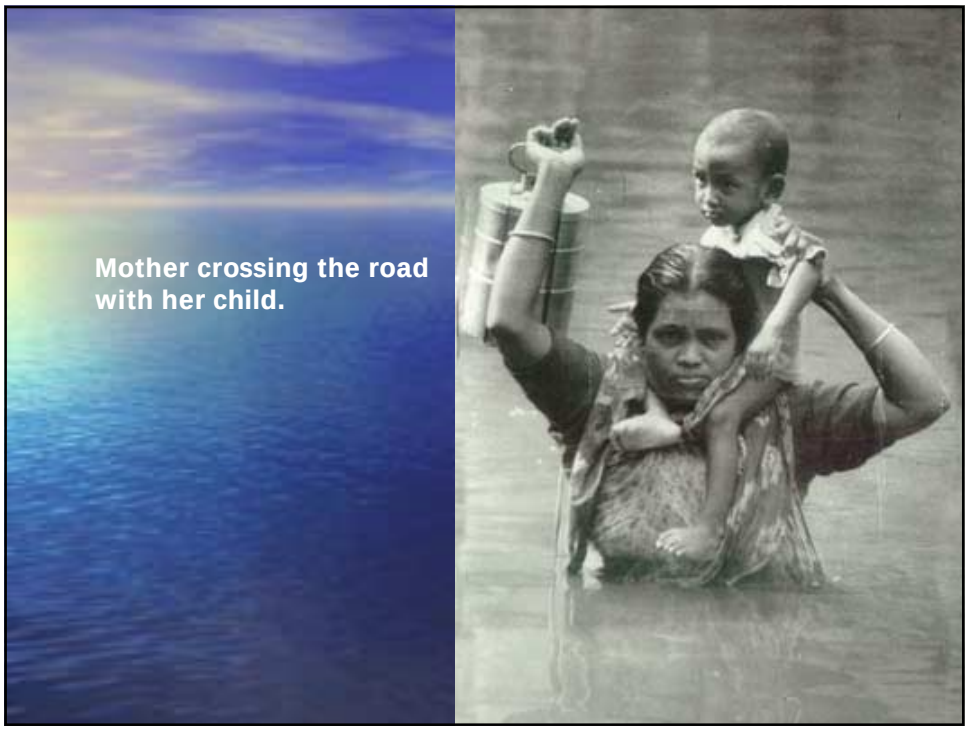
CAUSES of Flood

- Runoff generated by heavy local precipitation that can not be drained out due to high stage in the outfall rivers.
- Synchronization of peak flows in the major rivers, causing drainage congestion at the mouth.
- Upstream anthropogenic interventions in the transboundary rivers crossing into Bangladesh.
- High tide in the Bay of Bengal coupled with wind set-up caused by southwesterly monsoon winds that obstruct drainage of the upland discharge.
- Excessive siltation of the river channels which have reduced their carrying capacity
- Storm surges due to tropical cyclones in the Bay of Bengal.
- Deforestation in the country.

IMPACT OF FLOOD

- Losses of human lives
- Losses of cattle heads
- Losses of poultries and other domestic animal
- Losses of crops
- Losses of properties
- Inundation of settlement areas
- Damage of roads and bridges
- Making poor more poorer

People moving for shelter



Railway Track Inundated

Houses under Flood Water

Road Communication Disrupted

FLOOD MITIGATION

1. Flood Proofing is feasible in Bangladesh rather then total Flood Control.

2. National Water Policy : Develop early warning and flood proofing systems.

3. National Water Management Plan : Reviews the possible costs of flood-proofing

4. FAP-23 Study : Flood Proofing strategies have so far inadequately addressed.

5. FAP-23 Objective : To identify and implement effective flood proofing measures.

FLOOD PROOFING

- **Definition :** Provision of long term non-structural or minor structural measures to mitigate the effects of floods.
- **Aims :** Reducing the chance of human death and inconveniences to the daily activities of the people.
- **Output :** Provide people the security and motivation to make and sustain developments in their economic and social well-being and achieve prosperity.

STRUCTURAL FLOOD PROOFING

- Raising of homestead, tubewells, latrines above flood level
- Construction of Refuge Areas or Flood Shelter with water supply and health facilities
- Raising of roads above peak flood levels with adequate bridges and culverts to improve water flows across.
- Stabilizing of village mounds, embankments and structures against chance of their being washed out.
- Construction of submersible roads in Haor areas.

NON STRUCTURAL FLOOD-PROOFING

- Establishment of Flood Warning System
- Evacuation facilities and community education for improved health
- Erosion protection by plantation
- Home gardening for nutrition support
- Skill training program
- Introducing credit program

INTERVENON OF LGED IN FLOOD PROOFING ACTIVITIES

LGED basically involved with the overall rural development of the country. Even in the remotest area LGED is proving the support. Lack of necessary infrastructures and the very poor social condition of the people living in the char and haor deserved the intensive intervention.

LGED was thinking for implementing Flood Proofing Projects in the flood prone rural areas and was requesting development partners for financing. So far US-AID and JICA responded the request and extended their support against Flood Proofing Project particularly for char and haor areas. Those are :

1. US-AID Supported Flood Proofing Program under IFSP
2. JICA Assisted Study on Rural Development Focusing on Flood Proofing.

US-AID SUPPORTED FLOOD PROOFING PROJECT

Implementing Agency : LGED & CARE Bangladesh

Project Duration : July 1999 to June 2004

Project Area : Kurigram, Gaibandha, Bogra, Serajgonj Netrokona, Kishoregonj, Sunamganj, Shariatpur

Project Activities : Structural Measures are being implemented by LGED and the Non-Structural Measures by engaging NGO

Homestead Rising by Earthwork

Reconstructing the House after Platform Raising

Slope Protection by CC Block in Haor Area

Flood Shelter Cum Primary School

Home Gardening

Home Gardening in the Slope

Raised Latrine

Training Program on Health Care

JICA ASSISTED RURAL DEVELOPMENT FOCUSING ON FLOOD PROOFING STUDY

Implementing Agency : LGED

Study Duration : December 2000 to June 2002

Study Area : Char Areas of Four Districts (Gaibandha, Kurigram, Sirajgonj, Jamalpur)

Haor Areas of Four Districts (Kishoregonj, Netrokona, Hobigonj, Sunamgonj)

STUDY AREA

OBJECTIVE OF THE STUDY :

- Prepare a Master Plan for overall development of study area focusing on Flood Proofing.
- Conduct a feasibility study on priority project
- Transfer technology to counterpart personnel in the course of study

The JICA Study Team surveyed the area with the co-operation of LGED officials and collected all information by :

- Extensive field survey
- Secondary data
- Discussion with different organization
- PCM workshop with the participation of local level govt officials
- PCM workshop with the participation of local people.

Then the Study Team analyzed all the information and based on the analysis they presented following steps in the Master Plan :

- Constraints & Problem Structure of Study Areas.
- Sequence of Problem Solution
- Development Plan
- Feasibility Study for Model Project Area
- Recommendation

Constraints and Problems of Char & Haor Areas :

1. Flood Related Problem :

- Loss of properties including house furnishing, livestock, food etc.
- Loss of homestead land
- Crops losses
- Disruption of economic activities

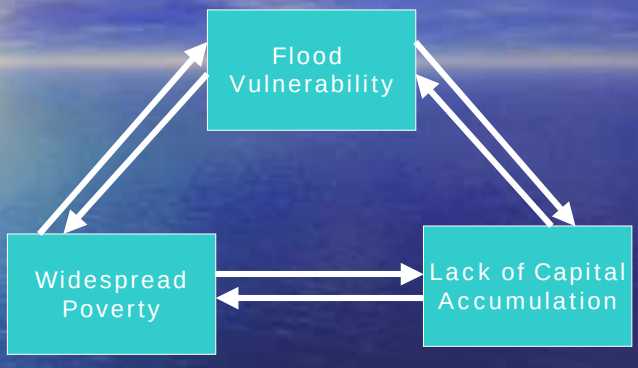
2. Livelihood Related Problems :

- Interruption of farming activities during flood
- Small land holding size
- Difficult marketing condition
- Inadequate input supply
- Poor extension services
- Lack of employment
- Few alternative for income generation
- Inadequate credit facilities
- Underdeveloped transportation infrastructure

3. Social Problems :

- Low literacy rate
- Prevailing mal-nutrition and diseases
- Poor sanitation and hygiene condition
- Lack of health facilities
- Absence of pure drinking water
- Discrimination against women
- Poor community activities.

PROBLEM SOLUTION



Most of the problems in the Char and Haor areas are caused by the flood and from the impact of flood.

So Flood Proofing is the only solution for the development of the study areas.

GOAL OF DEVELOPMENT PLAN

- Flood Proofing
- Improvement of living environment
- Livelihood development
- Enhancement of people's capacity with institutional development.

STRATEGY OF DEVELOPMENT PLAN

- A Small Model Project in the area of most favourable condition is recommended for the first step of development plan.
- Participatory approach is adopted in the course of planning, implementation, operation and management of every project.
- Close co-ordination between Government organizations, NGOs and local communities is recommended.

MODEL PROJECT

Two villages are selected for Model Projects , one in char and another in haor area.

Char Area : **Algar Char in Erendabari Union under Fhulchari Upazila of Gaibandha District with area of 713 hector and population of 3139.**

Haor Area : **Gurai Gram in Gurai Union under Nikle Upazila of Kishoregonj District with area of 569 hector and population of 12,132.**

Flood Situation of Gurai Gram

Temporal Bank Protection Against Wave Action (Gurai Gram)

DEVELOPMENT PLAN FOR MODEL PROJECTS

Algar Char Gram : (Char Area)

1. Flood Proofing and Improvement of Living Environment

a. **Homestead Rising (61 houses)**
b. **Raising of school ground as sheltering place (4500 m^2)**
c. **Raising of hand tubewells (five units) and new construction (one unit)**
d. **Flood Warning and Evacuation system establishment**

2. Support Service for Livelihood Development

a. Home gardening promotion with nutrition education

b. Poultry promotion

c. Skill training on hand weaving

d. Mulberry plantation and cocoon production (long-term vision)

3. Savings and Credit Scheme :

a. Compulsory savings

b. Surcharges or user fees

c. Insurance and loan

Gurai Gram (Haor Area)

1. Flood Proofing and Improvement of Living Environment

a. Wave protection (brick masonry retaining wall 1756 m length and 2.75 m height.

b. Raising hand tubewells (27 units) and new construction (19 units)

b. Flood Warning and Evacuation System established

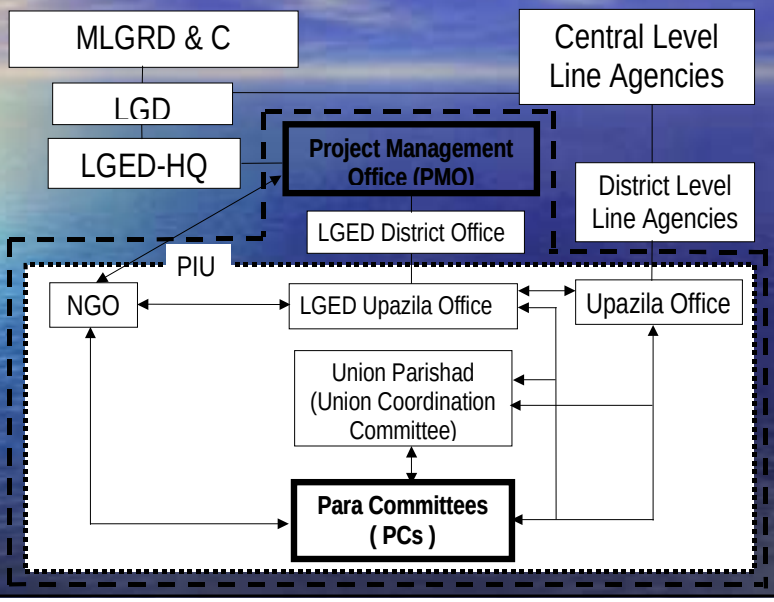
2. Support Service for Livelihood Development

a. Home gardening promotion with nutrition education
b. Poultry (duck) promotion
c. Fish Culture promotion
d. Nursery development for social forestry
e. Entrepreneurship development for paraboiling plant operation.

3. Saving and Credit Scheme :

a. Compulsory savings
b. Surcharges or user fees
c. Insurance and loan

IMPLEMENTATION ARRANGEMENT



Conclusion :

The people living in the rural areas are vulnerable to flood, suffers a lot every year and their economic and social development is hindered seriously due to the losses causes by flood. But adequate intervention for flood mitigation yet not been there.

Government, NGOs and Development Partners may come forward with more support to stand beside those distress people.

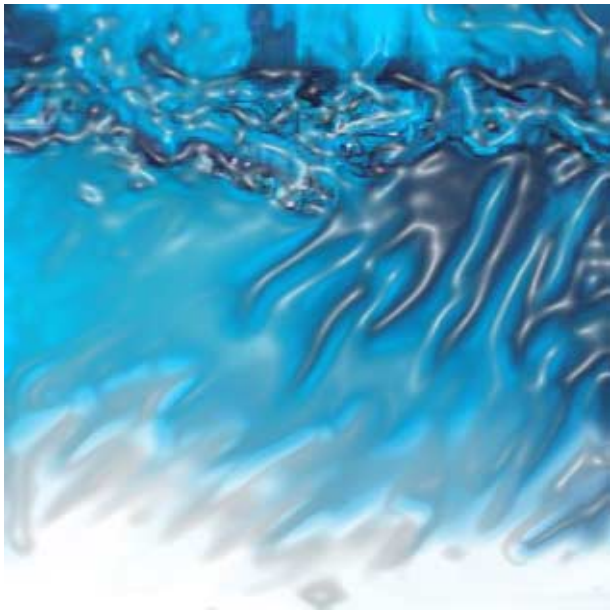
LGED has taken up two flood proofing model projects (one in char and other in haor) with the assistance from JICA. With the experiences of those model projects, LGED has intention to implement a complete flood proofing project for the entire areas.

洪水と貧困（マニラ）Session 1-3

TC Hazard Mapping Project and Practice in Japan

Mr. KIKUCHI Ryosuke

Infrastructure Development Institute,
Japan



第 2 次水資源プロジェクト研究計画調査

TC Hazard Mapping Project and Practice in Japan

October 17, 2002

KIKUCHI Ryosuke

Infrastructure Development Institute Japan

TC is an International organization established under the ESCAP and WMO in 1968

【TC Signatory and Area】
Japan, Korea, North Korea, China, Hong Kong, Macao, Vietnam, Cambodia, Thailand, Laos, Philippines, Malaysia, Singapore, USA

Review of Activities of TC Hydrology Component

- 2001 April Questionnaire Survey
- August Workshop in Bangkok
- Sep.-Oct. Review Missions
- November Recommendation to TC34

Recommended Projects to TC34

1. Assessment of national requirements and capabilities on Hydrological and Disaster Prevention and Preparedness (DPP) components
2. Pilot project for data sharing between TC members to enhance flood forecasting accuracy.
3. Development of guidelines for the Dam Operation in relation to flood forecasting
4. On-The-Job Training on Flood Forecasting between TC members
5. Extension of flood forecasting systems to selected river basin: **China**
6. Pilot Project on the preparation of Inundation and Water-related Hazard Maps: **Japan**
7. Project on the evaluation and improvement of operational flood forecasting system focusing on model performance: **China and Republic of Korea**
8. Pilot project on the establishment of a community-based flood forecasting system: **Philippines**
9. Pilot project on the establishment of flash-flood warning system (including debris flow and landslides): **Japan**
10. Improvement of hydrological products in response to user needs: **Malaysia**
11. Project on the evaluation and improvement of hydrological instruments and telecommunication equipment: **China**

Schedule of Hazard Mapping Project

2002

- **Feb.25&26 the 1st Working Group Meeting in Tokyo**
- **July 22-25 Workshop in Manila and the 2nd Working Group Meeting**
  - Discussions on the manuals for producing hazard maps
  - Discussions on the pilot areas
- **November The 35th TC General Meeting and the 3rd Working Group Meeting in Thailand**
  - Determination of the pilot areas to be adopted

2003

- **March WWF3 participation in Japan**
- **July Workshop and the 4th Working Group Meeting**
  - Preparation and discussions of inundation record (prediction) map
  - Discussions on the evacuation centers and evacuation routes
  - Discussions on the Warning and Evacuation System (evacuation criteria, and communication methods)

2004 July Workshop

- Promulgation & Training

2005 July Workshop

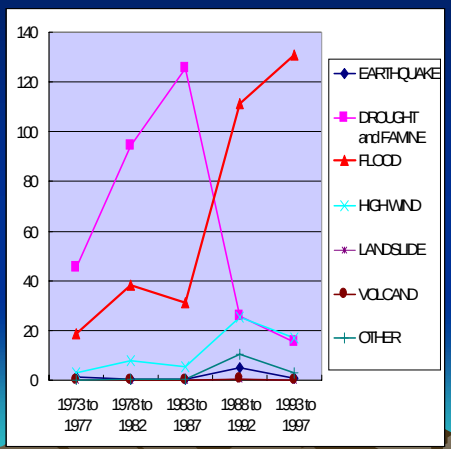
- Revision of the Manuals
- Expansion of the projects to other river basins

2006 July Workshop

- Project evaluation

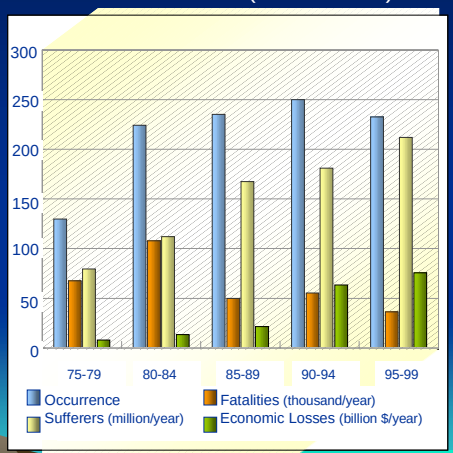
Recent Natural Disaster

Fig.-1 Affected by type of disaster and by period (1973～1997)



Source : CRED, "World Disasters Report 1999"

Fig.-2 Average occurrence and damage of natural disasters (1975～1999)



Source : Asian Disaster Reduction Center, "Data book of Asian Natural Disasters in the 20th Century"

Background

Lack of public awareness for dangers of flooding

- new residents live without awareness
- flood control has been improved and flood frequency is sufficiently lowered

Hazard map :

- to raise public awareness of dangers of flooding
- to promote voluntary disaster prevention activities of the inhabitants

Utilization of the flood hazard maps

- **To take an accurate evacuation activity based on the evacuation information**
- **To deepen the knowledge on the past flood records and future potential floods**
- **To prepare for reducing the damage**
- **To utilize the land and carry out architectural design**

Impacts and effects for government

- **Determination and review of the location of evacuation centers and evacuation routes**
- **Development of communication measures of alert/evacuation information**
- **Dissemination of the knowledge of disaster prevention**
- **Raising public awareness of disaster prevention**

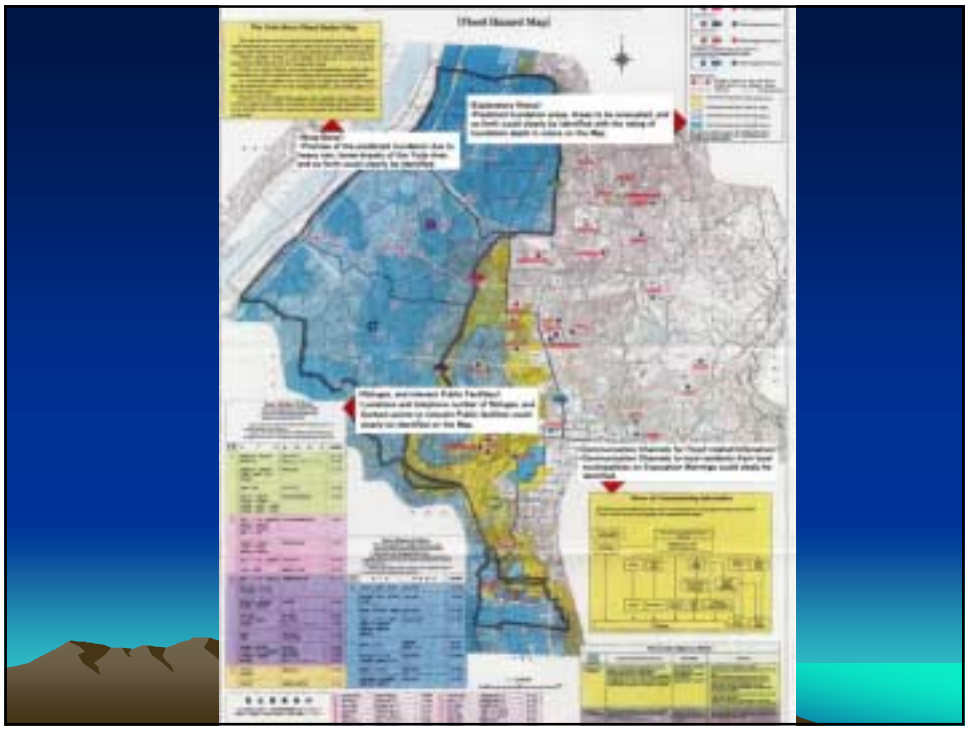
Hazard Mapping and Practice in Japan

Contents

- Definition and Contents of a Flood Hazard Map
- History of Flood Hazard Mapping
- Current Status of Hazard Mapping
- Requirements of a Flood Hazard Map

What is a Hazard Map?

- Map showing Susceptibility of Inundation, and Information for Evacuation.
- Objective: To mitigate flood and inundation damage
- Publisher: Mayor of the Municipality who is responsible for issuance of evacuation guidance/order.

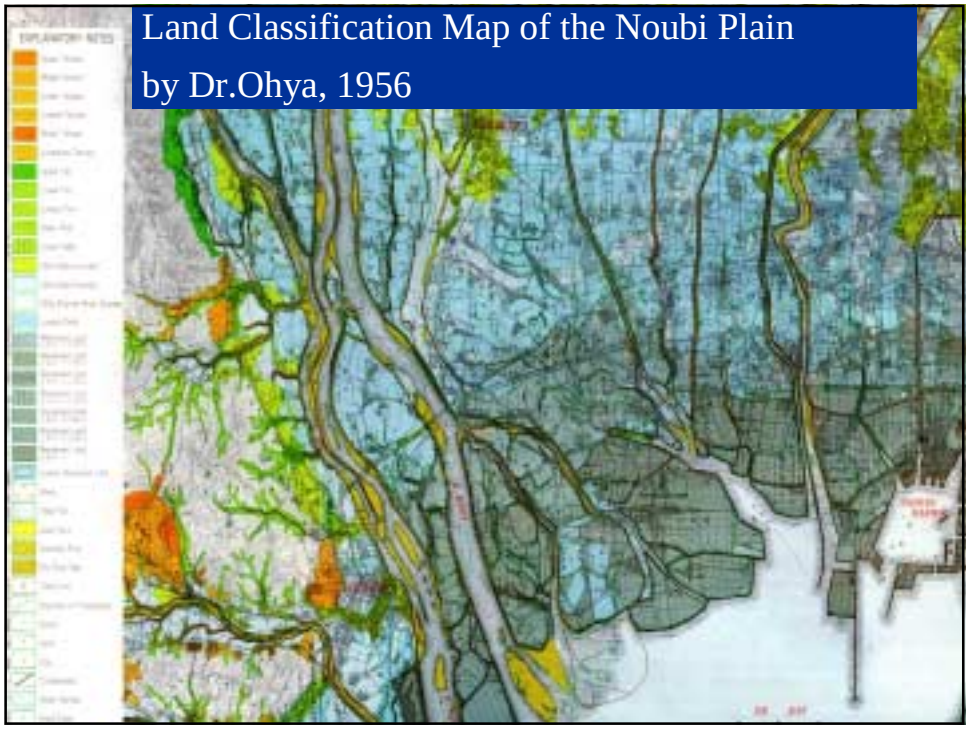


History of Hazard Maps in Japan

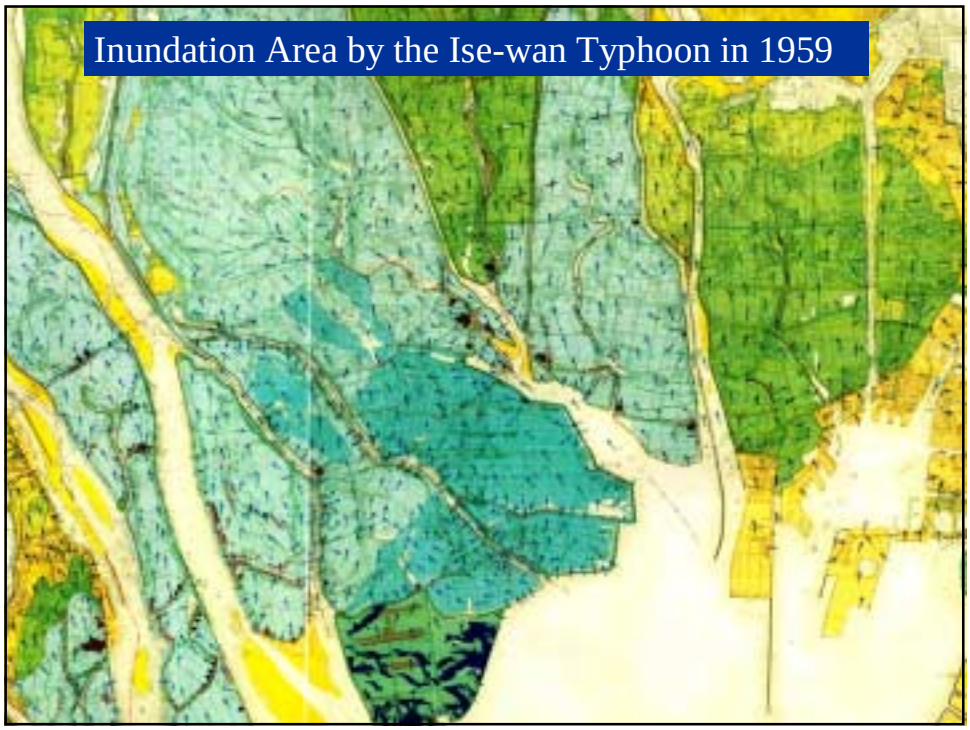
- Prehistory:
  - Researcher's Proposal
- Administrative Initiatives:
  - Step-by-step Publications of Inundation Status
- Formalization of Hazard Map:
  - Instruction by the Director of Flood Control
- National Policy Endorsed by Law:
  - Amendment of the Flood Fighting Law

Land Classification Map by Dr.Ohya

- Dr.Ohya's Land Classification Map for Noubi Plain in 1956
  - The plain is a delta formed by the Kiso River, and is suffering from land subsidence.
- Ise-wan Typhoon in 1959 struck the delta.
  - The area of inundation was consistent with Dr.Oya's map. "The map predicted the disaster."

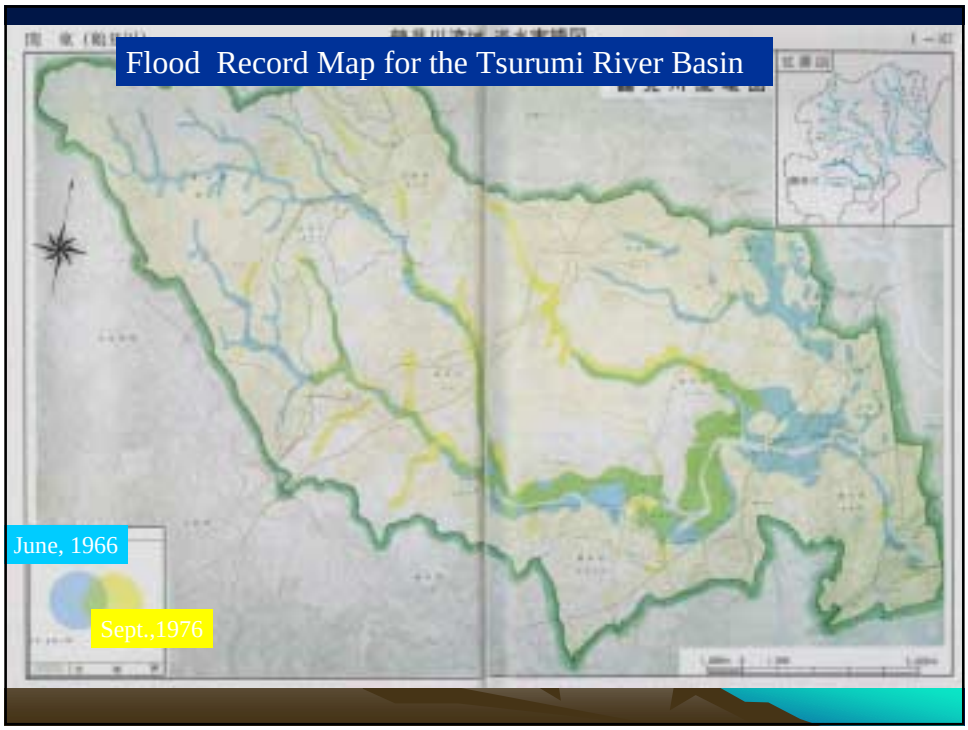


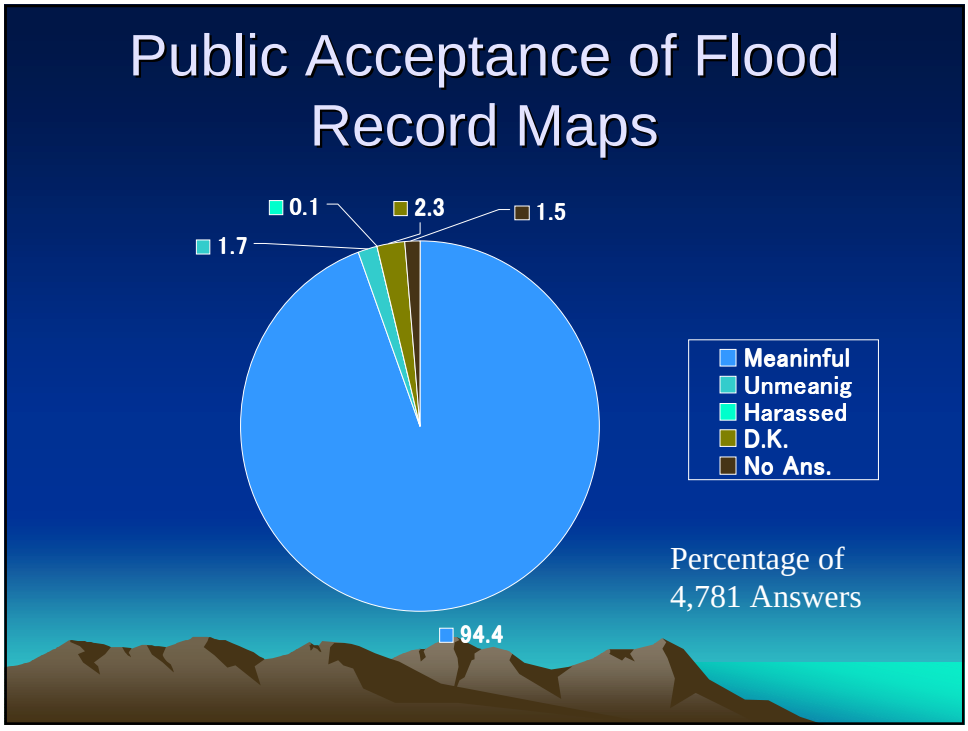
Land Classification Map of the Noubi Plain by Dr.Ohya, 1956



Administrative Initiatives

- Publication of Flood Record Maps
  - Since 1981, for some 500 Rivers
- Publication of Flood Risk Area Maps
  - Since 1988, for the Tsurumi and other Rivers


Flood Record Map for the Tsurumi River Basin
June, 1966
Sept.,1976


Public Acceptance of Flood Record Maps
0.1
2.3
1.5
1.7
94.4
Meaninful
Unmeanig
Harassed
D.K.
No Ans.
Percentage of 4,781 Answers

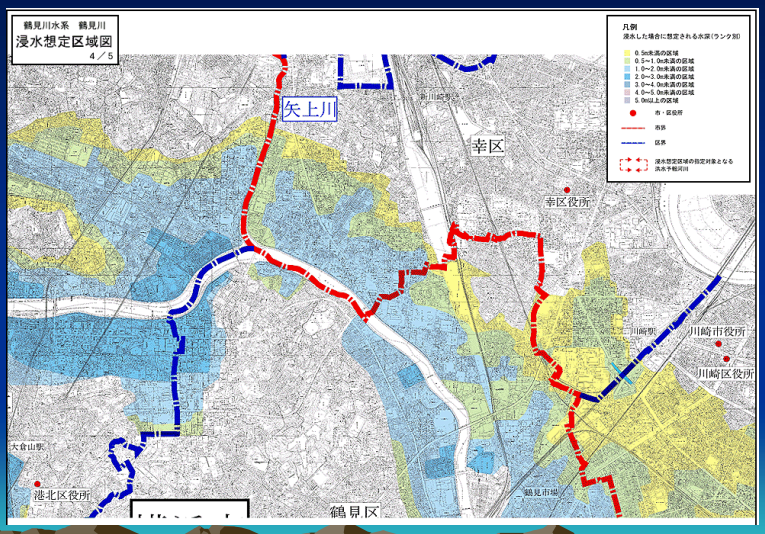
Public Opinion to Flood Record Map

- Indication of present status rather than past records was preferred.
  (36.9 % of 185 respondents, multiple answer)
- Larger and more detailed map to identify individual house was demanded. (25.2 %)
- Inundation depth in addition to inundation area was thought necessary. (24.8 %)
- More records for other floods requested. (8.3 %)

Flood Risk Area Map

- Inundation area and depth
- Calculation based on a model storm with 150-year return period
- Compiled for each river basin
- Publication through pamphlets, municipalities' PR papers, mass media, etc.
- Map scale of 1:25,000 to 1:50,000

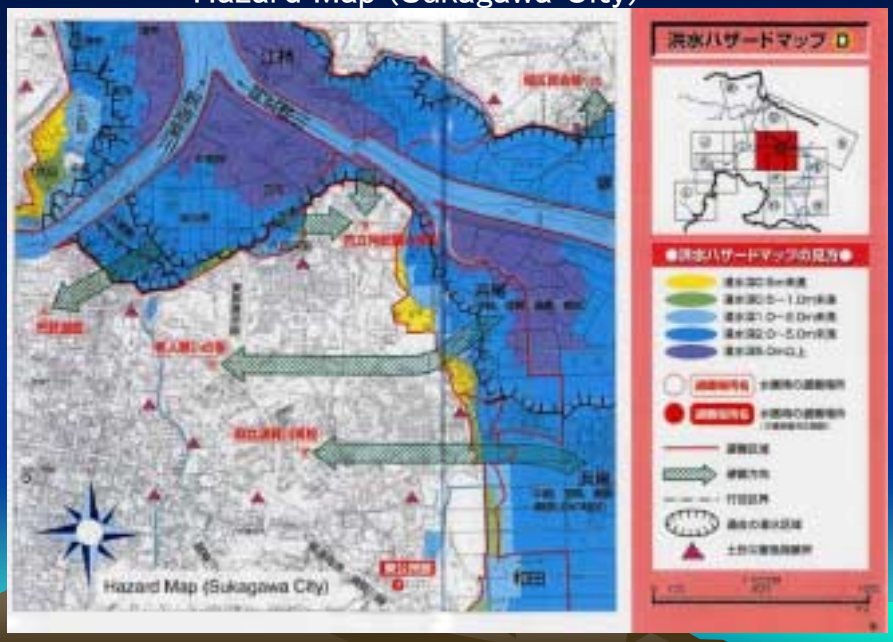
Flood Risk Area Map for the Tsurumi River



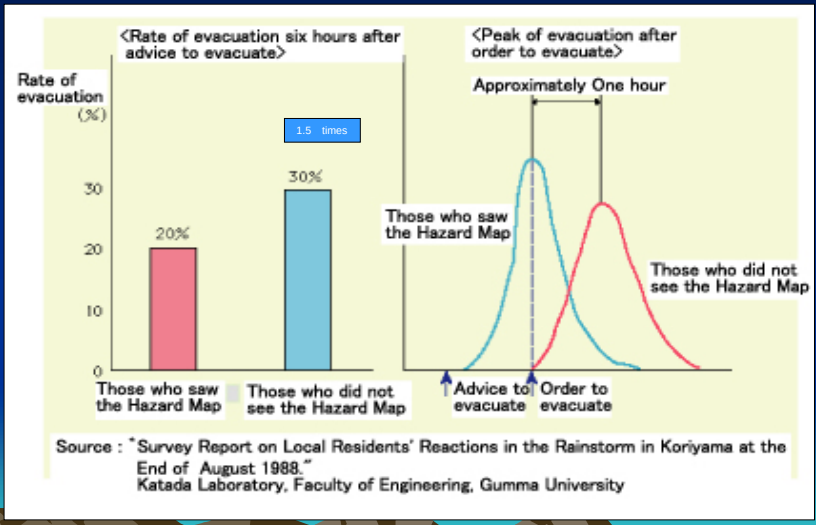
Public Opinion to Flood Risk Area Maps

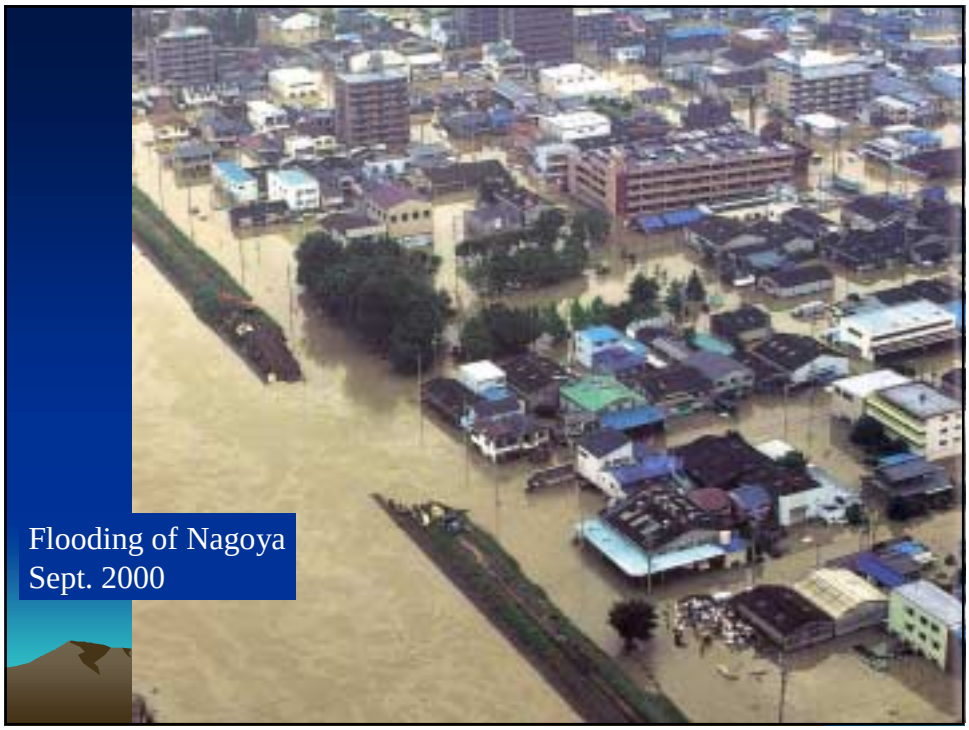
- More information was needed.
  - Larger map for individual municipality (33 % of 1,799 respondents, multiple answers)
  - Inundation areas and depths for more frequent storms (17 %)
  - Evacuation sites and routes (12 %)
- Necessity of a flood hazard map was confirmed.

Hazard Map (Sukagawa City)

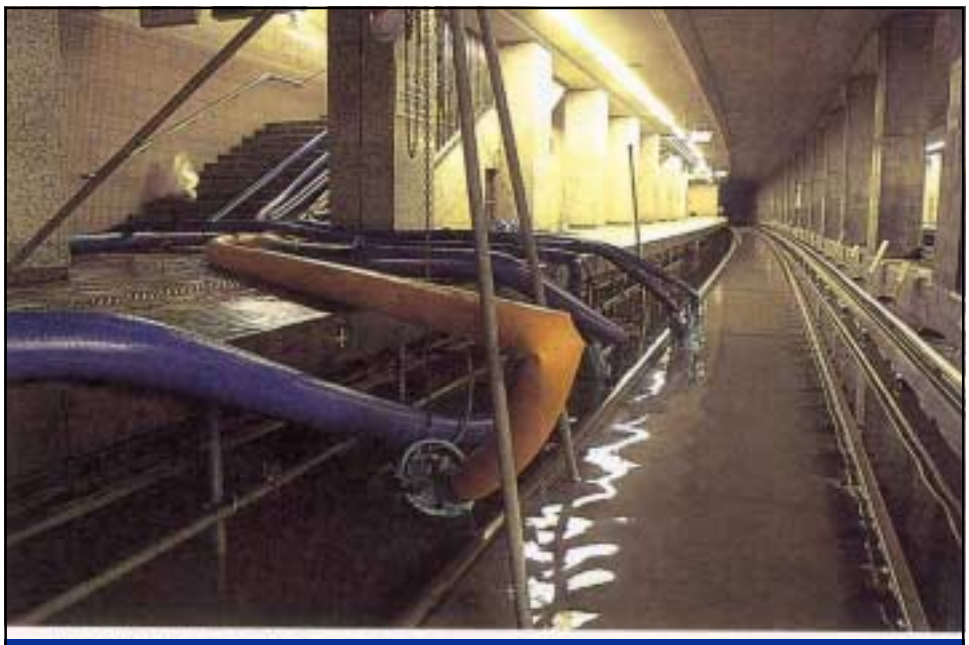


Effectiveness of Hazard Map





Flooding of Nagoya
Sept. 2000



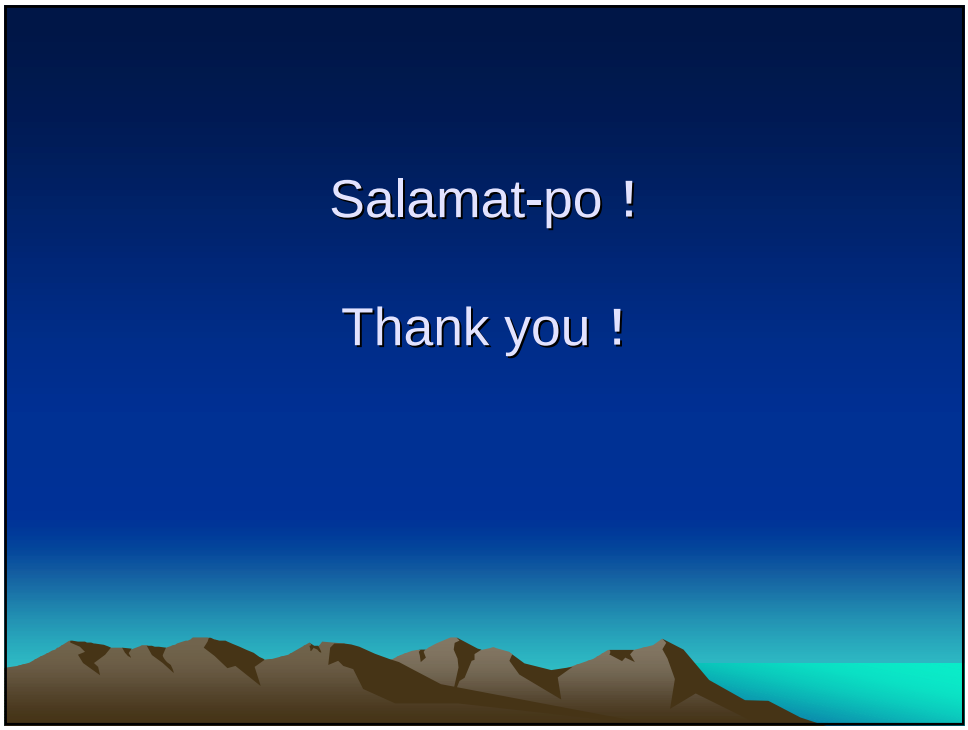
Subway Network was Submerged Hampering People's Activity

Revision of Flood Fighting Law

- Prefecture governors newly got responsible for flood forecasting for rivers under their jurisdiction;
- Announcement of predicted inundation area and depth became a legal obligation if a river is designated as a target of flood forecasting; and
- Mayor got legally responsible for provision of evacuation facilities and evacuation routes along with publication of them to the public, in effect responsible for preparation of a flood hazard map.

Conclusion

- Flood hazard map has been conceived through long history of official publication of inundation vulnerability.
- Experience of Japan shows that general public welcome the provision of detailed information, which they can make good use of.
- Fears for a decline in the price of land proved unfounded.
- Recent revision of the Flood Fighting Law will enhance and promote the compilation and publication of flood hazard maps.

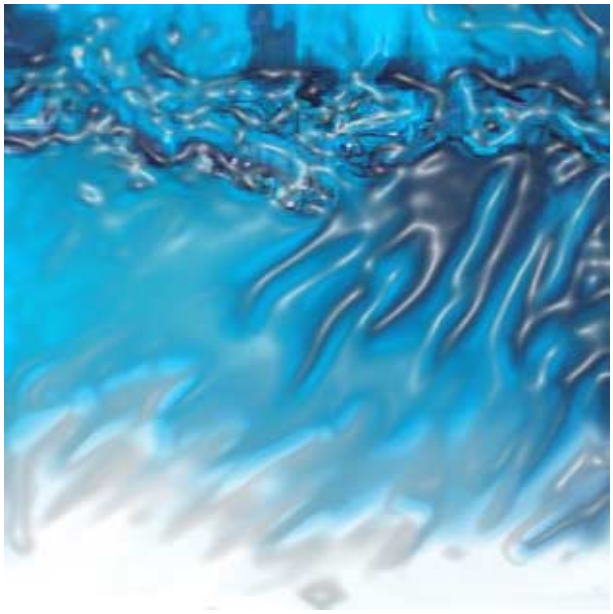

Salamat-po！
Thank you！

洪水と貧困（マニラ）Session 1-4

Flood Hazard Mapping Project Pilot Area: Quezon City, Philippines

OSKAR D. CRUZ

Joint Project of Flood Forecasting Branch (FFB)
and Natural Disaster Reduction Branch (NDRB)
Philippine Atmospheric Geophysical Services Administration (PAGASA)
Manila, Philippines



第 2 次水資源プロジェクト研究計画調査

Flood Hazard Mapping Project

Pilot Area: Quezon City, Philippines

By:

OSKAR D. CRUZ

Joint Project of Flood Forecasting Branch (FFB)
and
Natural Disaster Reduction Branch (NDRB)
Philippine Atmospheric Geophysical
Services Administration (PAGASA)
Manila, Philippines

Background Information

- **Population and Density:**
  1.29M ; 100-300 persons per hectare
- **Basin Area :**
  78 sq. kms.
- **Tributaries, Width and Length :**

  - Main San Juan River (45-50 meters wide (riverbed), 5 kms. long)

  - Five (5) Major tributaries (16-20 m wide and 17.65 km long)

  - Seventeen (17) Minor tributaries (7.94 m wide and 47.55 km long)
- **Water Flow :**
  North to south draining to Pasig River

Background Information

•**Climate:**

Dry from November to April, Wet from June to September

•**Annual RR: 2,531.8 mm**

526.8 mm with peak in August and a low of 8.9 mm in February

•**Temperature:**

Highest during the month of April and the lowest, occurs during the month of December

•**Flooding :**

Portions of Barangays Dona Imelda, Damayang Lagi, Tatalon, Talayan, Del Monte, Apolonio Samson, Roxas and Masambong

Available Data Inventory

Political and geographic subdivision (NAMRIA, LGU)

Topography Map(NAMRIA)

Land use Map (NAMRIA, LGU)

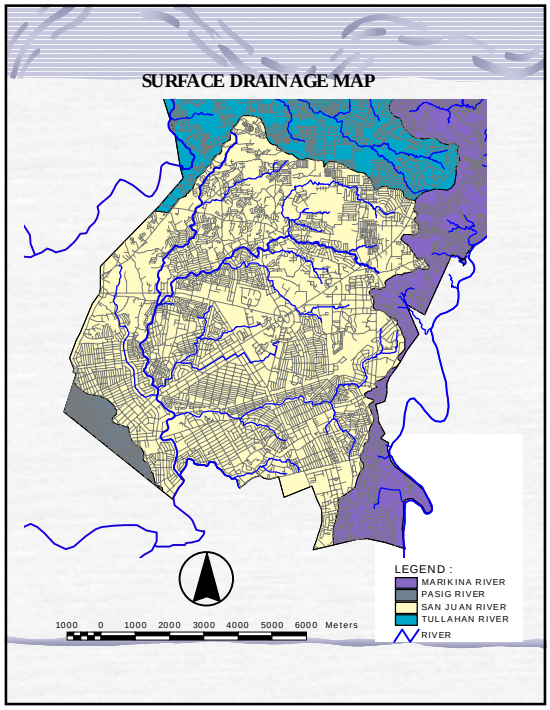
Hydrography Map(LGU, NAMRIA)

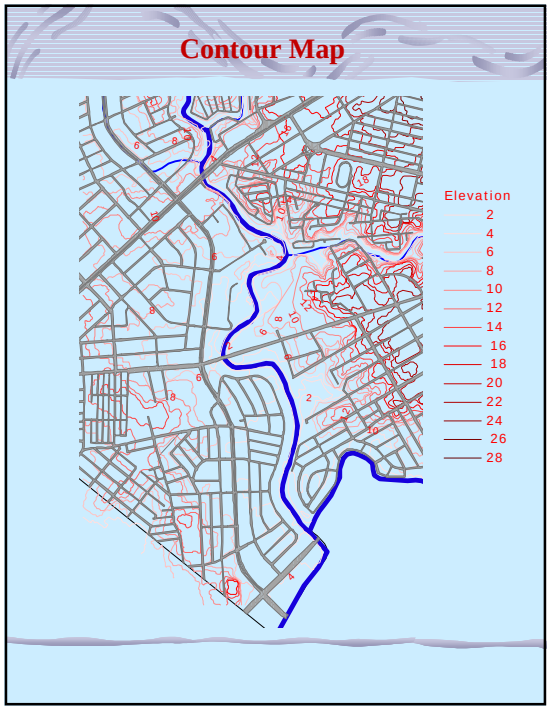
Physiography Map (Bu. of Soils)

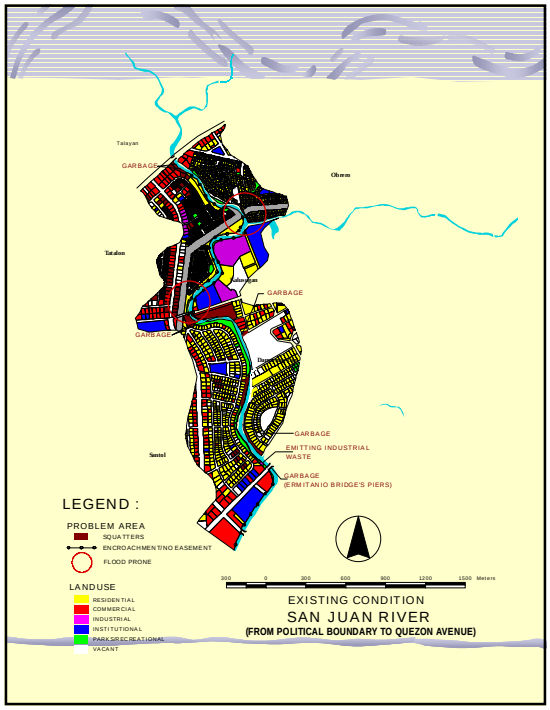
Slope map (Bu. of Soils)

Historical data (DPWH, LGU)

Aerial Photos (NAMRIA)


SURFACE DRAINAGE MAP
LEGEND :
MARIKINA RIVER
PASIG RIVER
SAN JUAN RIVER
TULLAHAN RIVER
RIVER
1000 0 1000 2000 3000 4000 5000 6000 Meters


Contour Map
Elevation
2
4
6
8
10
12
14
16
18
20
22
24
26
28



Inundation Information

- **Inundation Area**

  Areas subjected to flooding

- **Water Depth**

  Depth of flooding or actual flood heights

Proposed Methodologies

1. **Geomorphological Analyses**

   Analyzing the river system by identifying landform units, e.g. floodplains and terraces.

2. **Drainage inventory and quantification**

   Delineating river cross sections and profiles

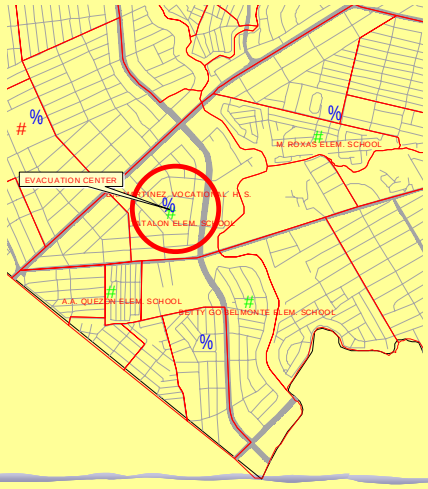
3. **Field Surveys**

   Establishing vertical control points to Determine elevations at selected locations

4. **Historical Analyses**

   Determining past flood records through Research and actual interviews.

Designated Evacuation Centers



Typical Scenes during the Typhoon and Monsoon Season






Source	Date	Date of Occurrence	Type of Event (Monsoon, TSTM, ITCZ, Low pressure, Storm,Ty)	Areas Affected
Phil Daily Express	10/30/80		Ty Yoning	Novaliches, Quezon City
Times Journal	7/27/80		Ty Nitang and Osang	Quezon City
Times Journal	7/26/80		-do-	Quezon City
Times Journal	7/26/80		Ty Osang	Tatalon, Quezon City
Phil. Daily Exp	7/25/80		Ty Osang	San Francisco del Monte
Bulletin Today	5/20/80		T.S. Gloring	Dario Creek, Tatalon
Phil Star	9/8/90	9/7/90	Ty	Tatalon Creek, Quezon City
Mla. Bulletin	7/27/91	7/26/91	TS	Intersection of Banaue and of G. Tuazon along Quezon Avenue
Phil. Daily Inquirer	10/27/92	10/26/92	TS	Tandang Sora, Quezon Avenue
Manila Bulletin	6/27/93	6/26/93	Ty Maring	San Bartolome, Novaliches, San Juan, Quezon Avenue, Camp Crame, Camp Aguinaldo
Phil. Star	10/22/94	10/21/94	Ty	Quezon Avenue Extension, Elliptical Road, Quezon City
Mla. bulletin	5/25/97	5/25/97	Low pressure	Roces Avenue, Roxas District
Mb	12/17/98		ITCZ	Kalayan to Gate 4 of City Hall, Balintawak, Quirino Highway and Araneta Avenue, Brgy Bahay Toro, Kamuning, La Loma, Novaliches, Fairview and Commonwealth
Phil Daily Inq	9/1998		Monsoon Rains	Quezon Avenue, EDSA, Sgt. Chuatoco, Pegasus, Agham Road and Quezon Memorial Circle

MB	8/4/99		Heavy SW Monsoon rains	- Araneta – Quezon Avenue, Araneta, E. Rodrigues, Araneta – Brgy. Imelda, Biak na Bato to Calamba, Araneta C-3-Quezon Avenue - Quezon City – Brgy. Sto. Domingo (1,200 persons), Brgy Dona Imelda (400), Brgy san bartolome (1920, Brgy. Gulod (272), Brgy. Maribio (480), Brgy Fairview (20), Bagong silang (600), Roxas (32), Kaligayahan (120), Batasan (20), Batasan Hills (320), Manga (72), Tatalon (200), North Fairview (400), Kalusugan and Damayan Lagi (3,200), Paraiso (80), Tagumpay (2,400) -
PDI	8/14/99		Monsoon Rains	Tanadang Sora, commonwealth, Timog Avenue, La Loma, Banaue, P. Tuazon
PDI/Mla. Bulletin	9/12/99		Monsoon Rains/TD Neneng	Kamias Road, SM West, Kamuning road, East Avenue, elliptical road, Quezon Avenue, Timog Avenue, E. Rodriquez Ave./ Some parts of Quezon City
PDI	9/1			
Mla. Standard	9/1/89		TD	Metro Manila
MB	10/18/99		Storm Rening	Retiro, Aranteta Avenue and Banaue
MB	10/24/99		Ty Loleng	Quezon City
Sun Star	8/28/00		Monsoon Rains	Mother Ignacia, Sgt. Esguerra, Capitaol Medical center, North Ave., Kamias Road, Aurora Blvd, Santolan, Kalayaan and Elliptical road

Source	Date	Date of Occurrence	Type of Event (Monsoon, TSTM, ITCZ, Low pressure, Storm,Ty)	Areas Affected
Mla. bulletin	9/5/00		TD Maring, flashfloods	Tatalon in Araneta Avenue Mother Ignacia St, Roxas District, Loyola heights and Tatalon Tomas Morato, E. Rodriguez, Araneta Avenue, EDSA, Panay Avenue and Sgt. Esguerra Del Monte Avenue, West Riverside and P. Tuazon
PDI	9/5/00		Monsoon Rains	Araneta Avenue, Quezon Ave., Brgy. Basra, Sto Domingo, Proj. 6, teachers village, Brgy. Culiat, Tandan sora, UP Village and Bago Bantay
PDI	11/4/00		Monsoon Rains	San Bartolome Q.C., Novaliches, Q.C.
Phil. Star	5/9/01		TSTM	EDSA, Aurora Blvd, E. Rodriguez, Commonwealt Ave., Elliptical Road, Kalayaan Road, Santolan Road
MB	5/19/00		Flashfloods	Novaliches and Araneta Avenue, all barangay along Tullahan riverbanks from Q.C., Malabon, Calooocan to Valenzuela, (Brgy. Gulod and San Bartolome in Novaliches)
MB	7/6/02		Monsoon Rains (Ty Gloria, still outside PAR)	- Roxas District and Talatan - Commonwealth Avenue, Mindanao Avenue, Ma. Clara, C-3, Brgy. Imelda on Araneta Ave., Tandang Sora, Santiago, Pangulo tulay, Brgy. Kristong Hari in E. Rodriquez, Brgy Maribio, and Brgy. Damayang Lagi - 19th St. in roxas District and Talayan Village - Roxas District particularly Waling-Waling, Gumamela and Campupot Sts. And at the back portion of St. Luke's Hospital - Kamias Road and Kalayaan Ave., Cubao underpass, Del Monte Ave. in Frisco, barangay Talayan and part of Roces Ave.

Hazard Mapping Questionanire

Hazard: FLOOD

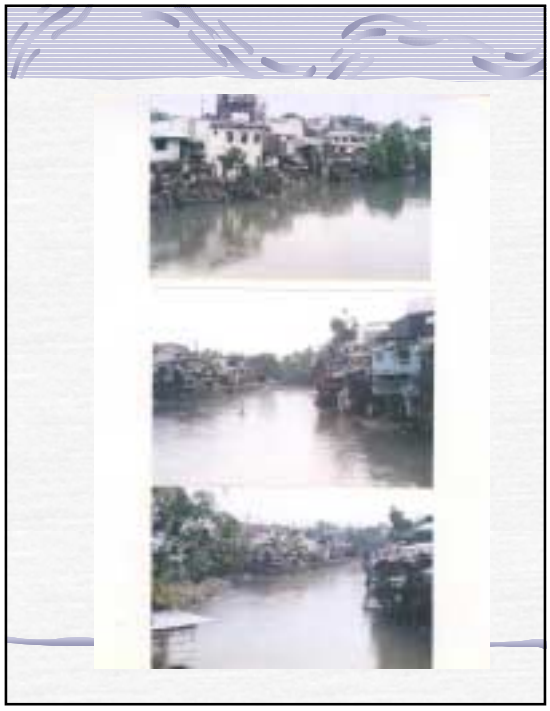
Name/Position : _____ Occupation : _____

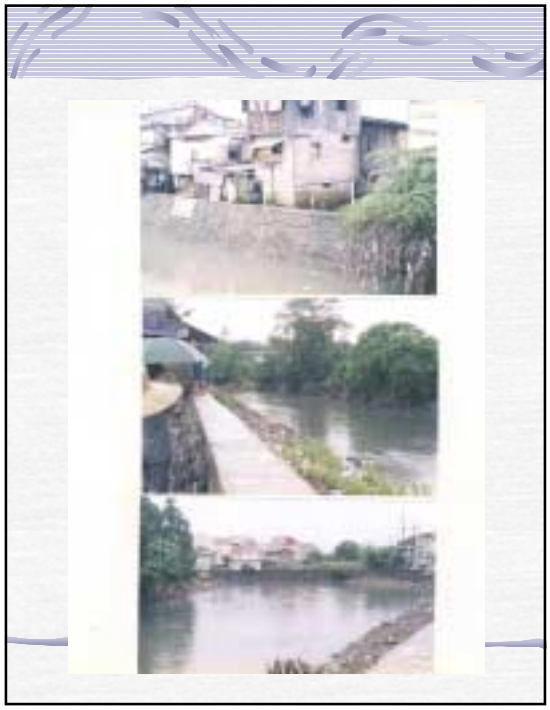
Address : _____ Age/Tel. No.: _____

Municipality/Barangay : _____ Date Accomplished : _____

Site I.D. No	Location (2)	Flood Height (meters) (Taas ng baha) (3)	Duration of Flooding (minutes/ hours/days/ month) (Gaano katagal) (4)	Frequency of Occurrence (How often/Gaano kadalas) (5)	Cause(s) of Flood in the area (low-lying area, areas along waterways, coastal areas, areas with poor drainage systems, etc.) (6)	Evacuation Center (Pls. Identify) (7)	Additional back-ground information of the area (8)	Suggestions/ Recom-mendation to solve flooding (9)

•This form is accompanied by a map, please indicate the *site number as you delineate the extent of flooding in the map.



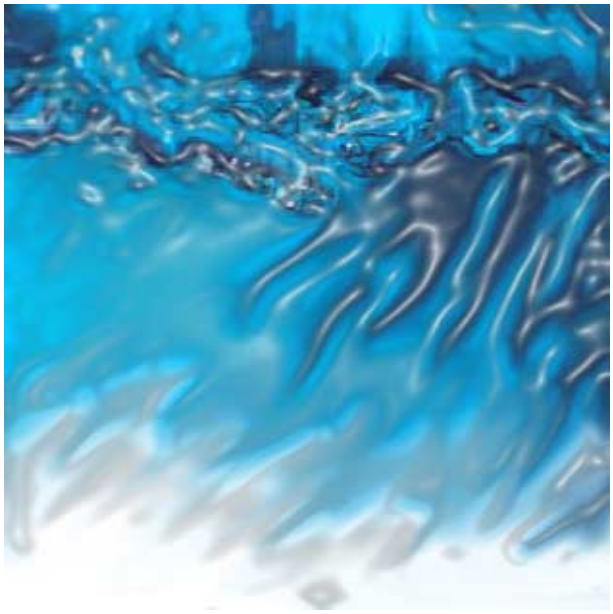


洪水と貧困（マニラ）Session 1-5

The Flood and Flood Forecasting in Yangtze River

Cheng Lin

Senior Engineer, Bureau of Hydrology,
Ministry of Water Resources
Beijing, People's Republic of China



第 2 次水資源プロジェクト研究計画調査

The Flood and Flood Forecasting in Yangtze River

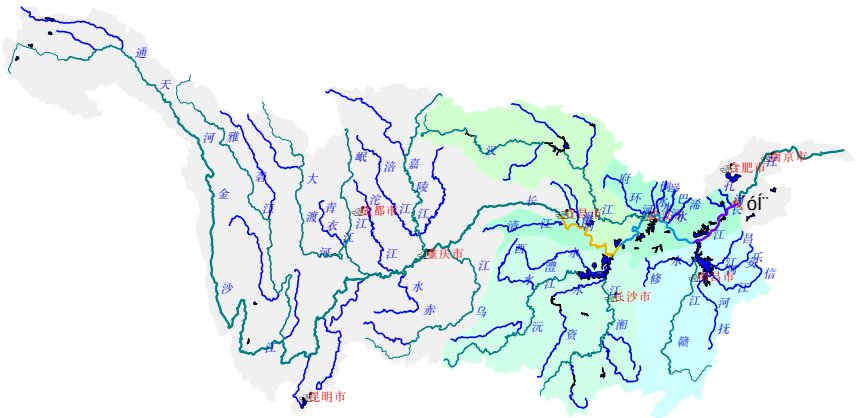
Cheng Lin

Senior Engineer, Bureau of Hydrology,
Ministry of Water Resources
Beijing, People's Republic of China

Three parts

- A. Yangtze River Introduction
- B. Flood in Yangtze River
- C. Flood Forecasting in China

Yangtze River Basin Map



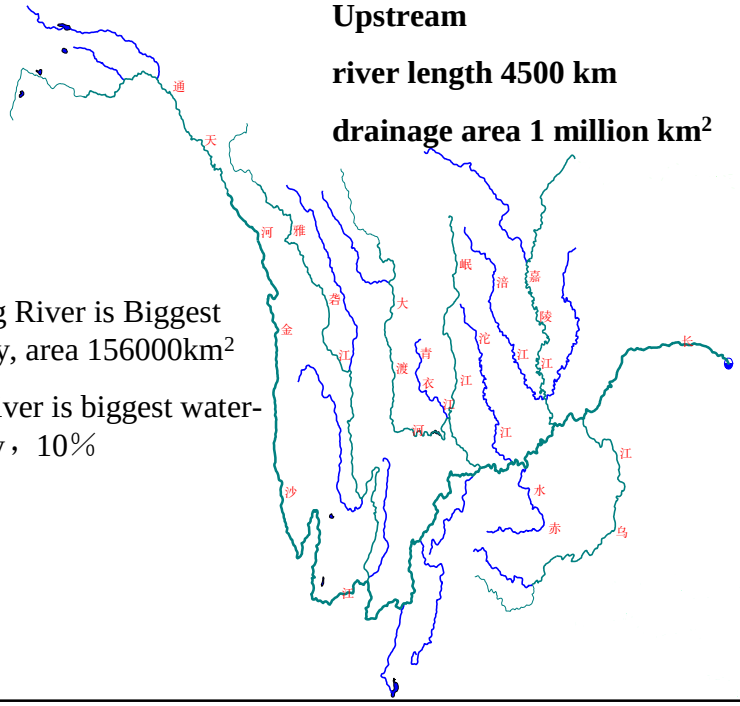
Brief Introduction

- Drainage area：1.8 million square kilometers
- River length：6300 kilometers
- Compositor：The longest river in China, The third longest river in the world.

Upstream

river length 4500 km

drainage area 1 million km^2



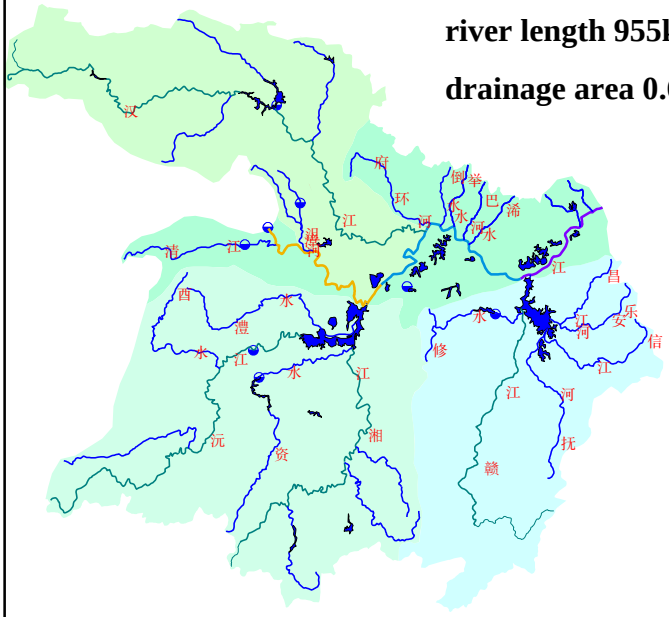
•JiaLing River is Biggest tributary, area 156000km^2

•Min River is biggest water-quantity，10%

midstream

river length 955km

drainage area 0.68 million km^2



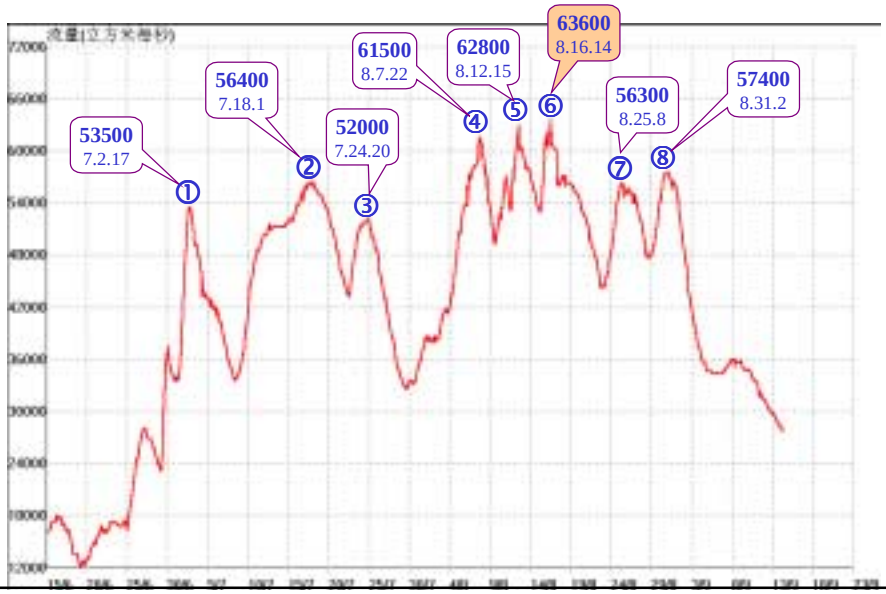
Downstream

- Hukou station，main stream station 600km is tide
- River length 938km，drainage area 120000km^2
- Main tributary：chaohu、qingyijiang、shuiyangjiang and taihu lake。

B. Yangtze River Flood in 1998

- full basin type flood
- many flood degree (8 times from upsream)
- big flood capacity
- high flood water level
- Long Flood extend time
- early, influence

Yichang station in upstream

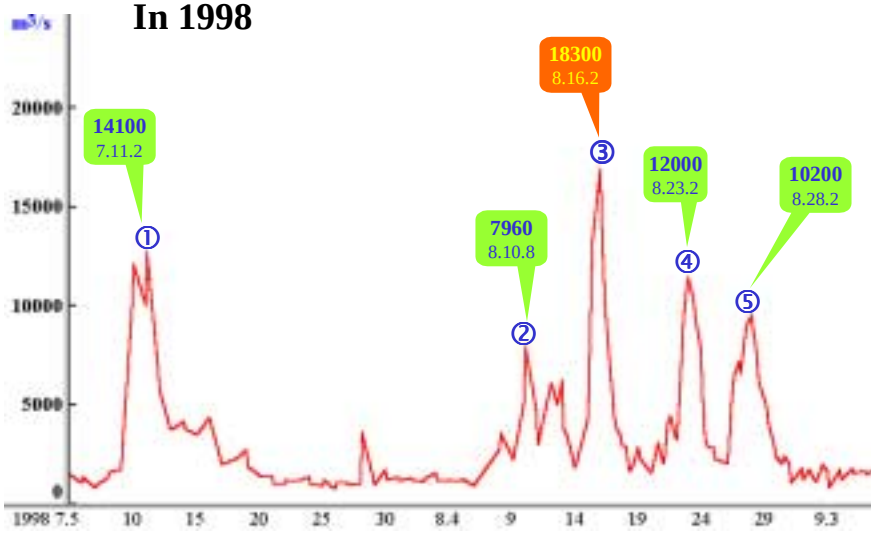


Water level in main stream overtake history degrees more than 359km, two reach: from shashi to luoshan、wuxue to jiujiang station

- midstream tributary dongting and boyang lakes

sta item	Sha shi	Jian li	Luo shan	Wu xue	Jiu jiang	Cheng lingji	Hu kou
98ymaxlev （m/d）	45.22 (8/17)	38.31 (8/17)	34.95 (8/20)	24.04 (8/4)	23.03 (8/2)	35.94 (8/20)	22.58 (7/31)
historymax （m/d）	44.67 (54/8)	37.06 (96/7)	34.17 (96/7)	23.14 (54/7)	22.20 (95/7)	35.31 (96/7)	21.80 (95/7)
Over max	0.55	1.25	0.78	0.90	0.83	0.63	0.78
Over max times	3	2	1	2	2	4	2

Danjiangkou reservoir input discharge In 1998



C. Hydrological forecasting in China

- 1. Collecting and Processing the Hydrological Information
- 2. Flood Forecasting
- 3.Problem
- 4.Measure and Suggestion

1. Collecting and Processing the Hydrological Information

- 1016 stations, with 113 stat.from Yangtze River agency and 903 stat. from 14 provincial services.
- Avenues of main collection are by Telegraph and WAN (wide area network)
- A system of real-time hydrological information processing

2. Flood Forecasting

- According to the characteristics of the various rivers in Yangtze River, operational flood forecasting are made in five steps
- The empirical relationship method was used for flood estimating; the CRFPDP, the API, Xinanjiang,and SCLS models were used for rainstorm curve method were used for flood routing in river reach; and the corresponding water level method with the discharge at rising as parameters was used for flood peak forecasting in downstream areas.

For 125 forecasting sections

- P~R correlation
- Muskingum
- Big lake hydrological forecasting
- Correspond water level rise rate

3.Problem

- How is the forecasted discharge transformed into water level?
- Presently, there are 290,000 km of dykes along rivers, lakes, and seas in China to protect half of the population and two thirds of the total output value of industry and agriculture from flood damages. Therefore, it is important to ensure the safety of the dykes.

4.Measure and Suggestion

- Nonstructural measures, which are measures of adapting to nature, in which flood forecasting is one important way to reduce disasters.
- It is our wish to enhance international cooperation and research in hydrological information and forecasting, especially in flood forecasting in the new century.

Hazard Mapping Project

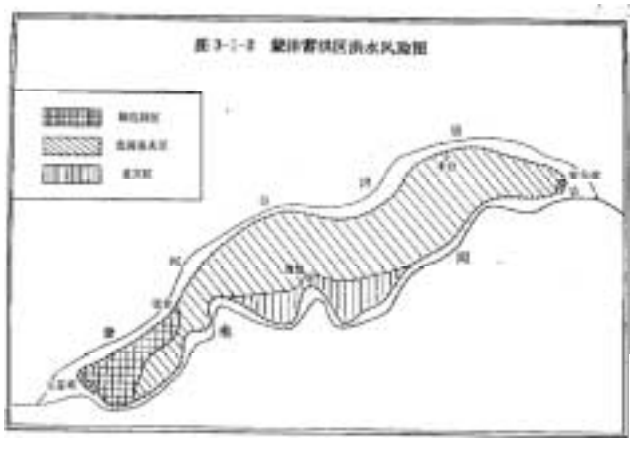
Basic Information of Flood Detention Areas

- MengWa Detention is located on the Huai River, objective area 181km^2 , Population is 148 thousand people (HRC, 1997, the same below). Farmland inside is 12000 hektare, with 4 town and 75 village, usually the land altitude is 26~21m, sloping from south-west to north-east. Storage area is 180 km^2 , and storage capacity is 750million m^3.
- MengWa Detention Project is including three parts.:
- 1. WangJjiaBa gate is fool control gate in the upstream;
- 2. CaoTaiZi outflow gate is in the downstream;
- 3. MengWa around dam

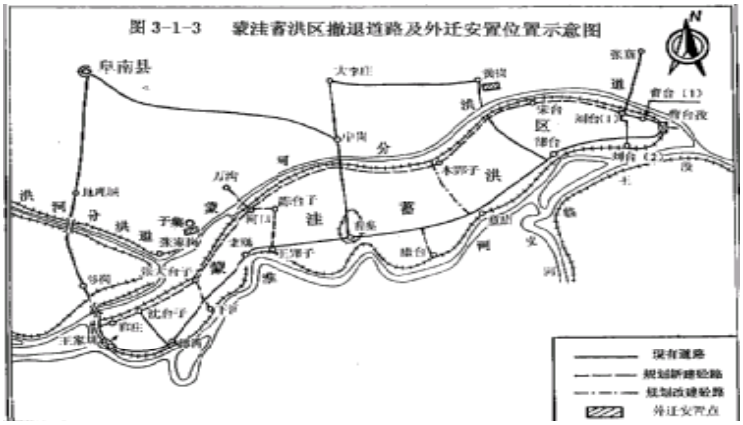
Hazard Mapping Project

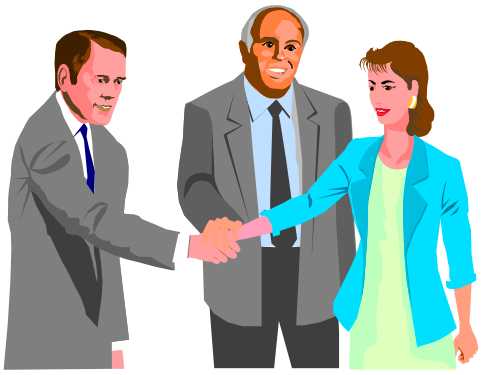
- Design releasing discharge max is 1626 m^3/s.
- Control Station water level is 27.66m,
- Its storage capacity is 72 million m^3
- From 1954 to 1991, MengWa detention area was used to store floodwater. In 1991, flooded farmland was 12000 hektare and affected population was 126 thousand people. In 1997,capital asset is 7.7million RMB Yuan and average income is 1128 Yuan per people.
- Its utilization frequency is below 10 years in return period.

MengWa Detention hazard Map



MengWa Detention retreat road and outward aftercare sketch map



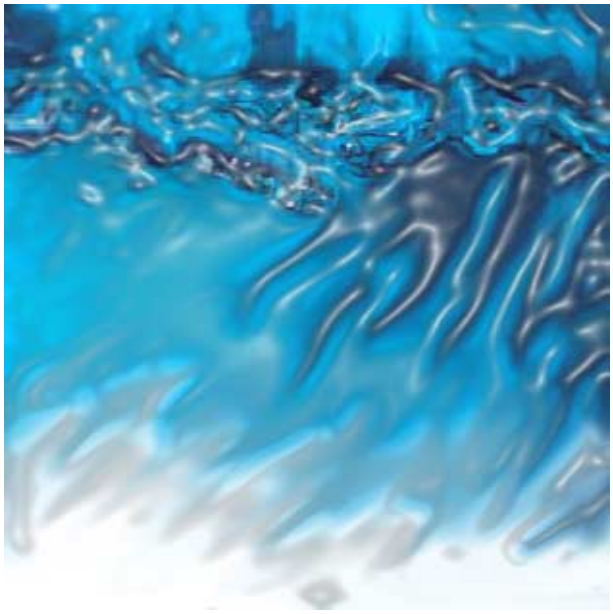


洪水と貧困（マニラ）Session 1-6

Flood Hazard Mapping in the Caribbean and the Central America

Mr. Hidetomi OI

Senior Advisor,
Japan International Cooperation Agency (JICA),
Japan



第 2 次水資源プロジェクト研究計画調査

FLOOD HAZARD MAPPING IN THE CARIBBEAN AND THE CENTRAL AMERICA

Hidetomi Oi, JICA

ABSTRACT

- Hazard map Is the prerequisit of the overall disaster management, providing information essential for emergency operation, rehabilitation, preparedness and mitigation.
- In the Caribbean,

Regional cooperation for flood hazard mapping in the Caribbean

Why and How?

1. There are many small island countries in the Caribbean, all of which frequently suffer from flood by hurricanes. **Need is huge in view of the frequency and the intensity of disaster in so many small vulnerable countries.**
2. Flood hazard map has been prepared only for a few communities in the region with assistance of donors. D**onors' assistance is very limited compared with such a huge need.**

3. Countries in the region are so small with limited resources that it is practically impossible for a country alone to prepare maps by itself.
4. One of ways to promote hazard mapping under such circumstances is to have a self reliant institution under collaboration of regional organizations (universities and technical institutes) where expertise is available but not sufficient to cover all required for hazard mapping by itself.
5. Project aiming at establishing such an institution has just started with the technical assistance of Japan: CARIBBEAN DISASTER MANAGEMENT PROJECT.

Caribbean Region with small island countries

THE CARIBBEAN

CARICOM **(Caribbean Community)**

CDERA **(Caribbean Disaster Emergency Response Agency)**

Member States **(16 States)**

Anguilla, Antigua & Barbuda, The Bahamas, Barbados, Belize, British Virgin Islands, Dominica, Grenada, Guyana. Jamaica, Montserrat, St.kits & Nevis, St.Lucia, St.Vincent & Grenadines, Trinidad & Tobago, Turks and Caicos Islands

CARIBBEAN DISASTER MANAGEMENT PROJECT

- Objective : To establish REGIONAL TEAM for flood hazard mapping
- Period : 3 years (2002-2005)
- Team Members

  Professional staff of regional institutions:

  -CIMH**(Caribbean Institute for Hydrology and Meteorology)**

  -UWI **(Universities of West Indies)**

  - CDERA

- Methodology : Hazard mapping by the RT at three pilot countries (Barbados, St.Vincent and Trinidad & Tobago) as the on the job training.

  A NATIONAL TEAM(NT) will be set up in each country to cooperate with RT.
- JICA's input : Experts, Equipment (GIS equipment, computer software etc.)

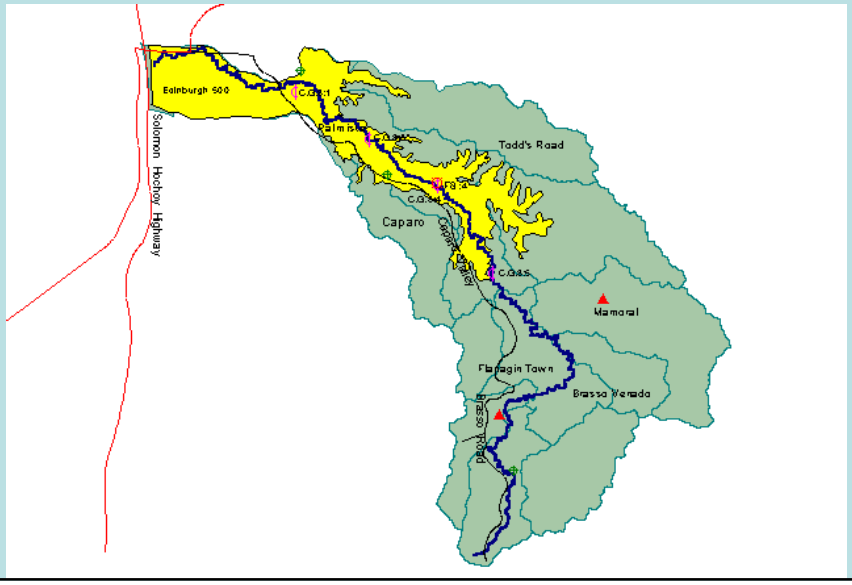
After 2005, RT will prepare hazard maps for flood prone areas in member states one by one in cooperation with NT to be set up by respective member state.

A manual for hazard mapping will be prepared.

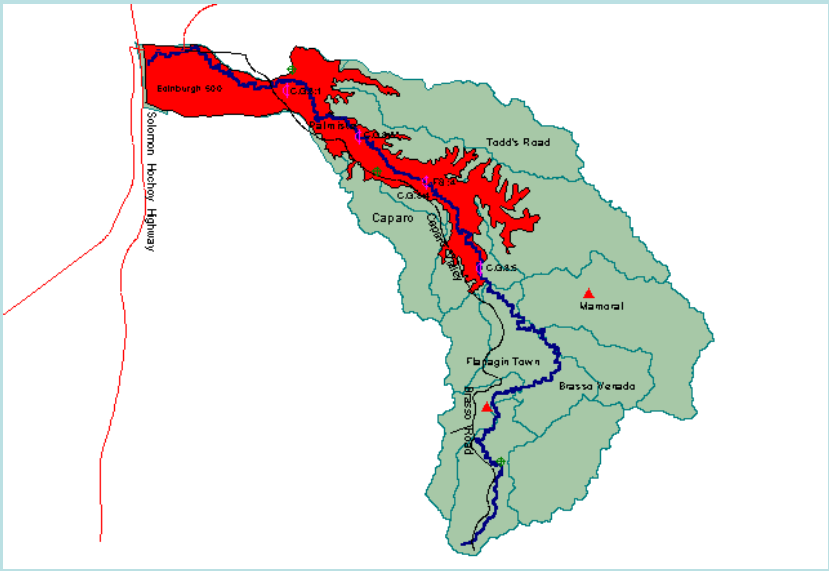
Caparo River Inundation Area by 2-Year Flood

Caparo River Inundation Area by 5-Year Flood

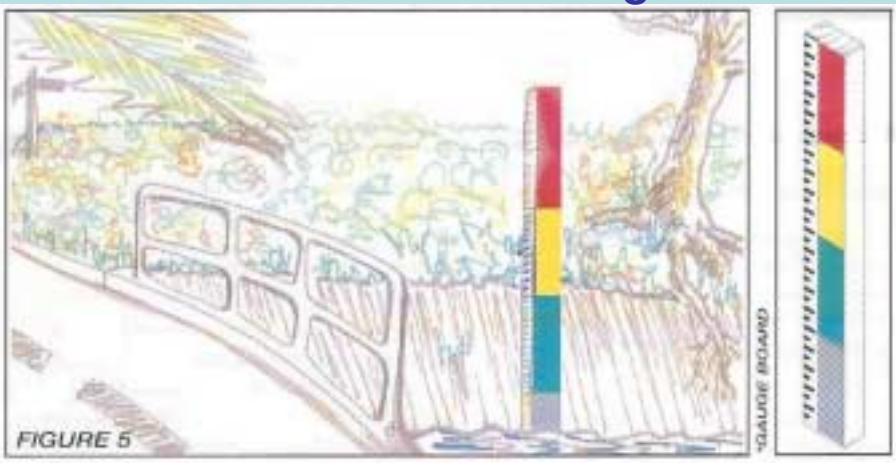
Caparo River Inundation Area by 10-Year Flood



Caparo River Inundation Area by 50-Year Flood



Example of Community Flood Warning in Trinidad & Tobago



Flood watchers in upper valley monitor the flood gauge board, determine the likely scale of flooding and issue warning to lower valley. Those warned of potential flooding then monitor the rise of water on their own board and take precautions. This warning system is sustainable as operation and maintenance can be done by local people by themselves.

Regional cooperation in Central America

Why and How?

- More than half of the Central America lie in international river basins. To reduce damage from floods more effectively, the basin approach under the collaboration of all countries concerned is necessary.
- Such an approach requires accessibility to and common use of information/data and materials by all concerned.

- Hazard mapping has been progressing in the region, especially since Hurricane Mitch in 1998, with assistance of different donors in different ways(the World Bank, UNESCO, USGS/USAID, Netherlands, Spain, Japan etc).
- A project has been started aiming at:
  - Standardization/Integration of GIS
  - Strengthening of CEPREDENAC as the center for storage and net-working of information

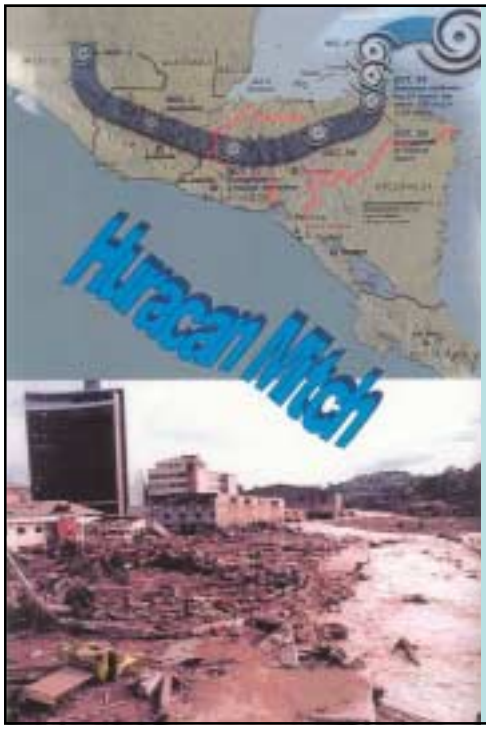
THE CENTRAL AMERICA

SICA(Sistema de Integracion Centroamericana)

CEPREDENAC(Centro de Coordinacion para Prevencion de los Desastres Naturales en America Central)

Member Countries(6 countries)

Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama



Hurricane Mitch

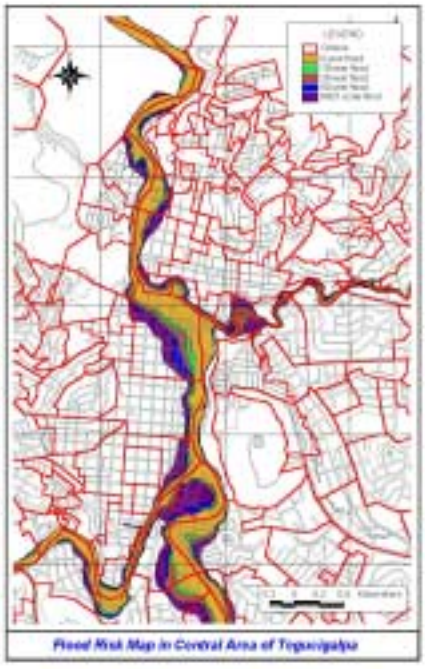
1998.10.27-11.2

Ranking in the historical hurricanes:

Intensity (905hPa,155knots) 4th

Death toll (10,000) 2nd

Damage in Tegucigalpa, Capital of Honduras



Inundation area of Tegucigalpa, Honduras by 5, 10, 25, 50 year flood and Hurricane Mitch flood

Land-use Regulation

River area

No new building should be constructed.

Zone1

New building's floor level should be higher than the ground level by 0.5-1.0m.

Zone2

New building's floor level should be higher than the ground level by 1.0m or more .

EPISODE

Mayor of Tegucigalpa, Honduras:

"The fundamental problem in disaster management is the increase of population due to inflow from rural areas. While implementing land-use regulation as recommended by JICA Team, we should cooperate with rural communities as far as we can to make them more attractive"

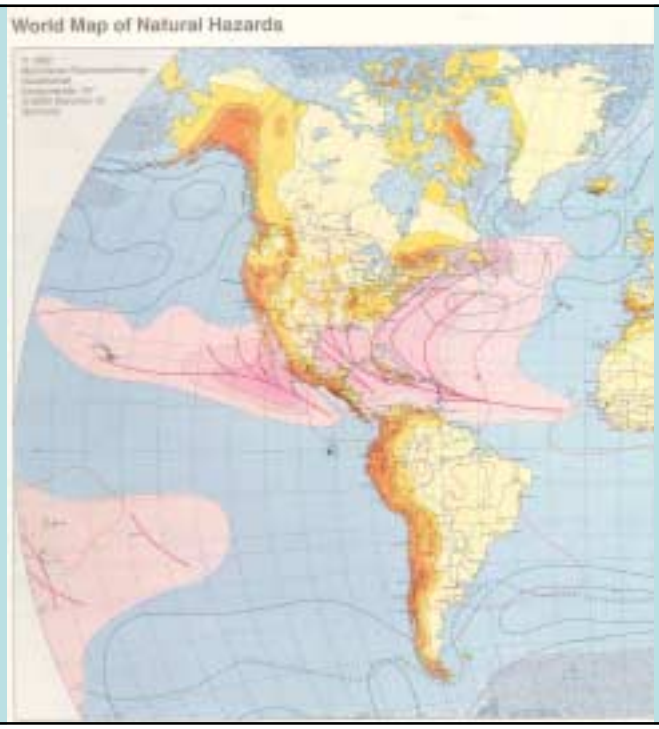
Lessons/Recommendations

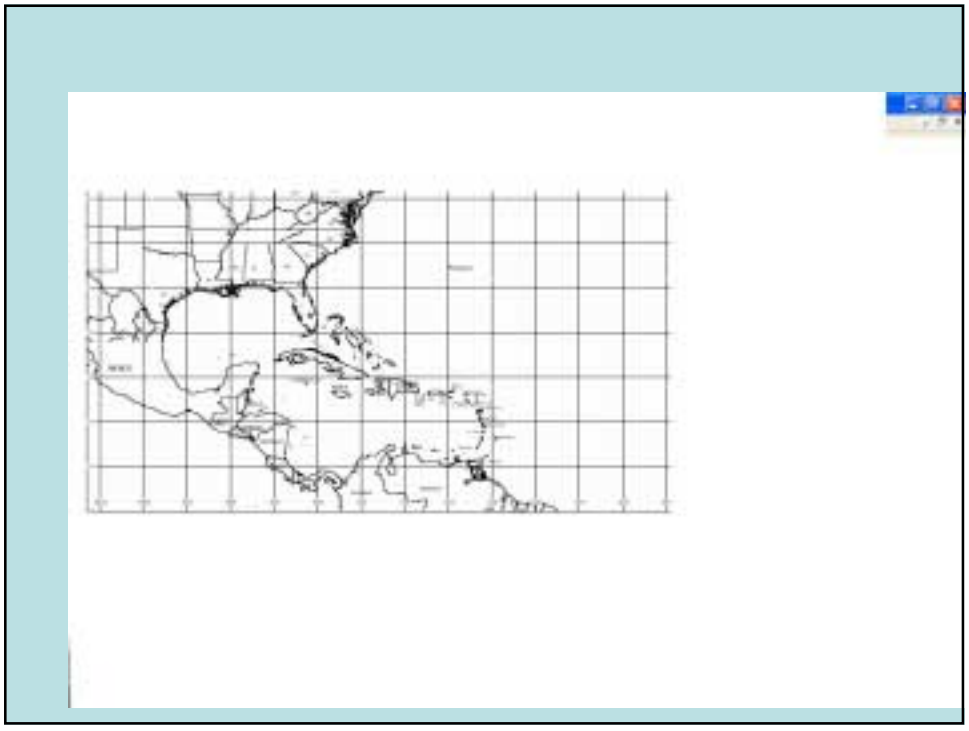
- Flood hazard mapping should be promoted in view of the rapid increase in population in areas susceptible to flooding in particular in urban areas.
  The majority being the poor, strict implementation of land-use regulation will not be a fundamental solution; measures for the poor to be able to abide by the regulation is necessary; further, cooperation between urban and rural communities is to be encouraged in order to reduce the inflow of population into urban areas.

- The expert team for flood hazard mapping being established in the Caribbean region under collaboration of local institutions will be a good model for Asian countries, especially for relatively small communities/river basins.

- The standardization/integration of GIS and other information being planned in the Central America will be a good model for Asia,especially for international river basins where accessibility to and common use of information is essential for cooperation of countries concerned.

- For the promotion of hazard mapping, a manual is a useful tool. Since preparation of manual is under way by regional organizations in Central America, the Caribbean, Asia etc., cooperation among regions is recommended.



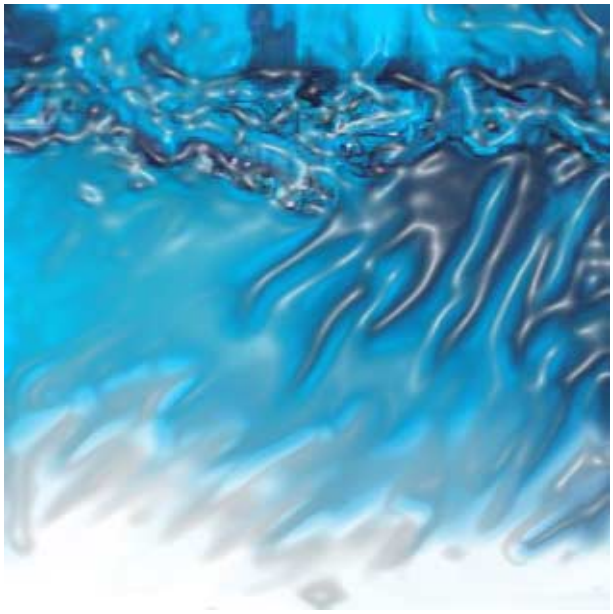


洪水と貧困（マニラ）Session 2-1

Flood Control and Poverty in Urban Area

Emil Sadain

Project Manager I, Project Management Office for Major Flood Control Project
Department of Public Works and Highways,
Philippines



第 2 次水資源プロジェクト研究計画調査

FLOOD CONTROL AND POVERTY IN URBAN AREA

Emil Sadain

Project Manager I, Project Management Office for

Major Flood Control Project

Department of Public Works and Highways

CASE STUDY

- Two flood control projects, which have been completed under Japan's ODA, are selected for the case study:

- **(1) The Mangahan Floodway Project**
- (4th OECF Loan)

- **(2) The Project for Flood Mitigation in Ormoc City**
- (Japanese Grant-Aid Program)

The Mangahan Floodway Project

Metro Manila
Philippines

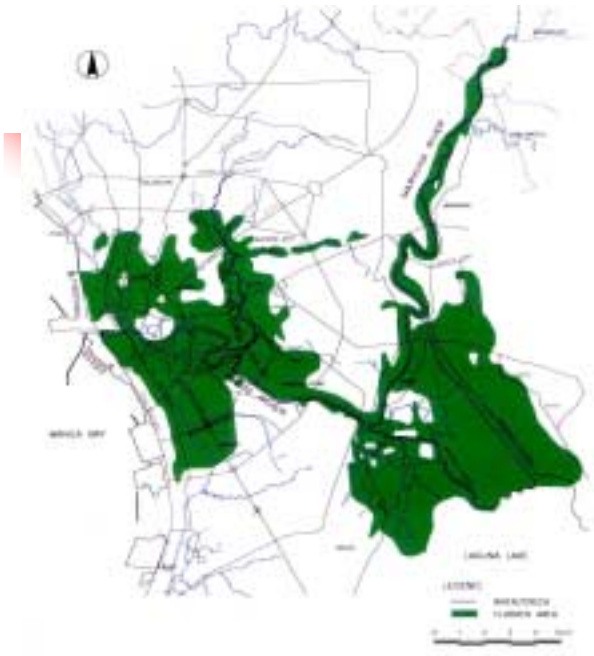
Overview:

- Metro Manila, which presently encompasses the 17 cities of the National Capital Region (NCR), is the economic, political and cultural center of the Philippines.
- Pasig-Marikina River, the main natural drainage of the NCR, contribute largely to the flooding in the Metropolis brought about by the riverbank overflow of floodwaters during heavy rains.
- The Mangahan Floodway Project was found as a solution to overbanking problem that occurs every year.

- The Mangahan Floodway

Objective

- To provide protection to the center of Metro Manila against Pasig-Marikina River flood discharges of up to 100-year return period by diverting the excess flood discharge of the Marikina River into the Laguna Lake for temporary storage.



- Approximate limit of inundated area during occurrence of 100-year return period flood before the Mangahan Floodway Project.
- This occurred on September 2, 1970.

Project-Related Activities

1970 & 74	Preliminary study and review for the floodway.
1974 – 75	Feasibility Study and Detailed Engineering Design on the Mangahan Floodway were conducted.
1977	Consultancy Services for the Review, Pre-Construction and Construction Supervision with funding assistance from OECF.
1978 – 80	Restudy of Rosario Weir, the headworks of the floodway.

Project-Related Activities

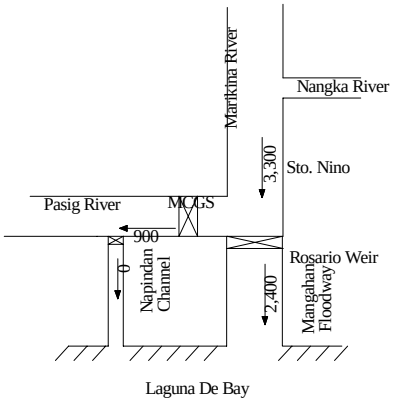
- May 8, 1980 — Start of Construction.
- Oct 1983 — Devaluation of the Peso. Prices of construction materials and labor rose too high to be offset by cost adjustments.
- Sep 1984 — Termination of works undertaken by contract. Thereafter, remaining works were implemented by administration/force account under PMO of DPWH.
- 1985 — Completion of Project.

Project Implementation Arrangements

- Project was implemented by the Department of Public Works and Highways (DPWH), Republic of the Philippines with Japanese financial assistance through OECF (presently JBIC).
- DPWH and NHA were jointly responsible for the relocation of about 450 informal dwellers in the project area to different relocation sites.

Project Scale

100-year return period flood of Marikina River.



Discharge Distribution

Project Works

FS/DE (Proposed)	Constructed
■ Mangahan Floodway Channel	■ Mangahan Floodway Channel
■ Rosario Weir (Fixed)	■ Rosario Weir (Full-Gated)
■ Ortigas Bridge (4-lane)	■ Ortigas Bridge (6-lane)
■ Marikina Control Gate Structure	■ Hydraulic test only. Indefinitely deferred due to its interruption to the navigation in Marikina River.
■ Link Road	■ Bank Road ■ Bypass & Access Roads

Project Works

- Mangahan Floodway Channel

Project Works

- Rosario Weir (Full-Gated)

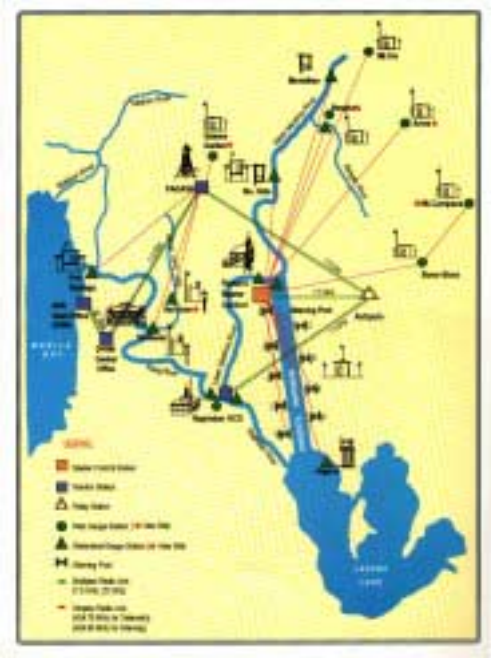
Project Costs

- P196.394 million – revised/updated cost (as of 31 Dec 1984)
- Y2,073 million allocated OECF funds
- P85 million local funds to complete remaining 25% works

Operations and Maintenance

- PMO of Mangahan Floodway Project DPWH-NCR operates & maintains Rosario Weir & Floodway.
- Gates of Rosario Weir are closed during non-flood periods except for maintenance purposes.

  Gates are opened to divert excess flood discharges of Pasig-Marikina River through the floodway to Laguna Lake.
- EFCOS (Effective Flood Control Operation System) was built up for an integrated operation.



EFFECTIVE FLOOD CONTROL OPERATION SYSTEM

Expanded System Configuration Through "Project for Rehabilitation of the Flood Control and Warning System in Metro Manila" under Japanese Grant-aid Program for EFCOS Project (OECF 11th Loan)

Project Benefits

- Economic Internal Rate of Return (EIRR) projected during the FS is about 20%.
- Although the utilization of Mangahan Floodway has been limited due to the deferment in the construction of MCGS:
  - ✓ Flood prone area has been reduced from about 94 km^2 without to about 81 km^2 with the floodway
  - ✓ Detailed design of Pasig-Marikina River Channel Project (2000 – 01) shows that Mangahan Floodway is still the most practical solution for flood control for Metro Manila.

Project Impacts

- Land Use and Poverty
  - ✓ The land use of the 13 km^2 previously flood prone area and now protected by the Project, is enhanced.
  - ✓ The reduction in the flood prone area can be translated to savings in the country's economy.
  - ✓ Land use in the vicinity of Mangahan Floodway and flood high risk areas has deteriorated.

- Before
- After

- Mangahan Floodway

- Informal Dwellers along Mangahan Floodway

The Project for Flood Mitigation in Ormoc City

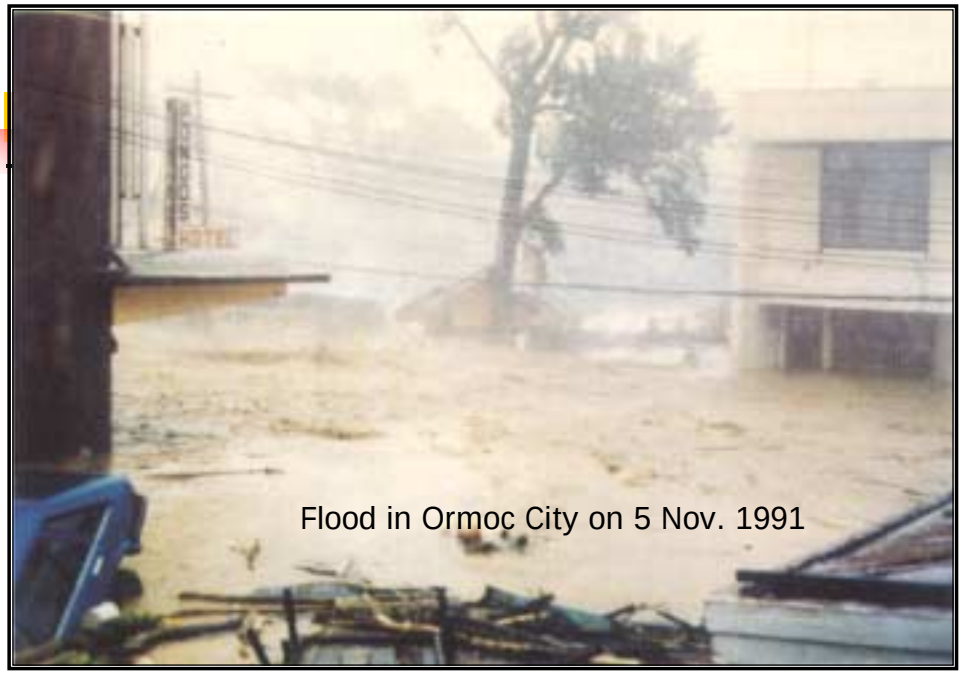
Leyte, Philippines

Location:

Philippines

Province of Leyte

- Ormoc City is situated between two rivers: Anilao River and Malbasag River.
- It was hit by typhoons with precipitation of more than 100 mm about ten times in ten years from 1982 to 1991.
- Typhoon Uring in November 1991 was the strongest and brought the most disastrous flood damage .



Flood in Ormoc City on 5 Nov. 1991

Logs with Flood Water on 5 Nov. 1991

After Flood in November 1991

Isla Verde in Ormoc City

Damage in 1991 Flood
(caused by Typhoon Uring)

- 4,922 deaths
- 3,000 missing
- 13,760 houses destroyed (2,850 totally & 10,910 partially)
- approx. 4% of population (129,200)
- about 3% of population (129,200)
- Approx. 55% of total houses (24,900)
- > P620 million worth of damage to properties and infrastructures.

Hence, the disaster was called “Ormoc Tragedy of 1991”

Objective

- To secure human lives and properties in Ormoc City from floods with magnitude of up to 50-year return period, and
- To conserve and improve the river environment of Anilao and Malbasag Rivers,

Project-Related Activities

1993-1994	Study on the Flood Control for Rivers in the Selected Urban Centers, conducted by JICA
1996-1997	Basic Design Study on Flood Mitigation Project in Ormoc City, conducted under Japan's Grant Aid System
1997-1998	Relocation and resettlement of 652 informal Settlers along the rivers
Mar. 1998 – Mar. 1999	Construction of Phase I, under financial assistance of the Government of Japan
Feb. 1999 – Aug. 2001	Construction of Phase II, under financial assistance of the Government of Japan

Project Implementation Arrangements

- Project was implemented by the DPWH acted as the principal and its Project Management Office for Major Flood Control Projects (PMO-MFCP) with the Japanese economic cooperation of grant aid executed by JICA.

- DPWH Region VIII, 4th LED and the Ormoc City Government assisted the PMO-MFCP as cooperating agencies.

Project Scale

The river improvement works are designed on the scale of a 50-year return period, the estimated magnitude of the November 1991 Flood. This corresponds to flow peak discharges of:

- 600 – 700 m^3/s in Anilao River, and

- 250 – 300 m^3/s in Malbasag River.

River Before Construction of Slit Dam

River After Construction of Slit Dam

Project Works

- Three Slit Dams

River Before Construction of Bridge

River After Construction of Bridge

Project Works

- Four New Bridges

Project Works

During Construction of Slope Protection

- Slope Protection
  Anilao River = 3,812m
  Malbasag = 3,640m

After Construction of Slope Protection

Project Works

During Construction of Hydraulic Drop

- Hydraulic Drops
  Anilao River = 3 places
  Malbasag = 5 places

After Construction of Hydraulic Drop

Project Works

During Construction of
Pipe Culvert

- Culverts
  Anilao River = 15 places
  Malbasag = 17 places

During Construction of
Box Culvert

Project Works and Costs

Phase I

- Slit Dams
- Bridges

Japanese Grant
1,111 million Yen about
317 million Pesos
ROW Acquisition
53 million Pesos

Phase II

- Slope Protection
- Hydraulic Drops
- Drainage Works
- Bridge Repairs
- Maintenance Road

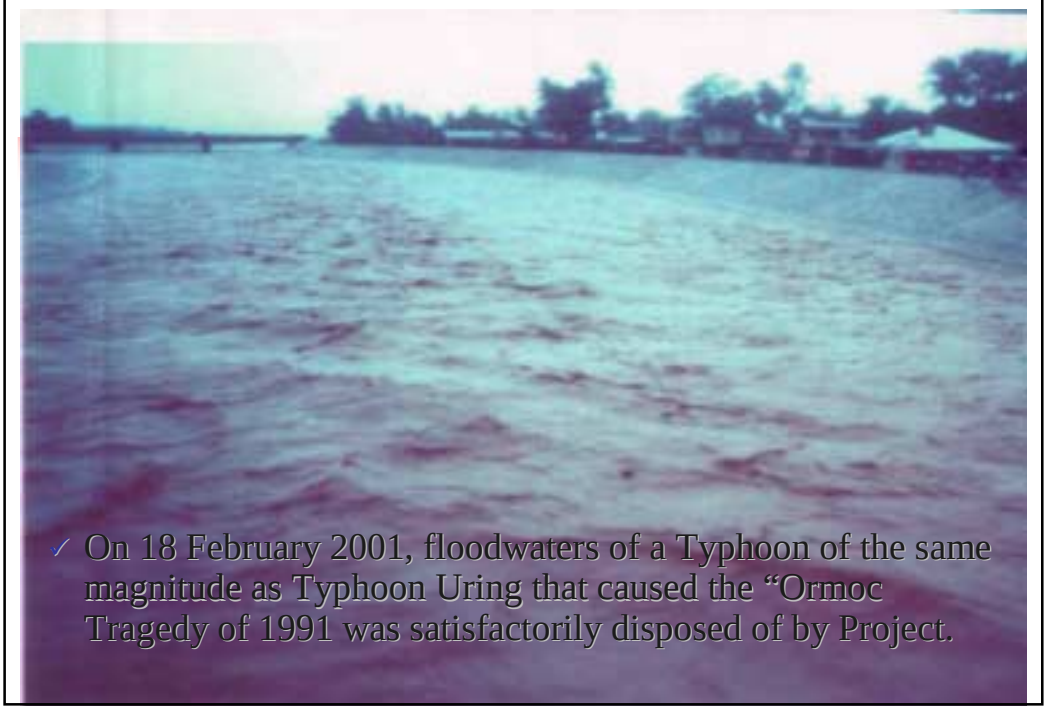
Japanese Grant
2,144 million Yen about
613 million Pesos
ROW Acquisition
230 million Pesos

Operations and Maintenance

- A Flood Mitigation Committee was organized to include the City, Barangay, NGOs, DPWH-4th LED and DPWH-PMO-MFCP.
- Actual operations and maintenance is done by the Technical/Monitoring Section of the OCE.
  - ✓ Vegetation Control;
  - ✓ Removal and disposal of garbage;
  - ✓ Declogging of lined canals and culverts;
  - ✓ Repair/restoration/replacement of flood control facilities, roads and bridges.
- Budget for 2002 is P2 million.

Project Benefits

- Economic Internal Rate of Return (EIRR) = 23%
- The Project appears to be attaining its objectives:
  - ✓ The flood control structures provided the necessary assurance as a mitigating measure to protect human lives and properties.
  - ✓ The locals developed an integrated approach about keeping the rivers clean.



- On 18 February 2001, floodwaters of a Typhoon of the same magnitude as Typhoon Uring that caused the "Ormoc Tragedy of 1991 was satisfactorily disposed of by Project.

Project Impacts

- Improvements in the socio-economic conditions of the area:
  - After 2000, population has increased by 7%. This is higher than provincial growth rate of 5%.
  - Number of financing institutions increased from 15 (in 1997) to 58 (in 2000) signifying the availability of credit and investment for economic endeavors.
  - With the Project, the four major bridges and the approach roads along the riverbanks have made the City easier access throughout.

Project Impacts

- Improvements in the socio-economic conditions of the area:
  - ✓ As a % of total family income, expenses in household furnishing and equipment reduced from 3.3% in 1997 to 2.5% in 2000.
  - ✓ The land use in the area has been enhanced and LGU plans are being followed.
    - To date, three resettlement barangays have been added to the original five.
    - Despite some inconveniences in resettlement area, the greater good of the City prevails.

Resettlement Area in Barangay Lao

Concluding Statements

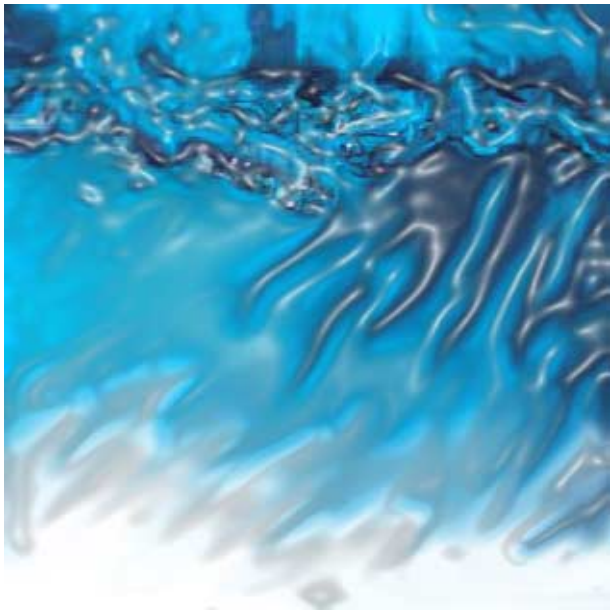
- It is the consensus among the urban residents that if the Projects were not implemented, another destruction could have happened during heavy rains.
- The Projects are typical cases of being demand driven; that people clamor for it. The early involvement of people in realizing the need for structures and the benefit that go with it is imperative.
- All indications lead to the conclusion that sustaining the above initiatives can lead to optimum development for the area, as it radiates its effects to the region and the national economy.

洪水と貧困（マニラ）Session 2-2

Development of the Brantas River Basin East Java Province the Republic of Indonesia

A. Rusfandi Usman

Former President Director of Jasa Tirta I Public Corporation
Lecturer on Faculty of Engineering, Brawijaya University, Indonesia



第 2 次水資源プロジェクト研究計画調査

DEVELOPMENT OF THE BRANTAS RIVER BASIN EAST JAVA PROVINCE THE REPUBLIC OF INDONESIA

By
A. RUSFANDI USMAN

- Former President Director of Jasa Tirta I Public Corporation
- Lecturer on Faculty of Engineering, Brawijaya University, Indonesia

DEVELOPMENT OF THE BRANTAS RIVER BASIN EAST JAVA PROVINCE THE REPUBLIC OF INDONESIA

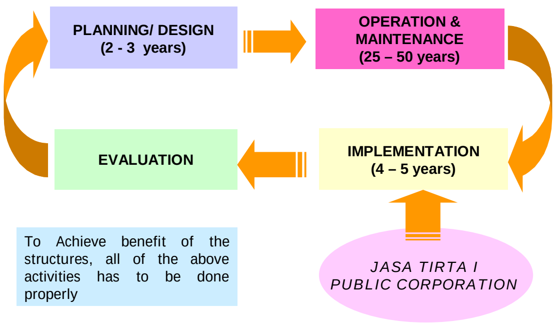
MAP OF INDONESIA

BECAUSE OF UNEQUAL DISTRIBUTION OF RAINFALL AND POPULATION IN THE COUNTRY CAUSES WATER CRISIS AT VARIOUS EXTENTS, ESPECIALLY IN DENSELY POPULATED AREA SUCH AS JAVA ISLAND. FOR EXAMPLE WATER AVAILABILITY INDEX (WAI) JAVA ISLAND IS 1.8 COMPARED TO WEST PAPUA 250. WORLD'S AVERAGE WAI IS 7.8).

BRANTAS RIVER BASIN

DEVELOPMENT OF BRANTAS RIVER STARTED IN 1961. UP TO YR 2003 SEVERAL INFRASTRUCTURES HAVE BEEN FINISHED ARE: 7 BIG DAMS, 15 BARRAGES, HYDROPOWER STATION, RIVER NORMALIZATION, ETC. THE PROBLEM AFTER PROJECT IS SHORTAGE OF BUDGET, PROFESSIONAL STAFF AND INSTITUTION. TO OVERCOME THE PROBLEM, IN YR 1990 JASA TIRTA PUBLIC CORPORATION WAS ESTABLISHED TO MANAGE BRANTAS RIVER BASIN.

DEVELOPMENT CYCLE



DEVELOPMENT CYCLES IS SERIES OF ACTIVITIES TO DEVELOP POTENTIAL OF WATER RESOURCES. TO GET OPTIMUM BENEFIT OF THE STRUCTURES ALL OF THE ACTIVITIES HAS TO BE DONE PROPERLY.

THE WEAKNESS OF WATER RESOURCES DEVELOPMENT IS ON THE O&M ACTIVITY. IN GENERAL WHEN STRUCTURES HAS BEEN CONSTRUCTED (PROJECT HAS BEEN FINISHED), MOST OF THE PROJECT'S STAFF MOVE TO OTHER PROJECT, ONLY A LITTLE STAFF REMAIN ON THE PROJECT SITE WITHOUT ENOUGH BUDGET FOR O&M. THEN IN SEVERAL YEARS THE FUNCTION OF STRUCTURES DECREASES.

IN BRANTAS RIVER BASIN TO OVERCOME LACK OF O&M, CORPORATION WAS ESTABLISHED ON YEAR 1990, NAMELY JASA TIRTA PUBLIC CORPORATION (PJT-I), BY THE MAIN TASK IS RESOURCES MANAGEMENT INCLUDING O&M OF INFRASTRUCTURES BY BASIC CONCEPT "**ONE RIVER, ONE PLAN, ONE COORDINATED MANAGEMENT**".

STUCTURES FINISHED

MASTER PLAN	OBJECTIVES	STRUCTURES FINISHED
MASTER PLAN I ([illegible])	FLOOD CONTROL; IRRIGATION; HYDROPOWER DEVELOPMENT; WATER SUPPLY (DOMESTIC & INDUSTRIES)	[illegible]
MASTER PLAN II ([illegible])	IRRIGATION; FLOOD CONTROL; HYDROPOWER DEVELOPMENT; WATER SUPPLY (DOMESTIC & INDUSTRIES)	[illegible]
MASTER PLAN III ([illegible])	WATER SUPPLY (DOMESTIC & INDUSTRIES); IRRIGATION; HYDROPOWER; FLOOD CONTROL	[illegible]
MASTER PLAN IV ([illegible])	WATER RESOURCES CONSER-VATION & MANAGEMENT	[illegible] MANAGEMENT

[illegible]

MONITORING STATIONS ON THE OUTLET OF INDUSTRIES

1									
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20									


Domestic Waste


Industrial Waste


Water Sampling


Laboratory test

SOURCE OF POLLUTANT


Informal Leader


KFT 2


Student


Young Generation

CLEAN RIVER PROGRAM CAMPAIGN

CONCLUSION

1. DEVELOPMENT OF THE BRANTAS RIVER HAD BEEN STARTED ON 1901
2. A SERIES OF MASTER PLAN (1901, 1973, 1985, 1996) HAD BEEN PREPARED AS GUIDELINE TO OVERCOME THE PROBLEMS ON THE BASIN.
3. THE VISION OF THE FOUNDING FATHERS OF BRANTAS PROJECT IS THAT IN PARALLEL BUILDING DAM ALSO BUILDING PEOPLE, SO THAT IN THE FUTURE INDONESIAN ENGINEERS CAPABLE TO BUILD DAM BY THEMSELVES.
4. ORGANIZATION SYSTEM, DESIGN AND CONSTRUCTION SYSTEM HAD BEEN IMPROVED INTENSIVELY, TIME TO TIME. IMPROVEMENT OF EDUCATION LEVEL (IN THE COUNTRY OR ABROAD), SKILL LABOURS (TECHNICAL AND NON TECHNICAL) HAS ALSO A PRIORITY.
5. A MODEL OF BRANTAS RIVER BASIN MANAGEMENT (BRBM) IS RECOMMENDED BY GOI AND APPROVED BY IMF TO BE IMPLEMENTED TO OTHER RIVERS IN INDONESIA.
6. PJT-I HAD BEEN INVITED BY RIVER BASIN ORGANIZATION IN THE DEVELOPING COUNTRIES (SOME OF THEM VISITED PJT-I) TO PRESENT THE BRBM (VIETNAM, MALAYSIA, SOUTH AFRICA, BOSNIA & HERZEGOVINA, SRI LANKA, ETHIOPIA). THEY INTEND TO IMPLEMENT SIMILAR ORGANIZATION AS BRBM.

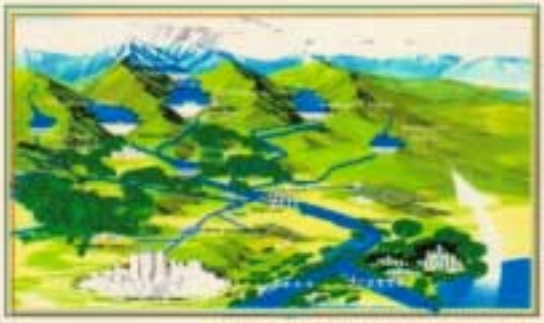


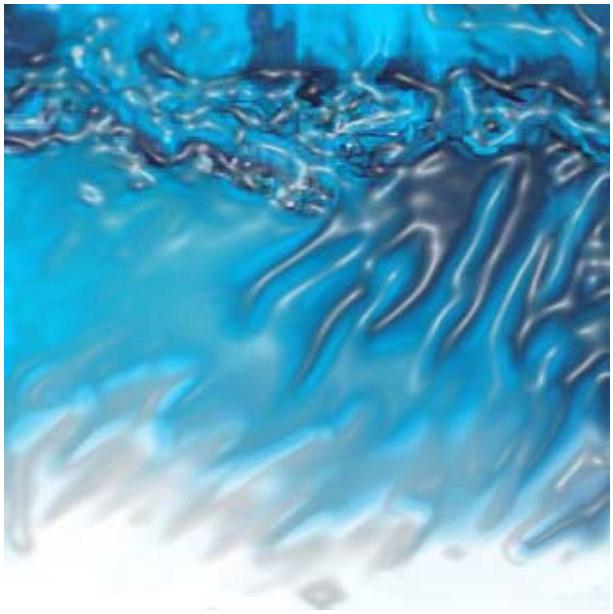
ILLUSTRATION OF THE BRANTAS RIVER BASIN (2001)

洪水と貧困（マニラ）Session 2-3

Riverbank Protection in the Lao PDR

Bounthieng VENVONGSOTH

Inland Waterway Administration Division, Department of Roads,
Ministry of Communication, Transport, Post and Construction,
Lao PDR



第 2 次水資源プロジェクト研究計画調査

Regional Consultation Workshop on "Poverty and Floods"
Manila Philippines, 17-18 October 2002

Riverbank Protection in the Lao PDR

Bounthieng VENVONGSOTH

Hydraulic Engineer

Inland Waterway Administration Division, Department of Roads

Ministry of Communication, Transport, Post and Construction
Lao PDR

Contents

I . Introduction

II . River Bank Erosion

III . River Bank Protection

IV. Conclusion

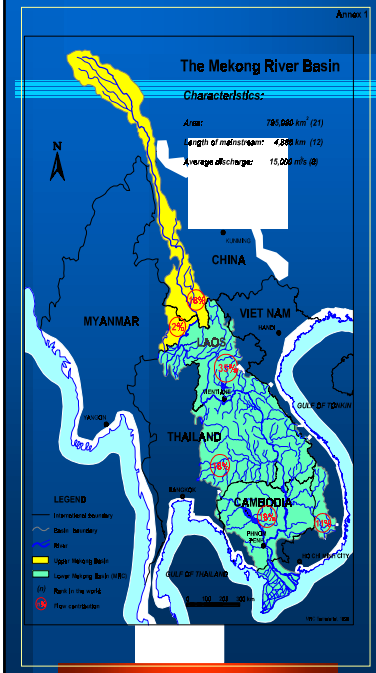
I . INTRODUCTION

- **Location**: A landlocked country in South East Asia, sharing its border with China, Myanmar, Thailand, Cambodia and Vietnam.
- **Total Area**: 236,800 sq.km.
- **Population**: 5.2 million (in 2000)
- **Per Capita GDP** :329US$ (in 2001), The growth rate is 5.7% from 1990 to 2001.
- **Infant Mortality Rate:** 8.2% (in 2000)
- **Under-5 Mortality Rate:** 10.6% (in 2000)

About 40% of the population lives in poverty.

One of the poorest countries in the world

THE MEKONG RIVER



The Mekong River is the largest river in South East Asia.

-It runs through six riparian countries in the basin: China, Myanmar,Lao PDR, Thailand, Cambodia and Vietnam

-The total length is approximately 4,800 km

-The basin area is approximately 795,500km2

The Mekong River Basin is of great importance to the Lao PDR.

In six riparian countries,

-The Lao PDR has the largest area of the Mekong River Basin (about 25% of the total basin area).

-The Lao PDR provides the Mekong River with the largest flow (about 35% of the total flow).

-The Lao PDR has the second greatest length of the Mekong River (about 1,700km).

II. RIVERBANK EROSION

- The Lao PDR has been suffering from damage caused by riverbank erosion.

- The damage extends to the urban lands, houses,electric cables, agricultural lands, roads, etc.

- Poor people are the main victims of the riverbank erosion.

- Riverbank erosion is the most serious constraint on poverty reduction and socio-economic development in the Lao PDR.

Houses being damaged by riverbank erosion in Vientiane Municipality

Serious riverbank erosion in Bokeo Province

(August 28 2002)

A factory destroyed by riverbank erosion

A road destroyed by riverbank erosion

III . **RIVER BANK PROTECTION**

1. Past Activities

- The government of Lao PDR (GOL) has executed riverbank protection works mainly with gabions.

- Even gabion works are expensive for the Lao PDR, because iron mesh baskets must be imported.

- The budget of the GOL for riverbank protection is about US$ 100,000 / year. With this budget, only about 60m can be protected in a year, if we use gabion.

- The use of gabions is not a sustainable riverbank protection method for poor countries such as the Lao PDR.

Past Riverbank Protection Works with Gabions

2. TRANSFER OF RIVERBANK PROTECTION TECHNIQUES FROM JAPAN

• The GOL has been introducing riverbank protection techniques using natural materials through the following projects.

(1) Groyne Construction in Bokeo Province with a JICA Expert's Technical Advice

(2) Experimental Work Using "SODA" (Fascine) Mattress by the Ministry of Land, Infrastructure and Transport of Japan and the Infrastructure Development Institute of Japan

(3) JICA Development Survey on Mekong Riverbank Protection around Vientiane Municipality

• These techniques are effective, environment-friendly and low cost, because the necessary materials can be secured in the country.

• Therefore these techniques can be sustainable for poor countries such as the Lao PDR.

(1) Groyne Construction in Bokeo Province (Northern Part of Lao PDR) with a JICA Expert's Technical Advice

- Very effective for the riverbank protection
  Slowing the river current and promote sedimentation along the riverbank.
- Low cost
  About 500US$/m, almost ¼ of the cost of gabion works

(2) Experimental Work using "SODA" (Fascine) mattress

- Implemented by the Ministry on Land, Infrastructure and Transport of Japan and the Infrastructure Development Institute of Japan in 2001

- The effectiveness of "SODA"mattress for the protection of the Mekong riverbank has been proved.

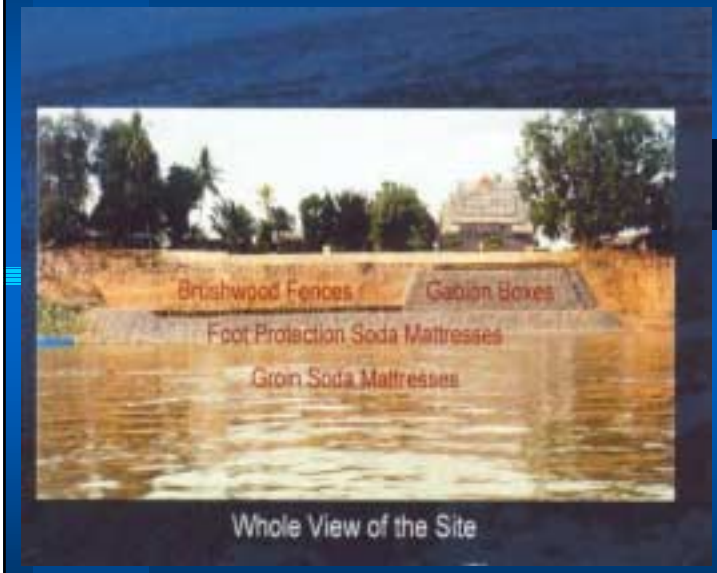
- If this work was implemented by a Lao local company, the cost would be almost half of gabion works

Constructing “SODA” Mattress

Installing “SODA” Mattress

Covering the “SODA” Mattress with Stones

Completion of the Experimental Work using "SODA" Mattress (80 m)



(3) JICA Development survey on Mekong riverbank protection around Vientiane Municipality.

The Japan International Cooperation Agency (JICA) has started its development survey on "Mekong riverbank protection around the Vientiane Municipality" in 2001.

The Objectives of the survey

1. To study practical , low cost and sustainable riverbank protection works for the Lao PDR.
2. To transfer such techniques to the Lao PDR through 3 pilot works.
3. To formulate a master plan for the Mekong riverbank protection around Vientiane Municipality, based on the monitoring of the pilot works.

3 Pilot Works

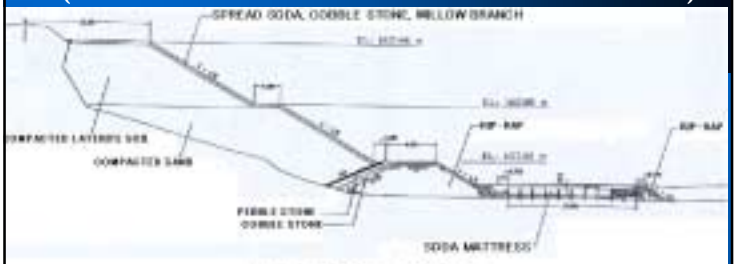
Sites	Length	Techniques
Ban Dongphosi	648m	Cobble stone with willow Branch work and"SODA"mattress
Wat Chom Cheng	240m	Wooden pile dike groin work with "SODA"mattress
Wat Sibounhuang	150m	Cobble stone with willow Branch work and"SODA"mattress

Ban Dongphosi

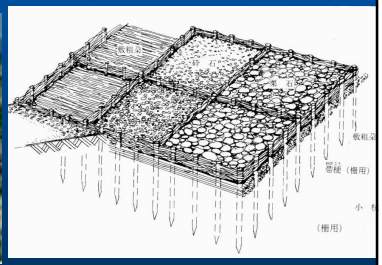
Present Situation

Ban Dongphosi

(Cobble stone with willow Branch work and"SODA"mattress)



Typical Cross Section



Image

If gabions are used here, the cost will be almost 1.5 times as big as this work.

Wat Chom Cheng

Present Situation

Wat Chom Cheng

(Wooden pile dike groin work with "SODA"mattress)

Typical Cross Section

Image

If gabions are used here, the cost will be almost 7 times as big as this work.

Wat Shibounhuang

Present Situation

Wat Shibounhuang

(Cobble stone with willow Branch work and"SODA"mattress)

Typical Cross Section

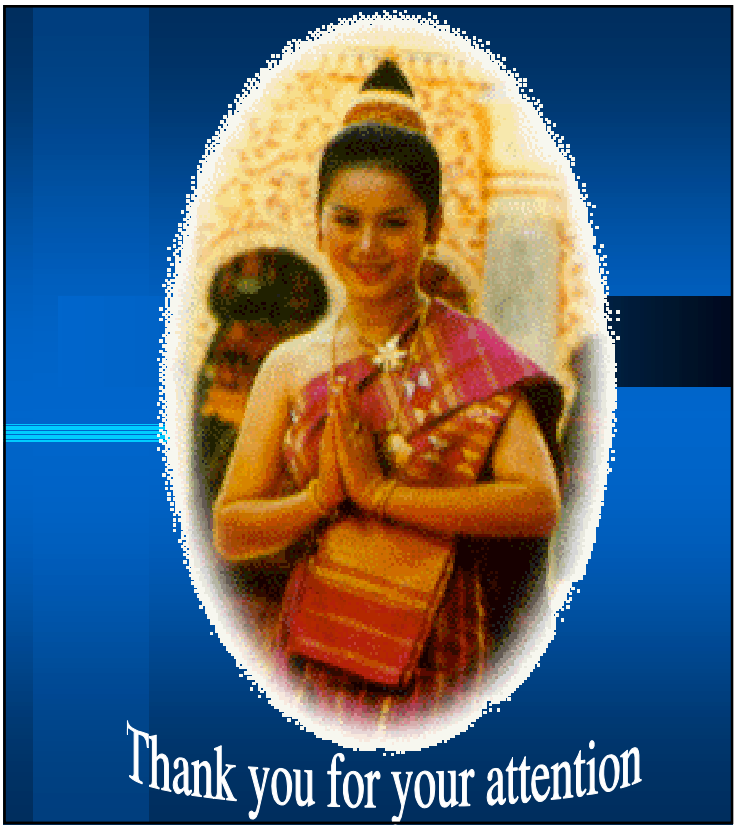
Image

If gabions are used here, the cost will be almost twice as big as this work.

IV . CONCLUSION

- In poor countries such as the Lao PDR effective and low cost riverbank protection techniques are absolutely necessary to protect poor people's lives and property.

- After the on going JICA development survey has finished in march of 2005, The GOL will independently use and disseminate the transferred the techniques for poverty reduction and socio-economic development in the Lao PDR.

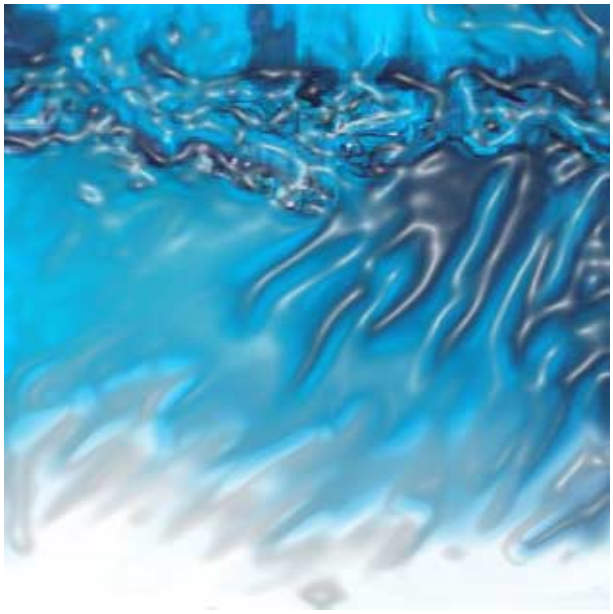

Thank you for your attention

洪水と貧困（マニラ）Session 2-5

Flood Control Projects Contribution to Basin Development in Japan

Toshihiro Sonoda

Ministry of Land, Infrastructure and Transport
Japan



第 2 次水資源プロジェクト研究計画調査

Flood Control Projects Contribution to Basin Development in Japan

Toshihiro Sonoda

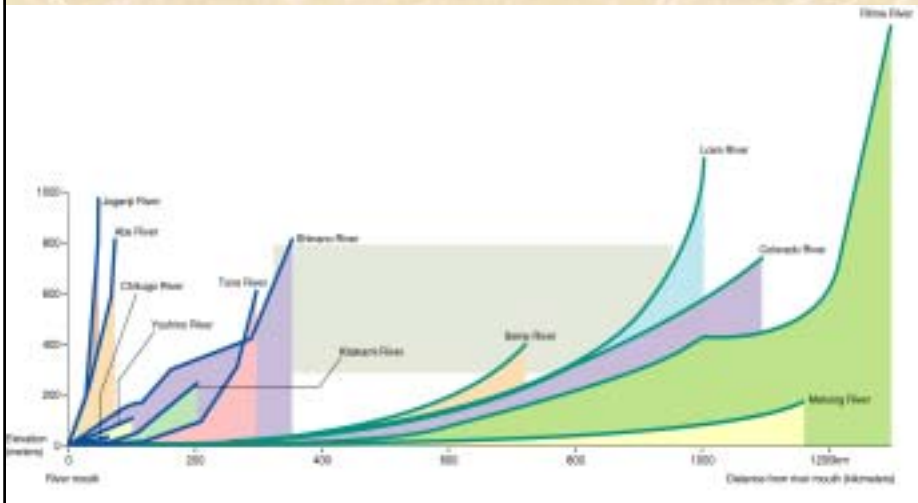
Ministry of Land, Infrastructure and Transport Japan

Maps of Japan

Maps of Rivers in Japan

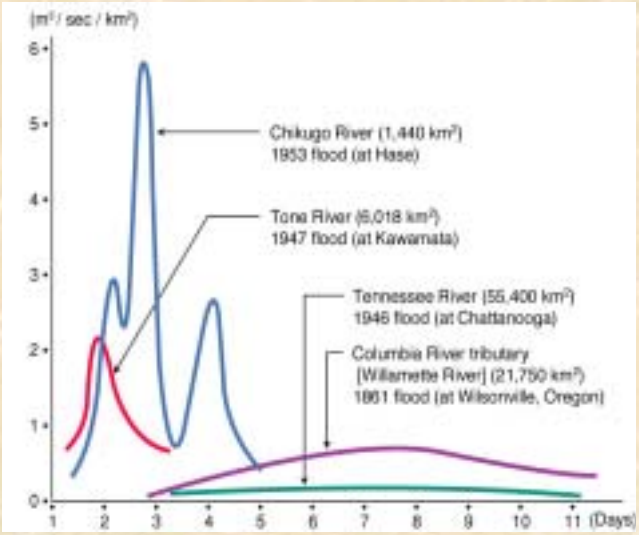
Characteristic of Rivers in Japan

Rivers in Japan flow directly from mountain to sea.
This comparison with selected rivers shows how precipitously they flow.



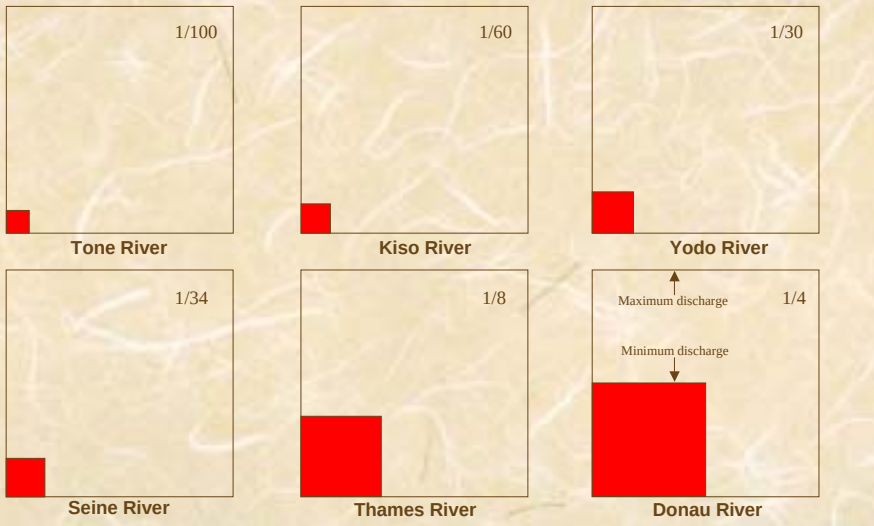
Characteristic of Rivers in Japan

Floods in Japan act like sprinters: short and quick.



Characteristic of Rivers in Japan

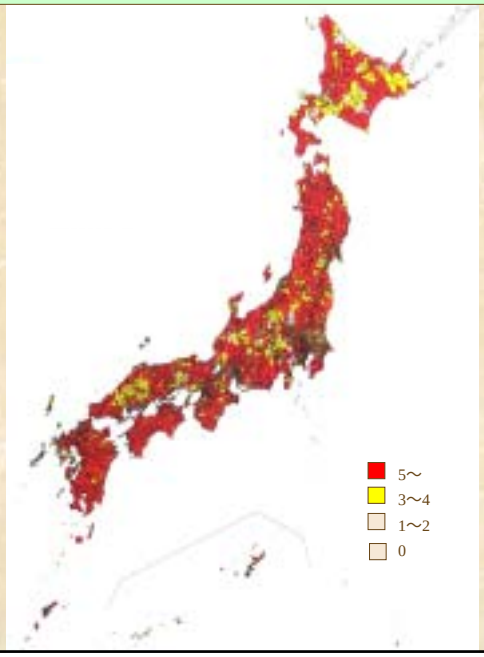
Rivers in Japan are characterized by a large difference between flood flow and normal flow. Floods suddenly occur and also recede soon.



Sources : Based on *Streamflow Yearbook 1984-1993*(domestic data) ; *Water Resources in Japan 1995*(overseas data)

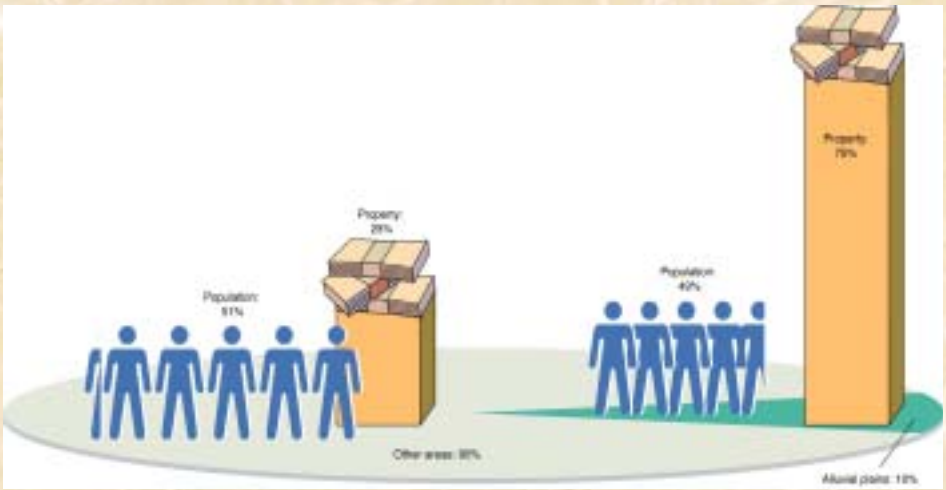
Annual frequency of flood and sediment damage

(1990 ～ 1999)

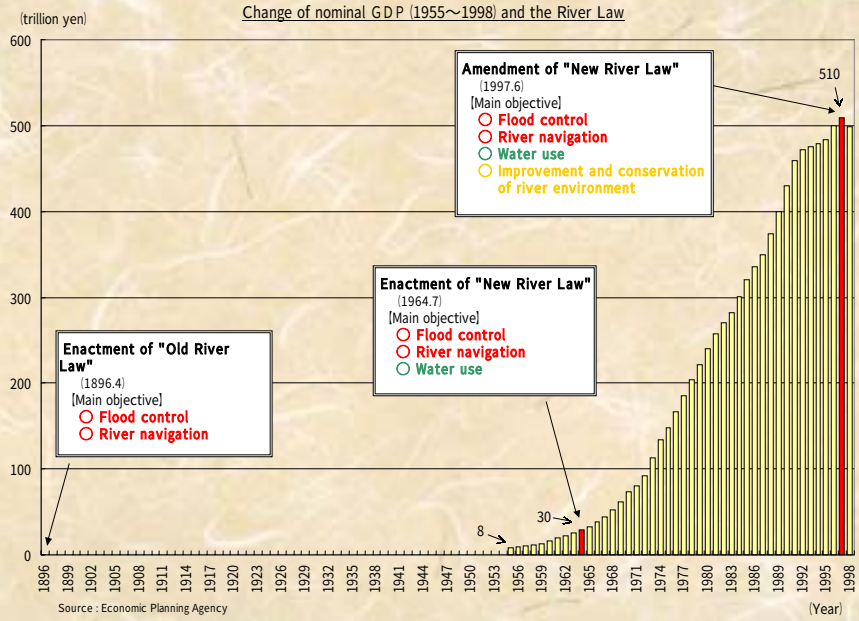


Concentration of population and property on alluvial plains

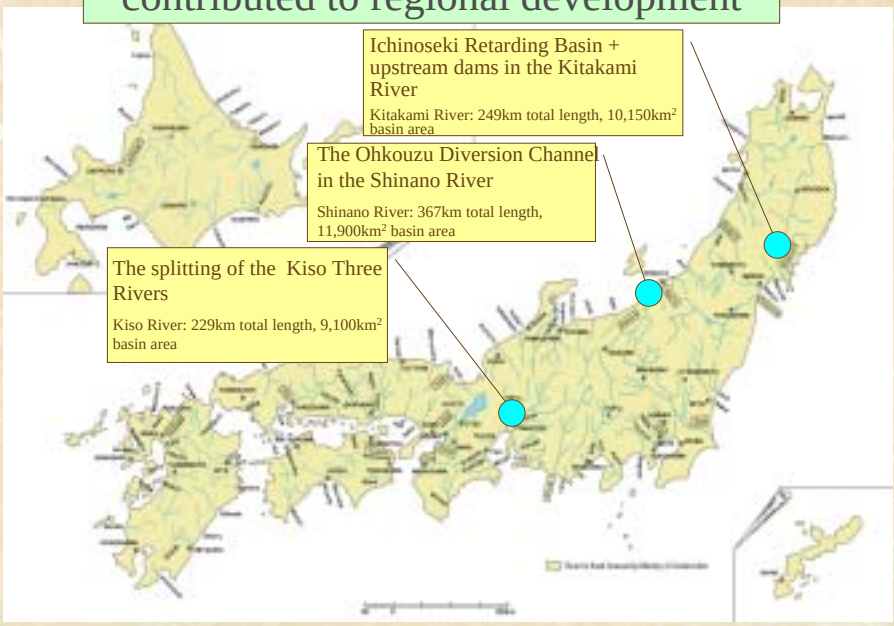
Japanese cities are quite susceptible to floods. Most population and property, and therefore most flood damage concentrate on alluvial plains.



Change of nominal GDP and the River Law



Major flood control projects that contributed to regional development



Ichinoseki Retarding Baisn + upstream dams

Ichinoseki district

A 28km-long narrow in the downstream area caused frequent flooding.

Typhoon Katherine (9/1947) and Typhoon Ione (9/1948) caused serious damage in the City of Ichinoseki.

- Dead or missing 573
- Washed-away houses 599
- Partially/completely destroyed houses 2,154
- Flooded farmland 3,078ha

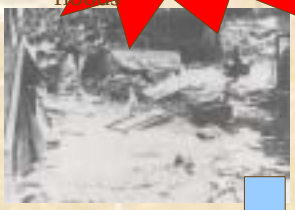
Distribution of the flood water to the entire basin

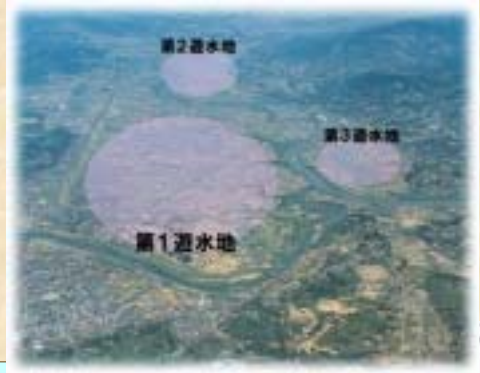
- Upstream basin → damming
- Middle basin → retarding basins

(Ichinoseki Retarding Basin)

Ichinoseki Retarding Basin

A narrow of as long as 28km causes frequent floods





Ichinoseki Retarding Basin

Double embankment consisting of the encircling and the lower embankments

Encircling embankment: protecting the urban area from floods

Lower embankment: preventing mid to small-scale flooding for enhanced water control

Three retarding basins built on rice paddy field

Flood control effects of the Ichinoseki Retarding Basin + upstream dams

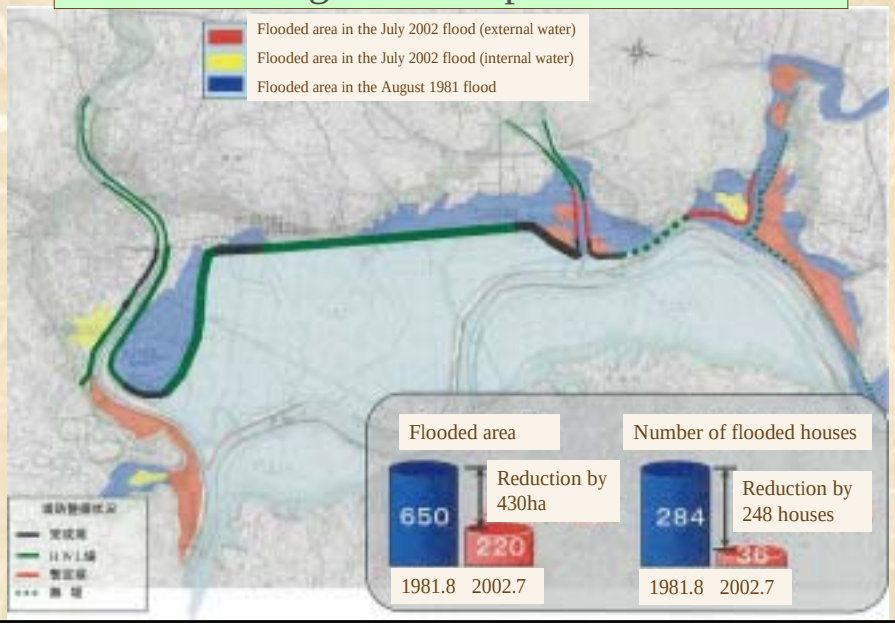
【The flood in August 1981 (before the encircling embankment)】

Reduction in the size of the flooded area

【The flood in July 2002 (after the encircling embankment)】

Shijushida Dam, controlling flood water

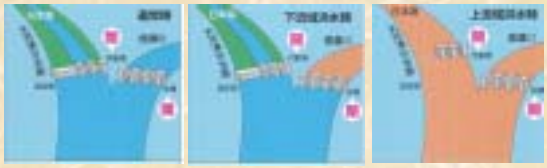
Flood control effects of the Ichinoseki Retarding Basin + upstream dams

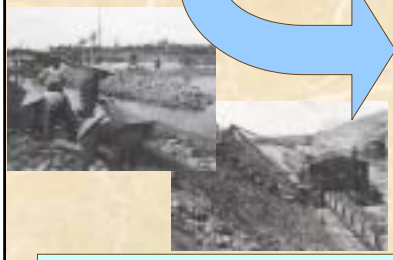


Ohkouzu Diversion Channel

The Echigo Plains suffered devastating damage from frequent flooding

The Mainstream Weir and the Deversion Channel Weir jointly control the flow of the Shinano River

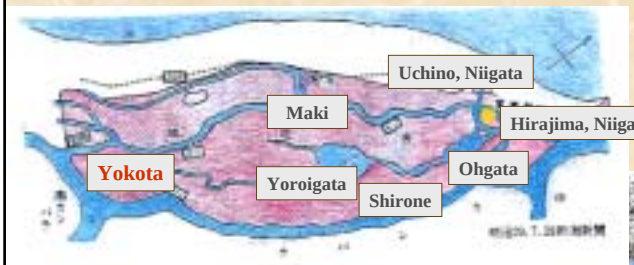




Construction of the Ohkouzu Diversion Channel to allow excessive water to directly flow to the sea

Economic effects of the Ohkouzu Diversion Channel

The Okouzu Diversion Channel reduced floods to almost zero from the average frequency of once 3-4 years, allowing remarkable development in the Echigo Plains



If there had not been for the Ohkouzu Channel…

Prefectural roads

Flooded area

Damage from 1896's Yokota Embankment Burst
Total damage ¥12.31 million
(roughly equivalent to current ¥44.6 billion)

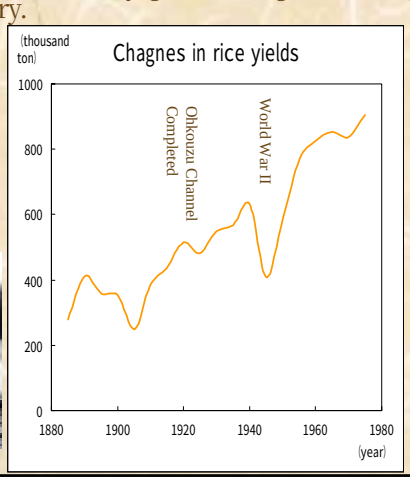
Assumed affected area calculated by the simulation of 1982's flood

Damage of ¥1 trillion !
Approx 250,000 victims
Flooded area of 448km2

The effects of the Ohkouzu Diversion Channel on agriculture land development

The establishment of the Ohkouzu Diversion Channel resulted in the protection of the Echigo Plains from floods and in land improvement enabled by drainage, gradually turning poorly drained rice paddy fields into well-drained ones.
With mechanization enabled by good drainage, the Echigo Plains have become Japan's top granary.

(thousand ton)

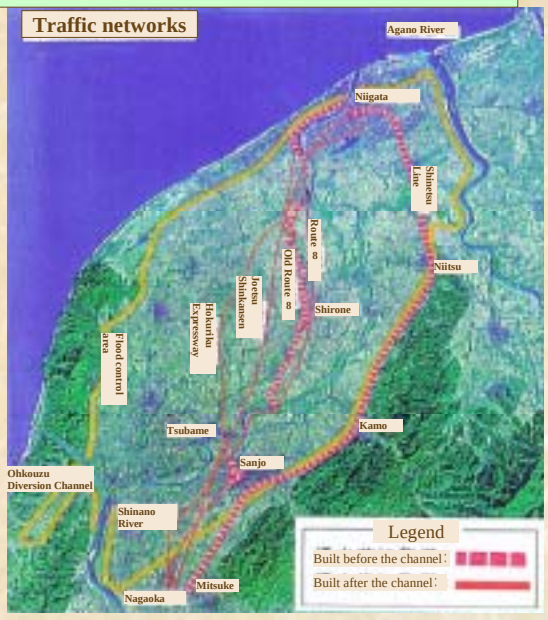


The effects of the Ohkouzu Diversion Channel on traffic networks

Before the Ohkouzu Channel
Before the channel was built, major traffic networks were constructed avoiding potential areas of flooding. For example, railroads were built on solid ground along mountains and national roads on embankments.

After the Ohkouzu Channel
Today, railroads, expressways, national roads, etc. can be built across the Echigo Plains in the shortest distance, largely contributing to the area's growth.

Landsat picture taken in November 1993



Splitting the Kiso Three Rivers

The influx of the flood water in the Kiso River to the Nagara and Ibi Rivers lengthened flooding.

Splitting of the Kiso Three Rivers (Ibi, Nagara, Kiso)

Splitting the Kiso Three Rivers

Dike

Dredging

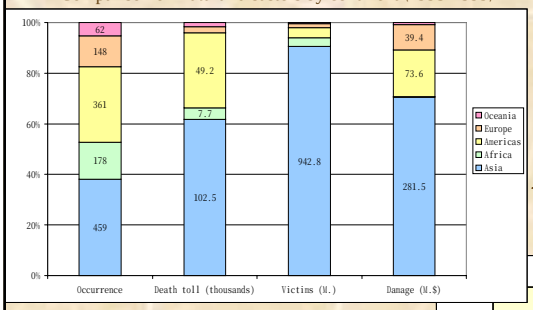
Other flood control projects conducted include groins, embankments, encircling embankments.

The scale of damage significantly shrank when comparing a decade before 1900 with a decade after 1900.

Death toll	316 → 10 people
Injured	732 → 16 people
Destroyed houses	15,436 → 314
Affected crops	¥13.52M → ¥3.18M
Embankment bursts	1,821 → 228

Increasing Flood Damage in the Asian Region

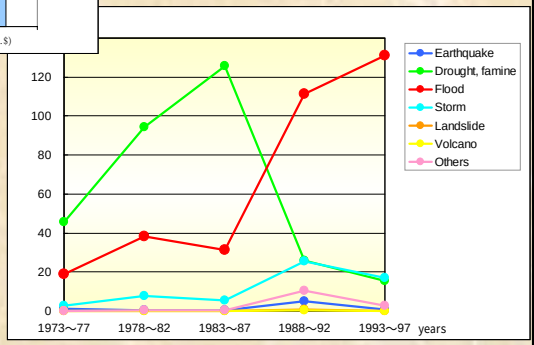
Comparison of natural disasters by continent (1995-1999)



The Asian region accounts for the largest part of the world's natural disasters.

Source: Cabinet Office, The 2002 Issue of Disaster Prevention White Paper

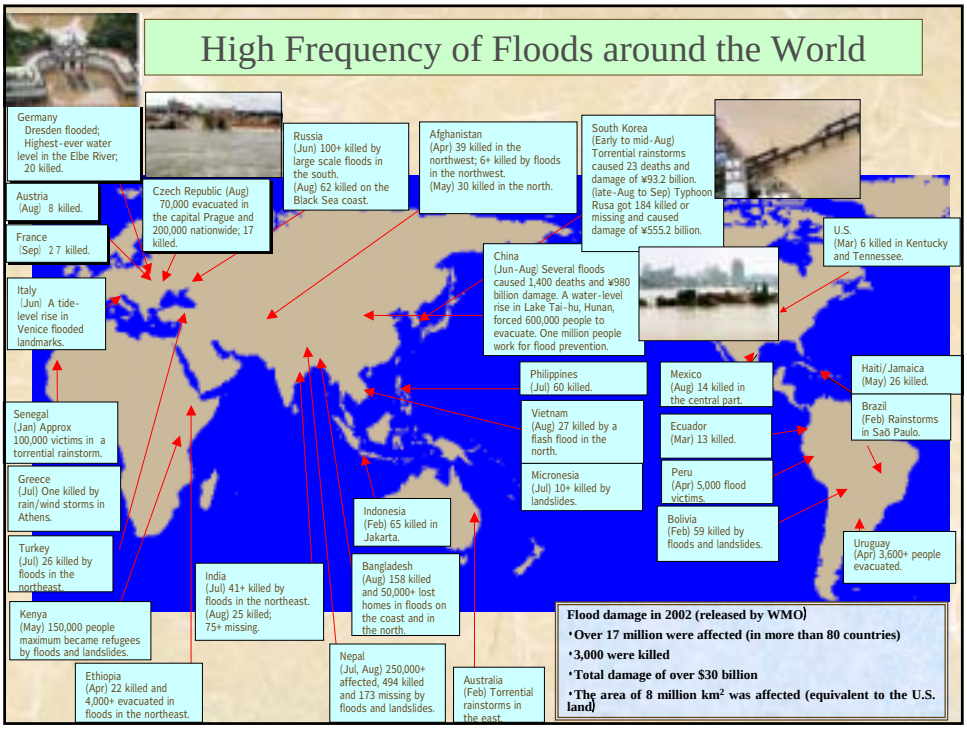
Changes in average number of annual victims by natural disaster type



Flood victims have made a sharp increase for the past 20 years to become the largest group among natural disasters

Source: World Disaster Report 1999

High Frequency of Floods around the World



Conclusion

・The flood, as the most damaging natural disaster, is an important problem to be solved to ensure sustainable development.

・Well-planned and continuous flood control activity is base of regional development.

・Appropriately selecting and combining structural measures (river improvement, damming, retarding basins, channel, etc.) in accordance with environmental/social conditions in each basin is important.

・Creation of a global network is crucial to address worldwide flood problems.

洪水と貧困（マニラ）Session 2-6

Effort in Eradicating Poverty, River, Stormwater Management and Flooding Issues in Malaysia

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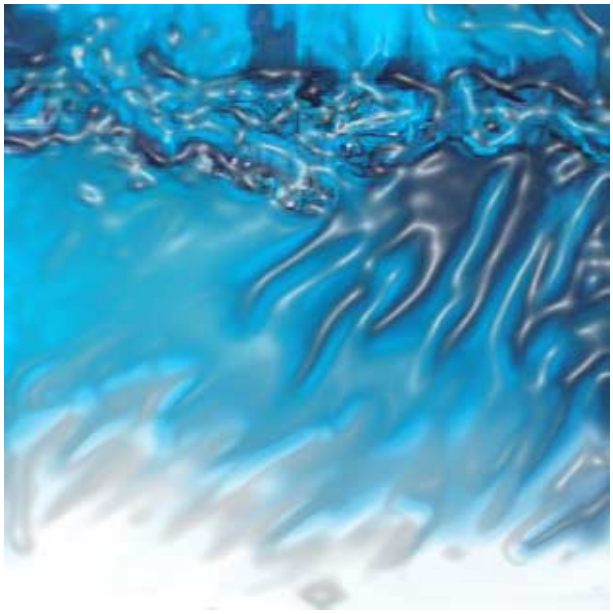

第 2 次水資源プロジェクト研究計画調査

REGIONAL CONSULTATION WORKSHOP ON POVERTY AND FLOODS FOR THIRD WORLD WATER FORUM

Manila, Philippines, Oct. 17 – 19, 2002

EFFORT IN ERADICATING POVERTY, RIVER, STORMWATER MANAGEMENT AND FLOODING ISSUES IN MALAYSIA

by

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http://agrolink.moa.my/did/

INTRODUCTION

- In Malaysia, flooding occur frequently in urban and rural areas due to heavy rainfall and monsoon rainfall causing damages to agricultural areas, property, public utilities, etc.
- People have to be evacuated, road closed, sometime causing death.
- However, poverty has not been associated with flooding.
- Malaysia does not experiences typhoon, earthquake.
- There are many policies, strategies and implementation programs to generate economic growth, increase standard of living, combat poverty, etc.

INTRODUCTION

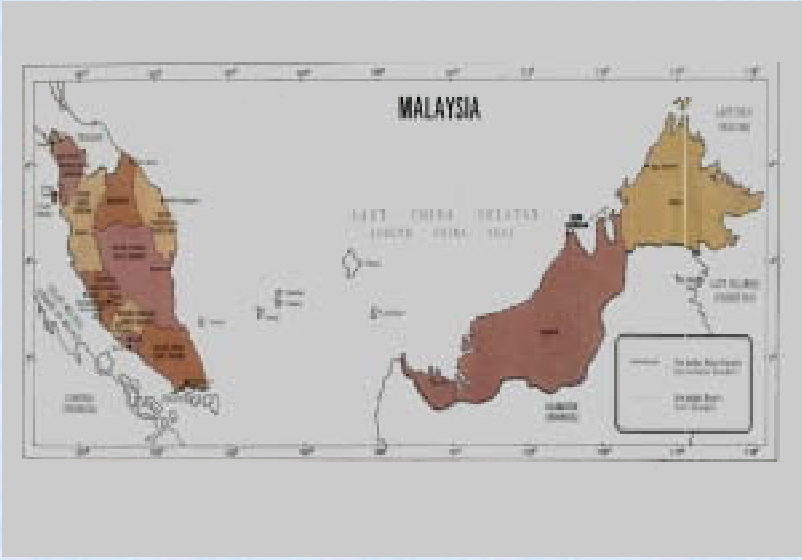
- This paper/presentation includes:
  - Poverty issues and measures
  - Development policies
  - Policies and strategies in eradicating squatters
  - Management of flood and other disaster relief aid
  - River management
  - Flooding issues
  - Urban stormwater management practices
  - Bilateral relationship between Malaysia (DID) with Japan (JICA)

INTRODUCTION

- **Land area**
  - Total area 330,242 sq. km
  - Peninsular Malaysia (131,703 sq. km), Sabah (74,089sq. km), Sarawak (124,450 sq. km)
  - Divided into states (13 states in Peninsular Malaysia) and sub-divided into administrative districts (Peninsular Malaysia – 82 districts plus Kuala Lumpur and Putrajaya, Sabah – 24 districts, Sarawak – 29 districts)

Location of Malaysia in the South-East Asia region

The states in Malaysia



INTRODUCTION

- **Population**:
- In year 1991 – 18,379,700; year 2000 – 23,274,700 (51% male, 49% female); year 2001 – 23.8 million; year 2002(mid-year estimate) – 24.37 million, Malaysian citizen – 23,076,800 (94.7%), non-Malaysian citizen – 1,297,300 (5.3%)
- Density of population 71 people per km
- Annual population growth rate 2.4%
- Consist of mixed ethnic groups Bumiputera (Malays and other Bumiputera) (65.1%), Non-Bumiputera (Chinese (26%), Indians (7.7%), Others (1.2%))
- In 1991, 51% live in urban area
- In 2000, 62% live in urban area, an increase of 11% over 9 year period

INTRODUCTION

- **Employment, household income and expenditure**
  - For year 2001: The total labour force – 9,892,100; number employed – 9,535,000; number unemployed – 357,100; unemployment rate – 3.6%

INTRODUCTION

- **Employment, household income and expenditure**
  - Employment by sector from 1996 to 2000

INTRODUCTION

- **Employment, household income and expenditure**
  - The mean monthly gross household income by stratum for 1995, 1997, 1999

Stratum	Mean Monthly Household Income (RM)			Average Annual Growth Rate (%)
	1995	1997	1999	1995 - 1999
MALAYSIA	2,020	2,606	2,472	5.2
Urban	2,589	3,357	3,103	4.6
Rural	1,326	1,704	1,718	6.7

  - Average monthly expenditure per household by stratum,1993/94 and 1998/99

	Total		Urban		Rural	
	1993/94	1998/99	1993/94	1998/99	1993/94	1998/99
Average monthly expenditure per household	(RM)					
	1,161	1,631	1,406	1,943	854	1,270

Note: US $ 1.00 = RM 3.80 (Malaysian Ringgit)

INTRODUCTION

- **Rainfall and climate**
  - Hot, equatorial climate, subject to moisture-laden monsoon winds
  - Average rainfall 3000 mm/yr
  - Rainfall of high intensity very frequent
  - Extreme events, 600 mm in 24 hrs have been recorded
  - The annual rainfall in Sabah and Sarawak is more abundant but has less seasonal fluctuation

Item	Year 2001		
	Kuala Lumpur	Kota Kinabalu	Kuching
Mean daily temp. (^{0}C)	27.8	27.2	26.4
Absolute highest maximum temp. (^{0}C)	35.2	35.8	35.6
Absolute lowest minimum temp. (^{0}C)	20.3	21.0	20.8
Total rainfall (mm)	2,210.9	3,155.9	3,786.0
Number of rain days	214	221	251
Mean relative humidity (%)	82.6	83.8	84.9

POVERTY ISSUES AND MEASURES

- Traditionally associated with rural and agricultural sectors
- The bulk of the poor are from the agricultural sectors: rubber smallholders, paddy farmers, estate workers, fishermen and coconut smallholders
- Causes of Poverty can be summarized as: small farm size, market exploitation, low accessibility to capital, technology and expertise, limited opportunity for off farm income within the rural sectors, low motivation and aspiration of the poor, deteriorating terms of exchange for agricultural producers.
- Poverty level (income): Peninsular Malaysia - <RM 460.00/month, Sabah - <RM 633.00/month, Sarawak - <RM 543.00/month
- Rural development program since independent through Five-Year Development Plans: allocation 19% - 30% of total development expenditure (e.g. infrastructure, land development for poor and landless, irrigation schemes for paddy area, primary commodities, etc.)

POVERTY ISSUES AND MEASURES

- 1987 statistics: 628,000 households below the poverty line income
- Poverty level has been reduced: 1970 – 48%, 1987 – 23.8%, 1990 – 17.1%, 2000 – 7.2%
- **Government approaches**:
  - **Sectoral approach** (in the fifties and sixties) – concentrating for infrastructure construction, e.g. roads, bridges, schools, dam, irrigation and drainage schemes, public facilities, etc.
  - **Group oriented approach** (in the seventies and early eighties) – identification of poverty groups, various projects for each group were planned and undertaken
  - **Individual approach** (present) – identification of each and every poor household in every location. Special projects such as allocations for upgrading the dilapilated houses, nutritious food (milk) for school children, rural industrial projects, etc.

POVERTY ISSUES AND MEASURES

- In general using 2 approaches: structural approach and changing the behaviour and attitude approach
- Program categories: program to increase the productivity; program that directly increase the income; and basic needs programs
- Subsidies to the poor: e.g. paddy planters, sell paddy at RM 496.00 per ton (1991 figure), government gives subsidy of RM 165 per ton.
- Two types of subsidies: input subsidy (e.g. fertilizers, credit, operation and maintenance of irrigation schemes and price subsidy (e.g. paddy bonus)
- For the hardcore poor (for income less than half poverty level) can get benefits from Social Security. In year 2000, no. of beneficiaries – 228,705 people.

POVERTY ISSUES AND MEASURES

- **The 2003 budget** (tabled in Parliament on 13 September 2002)
  - For rural development: government introduced 'One Village One Industry' especially for the traditional farmers and fishermen
  - Allocation for rural development increase to 36%, with RM 2.56 billion for infrastructure facilities
  - For poverty eradication – RM 190 million to benefit 67,200 people (for projects such as mindset development, balanced diet, development of urban society, house rehabilitation, in-situ community development, etc.)
  - RM 1 billion for construction of medium and low cost houses to benefit the poor and squatters.
  - RM 470.00 a year for each primary pupil from poor family for textbooks, school uniforms, etc. Benefiting 730,000 students. Allocation RM 87.8 million.

DEVELOPMENT POLICIES

- **Outline Perspective Plan (OPP)**
  - **First OPP (1971 – 1990).** Implemented four development plans (Second Malaysia Plan (1971 – 1975) to Fifth Malaysia Plan (1986 – 1990) Implemented within the New Economic Policy (NEP) to promote growth with equity with the objective of fostering national unity among the various races
  - **Second OPP (1991 – 2000).** To accelerate the process of eradicating poverty and restructuring society. Development strategies include: development in agricultural sector, manufacturing sector, mining sector, regional development, human resources development, etc.
  - **Third OPP (2001 – 2010).** Emphasis on environmental enhancement and productivity, one of which through integrated and holistic approach.

DEVELOPMENT POLICIES

- **Five-Year Malaysia Plan (since 1966)**
  - To implement strategies and programmes and allocation of funds for sustainable growth and development
  - Rio Declaration (1992) and Agenda 21, particularly on environment and natural resources management, incorporated and integrated into Sixth Malaysia Plan (1991-1995), Seventh Malaysia Plan (1996-2000), Eighth Malaysia Plan (2001-2005)
  - Average Gross Domestic Product growth rate 7.2% per annum (1999-2000), per capita income rising from RM 6,090.00 in 1990 to RM 9,786 in 1995 to RM 13,359 in 2000. Unemployment rate remain 3.1%
  - Eighth Malaysia Plan – emphasis on environment and resources management in integrated and holistic manner.To reduce incidence of absolute poverty to 0.5% by 2005. Development programmes for the very poor and other anti-poverty programmes consolidated under People Blissful Development Scheme.

POLICY AND STRATEGY IN ERADICATING SQUATTERS

- **Squatters**: occupation or construction of buildings in other people's land illegally or against the law.
- 1999 statistics(not including Selangor state): total squatters population – 409,792 people; squatters buildings – 91,105 no. of which 88,264 no. (91.1%) are residential houses; form 1.8% of Malaysian population; no. of villages – 1,037 no.
- The Government did provide squatters areas with basic facilities such as water, electricity, roads, toilets, bridges including garbage collection facilities.
- Reasons for squatters: shortage of land and difficulty in land development in urban areas due to rapid development, migration to urban areas, migration of poor people, difficulty to own houses through rental and ownership, traditional fishing villages, etc.

POLICY AND STRATEGY IN ERADICATING SQUATTERS

- 1999 statistics: Average income per household – RM 1,016.63 per month compared to national average of RM 1,580.50 per month; unemployment rate – 3.2% compared to 3.5%, the national average; majority works as general workers. There are professional and sub-professional staying in squatters areas (e.g. in Kuala Lumpur, professional (0.8%), sub-professional (3.3%))
- Government intention to eradicate most squatters by 2005
- Relocate squatters through construction of more low cost houses. Policy – 30% of residential area with low cost houses (RM 25,000 to RM 45,000). For the poor and squatters they are given some rebates.
- Where squatters are being demolished for development purposes such as for flood mitigation projects, commercial, industries, houses, the government and provide sector did provide long houses for temporary relocation with small amount rent.
- There are Government policies, short term and long term strategies at national and state levels to eradicate squatters

LOCATION OF SQUATTERS

Along foothill

River reserve

River reserve

River reserve

LOCATION OF SQUATTERS

Flat area by the roadside

Coastal area

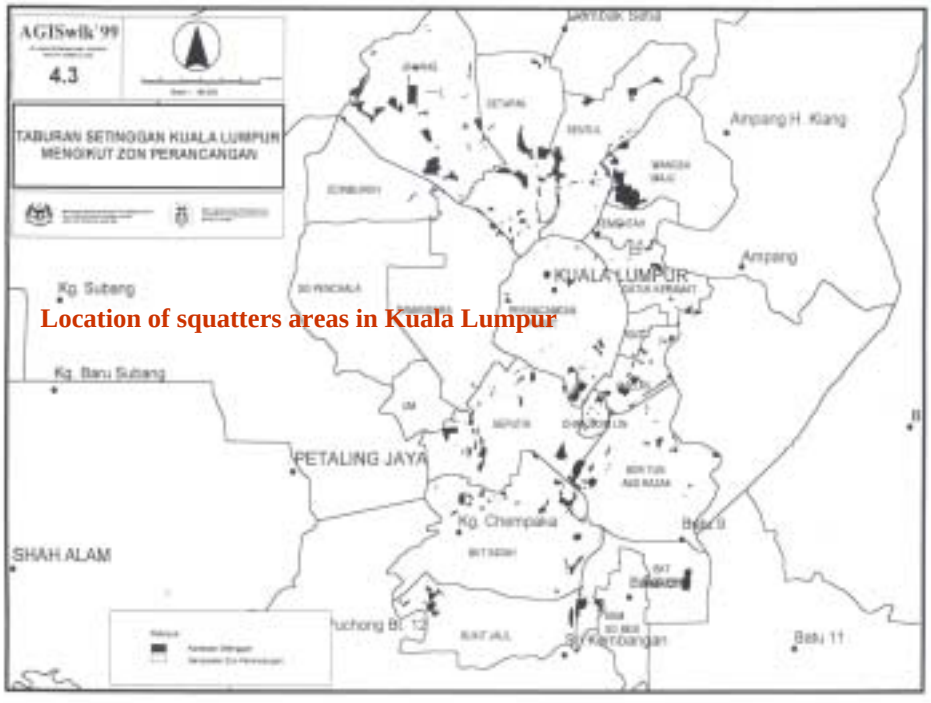
On the sea

TEMPORARY LOCATION OF SQUATTERS IN LONG HOUSES

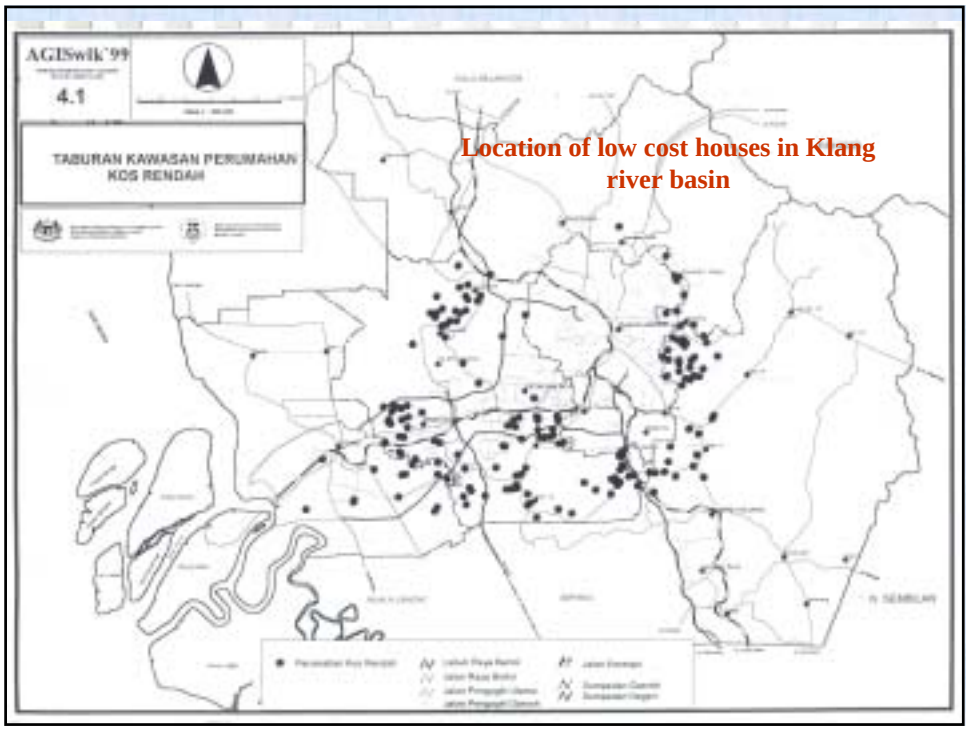
LOW COST HOUSES FOR PERMANENT RELOCATION OF SQUATTERS

FORMER SQUATTERS AREAS THAT HAVE BEEN REHABILITATED AND HOUSES BUILT BY RESIDENTS

SQUATTERS CLEARED FOR RIVER FLOOD MITIGATION WORKS



Location of squatters areas in Kuala Lumpur



MANAGEMENT OF FLOOD AND OTHER DISASTER RELIEF AID

- Flood happen every year, causing serious problems
- Table showing National disaster statistics (no. of occurrence) from 1999 - 2001
- Government action to reduce the burden for those effected through:
  - Management and Disaster Aid Committee at district, state and national level.
  - National Relief Council Instruction No. 20
  - For flood disaster – Permanent Procedure for the Operation of Flood Disaster.

Type of Disaster	Year		
	1999	2000	2001
Fire	2,537	2,662	2,778
Flood	28,111	7,409	3,502
Strong wind	1,826	1,691	2,870
Drought	1,502	None	290
Land slide	82	117	59
Others	None	None	195
Total	34,058	11,937	10,473

MANAGEMENT OF FLOOD AND OTHER DISASTER RELIEF AID

- Many government agencies involved in the management of floods at three levels: during preparedness stage, response stage and recovery/restoration stage
- Responsibilities of Social Welfare Dept. as follows;
  - Provide and maintain relief/shelter center (e.g. community halls, schools)
  - To prepare and circulate food, clothing aid and other necessity
  - Carry out registration of disaster victims for the purpose of helping the victims to recover some of their losses
  - Provide guidance, advice/counseling
- Short term aids: food supply for periods of 3 to 7 days for each family that move out from the relief center (see table)
- Long term aids: recovery aid or additional aid (see table for the type of aids)

MANAGEMENT OF FLOOD AND OTHER DISASTER RELIEF AID

Amount of food supply for one day for family of 5 after going back from disaster relief center

Item	Amount for One Day (grams)	Remark
Rice	1,800	The food supply for each family is given for period of 3 to 7 days. This is to help them recover before they earn back their living
Milk	145 (1 tin)	
Salt	35	
Sugar	185	
Tea/coffee	150	
Cooking oil	150	
Gas oil	600	
Sardine	145 (2 tin)	
Dried fish	300	
Biscuit	600	

Long term aid for those affected with disaster

Item	Amount (RM)	Remark
School aid (a) Books/beg/stationery (b) clothing	 50.00 (max) 70.00 (max)	Per student
Daily clothing	70.00	Per person
Family aid	40.00	Per person
House/Kitchen necessity aid	100.00 (max)	Per family
House repair	2,500.00 (max)	
Recovery aid for small scale businessman	3,000.00	
Maximum aid	5,000.00	Per family

MANAGEMENT OF FLOOD AND OTHER DISASTER RELIEF AID

- The Government also give aids to farmers and livestock breeders who loss their income because of flooding: e.g. paddy farmers - RM 750 per ha. (max. 2 ha.), vegetable farmers – RM 2,000 per ha. (max. 1 ha.), cow breeder – RM 800 per head (max. RM 4,000), etc.
- In 2001, total expenditure for disaster aids through Social Welfare Dept.were RM 7,049,118. For flood was RM 624,306.

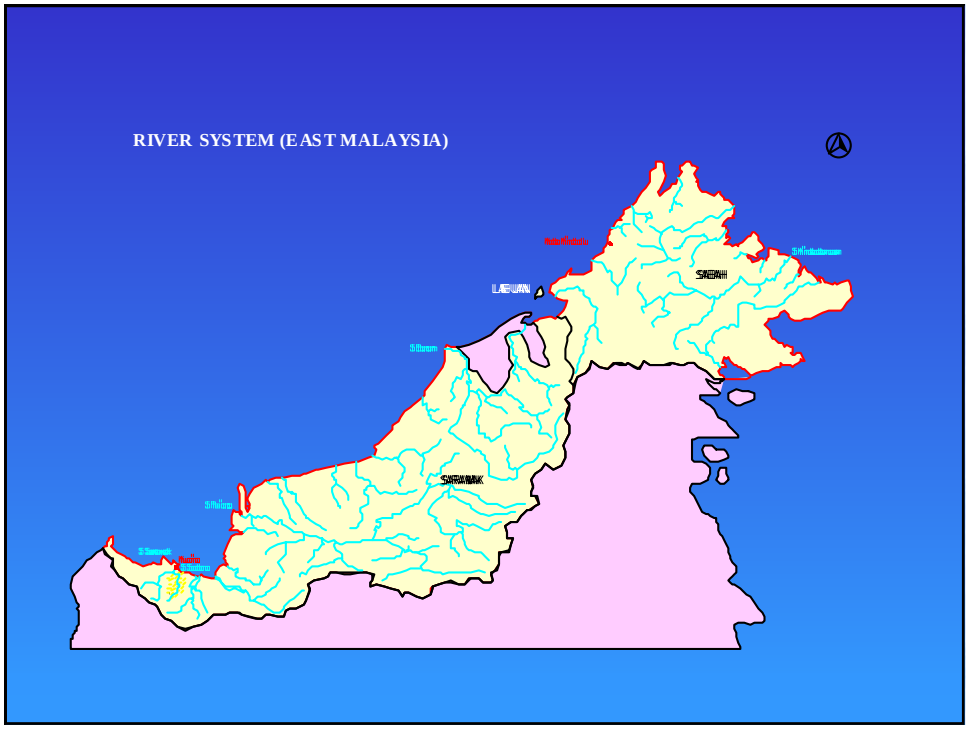
RIVER MANAGEMENT: RIVER SYSTEMS IN MALAYSIA

River basin - 189 no.

- Malaysia - 89 no.
- Sarawak - 22 no.
- Sabah - 78 no.

- 85 no. subjected to frequent flooding
- Total length of rivers - 38,000 km.
- Inter-country river with Thailand - Sg. Golok
- Interstate rivers - Sg. Klang, Sg. Muda, Sg. Bernam, Sg. Kerian, Sg. Muar, Sg. Endau
- Provide 97% water resources


RIVER SYSTEM (WEST MALAYSIA)
PULAU
LANGKAWI
PULAU
PINANG
THAILAND
KEDAH
PERAK
PAHANG
SELANGOR
JOHOR
SINGAPORE


RIVER SYSTEM (EAST MALAYSIA)
SABAH
LABUAN
SARAWAK

River Usage

River Usage

River Usage

Source of food

Mining activities

Religion

River Usage

Recreation

Sport activities

River Usage

Wrong Usage

Wrong Usage of River

Solid waste in the river

Wrong Usage of River

Highway columns in the river

Polluted River




Land development without proper control


EFFECT OF INPROPER LAND DEVELOPMENT ON RIVERS

Silted River

River ecosystem/diversity destroyed

River polluted with sediment

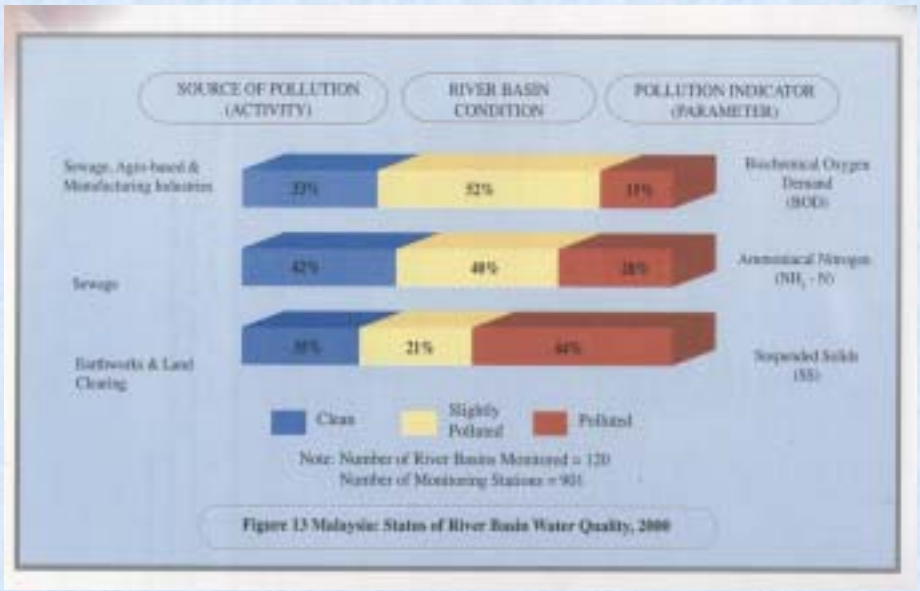


Figure 13 Malaysia: Status of River Basin Water Quality, 2000

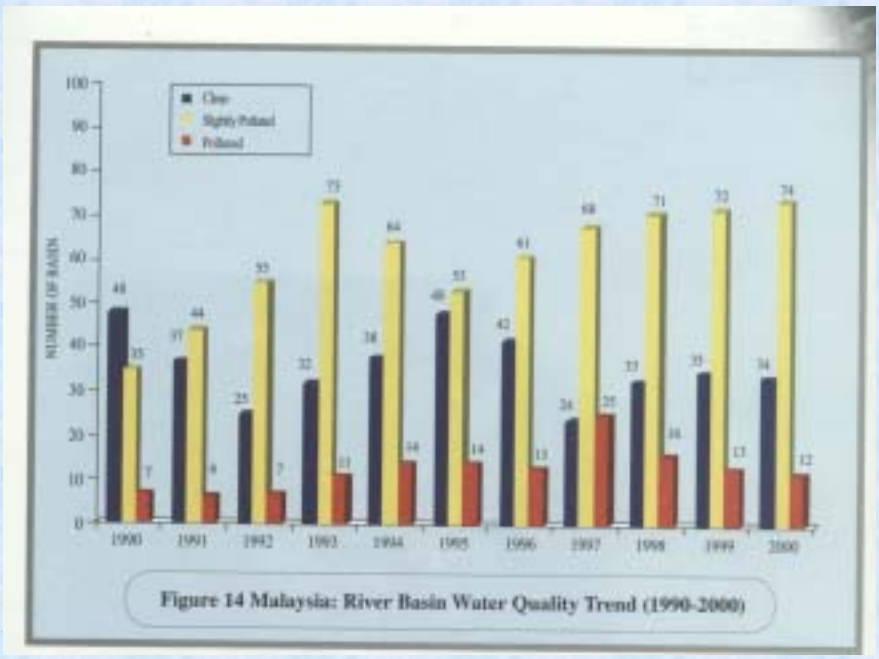


Figure 14 Malaysia: River Basin Water Quality Trend (1990-2000)

RIVER MANAGEMENT

- **River administration and related legislation**
  - There are some 40 Federal Laws relating to land and water, and additional 3 or 4 enactments in each state. Overall, more than 100 laws related one way or another to waters and rivers. Overlaps are common.
  - In the constitution, the land in the rivers and its waters are under the authority of the State Government
  - The Federal Constitution did provide specific portion of responsibilities and jurisdiction between the Federal and the State Governments
  - For state of Selangor, establishment of the Selangor Water Management Board (LUAS) through LUAS Enactment in 1999, with the responsibility to plan and regulate land and water development and activities in an integrated manner at the river basin level.

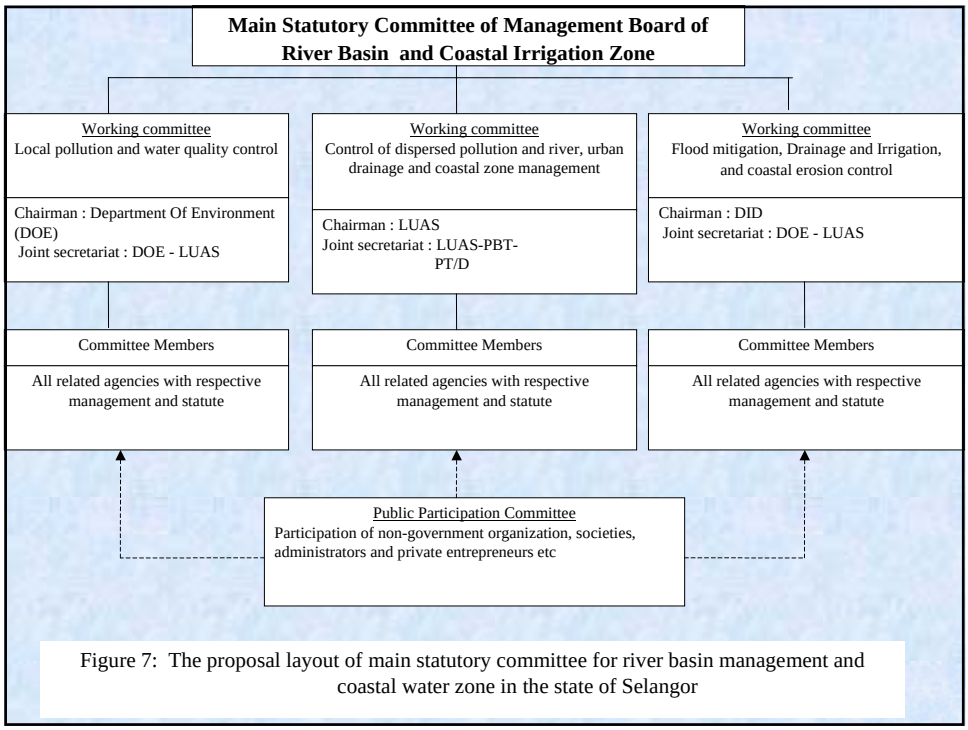


Figure 7: The proposal layout of main statutory committee for river basin management and coastal water zone in the state of Selangor

RIVER MANAGEMENT

- **Integrated River Basin Management (IRBM):**
  - The fundamental principle of IRBM is the decisions regarding the use and management of the natural resources of the basin account for the basin as a whole.
  - IRBM is the coordinated use and management of land, water and other natural resources and activities within a river basin.
  - Malaysia like many other countries has embarked on the journey to practise IRBM. There is a need to relook at the present mode of river management which is fragmented and segmented between local, state and federal governments and the many agencies and departments.

Components of Integrated River Basin Management

- Water quantity management
- Water quality improvement and management
- Catchments Management Plan
- River Corridor Management
- Legal and Institutional Frameworks
- Ecosystem and biodiversity management
- Public Participation and Education
- Operation and Maintenance
- Management Information System (MIS) and Decision Support System (DSS)

(to come up with Blueprint)

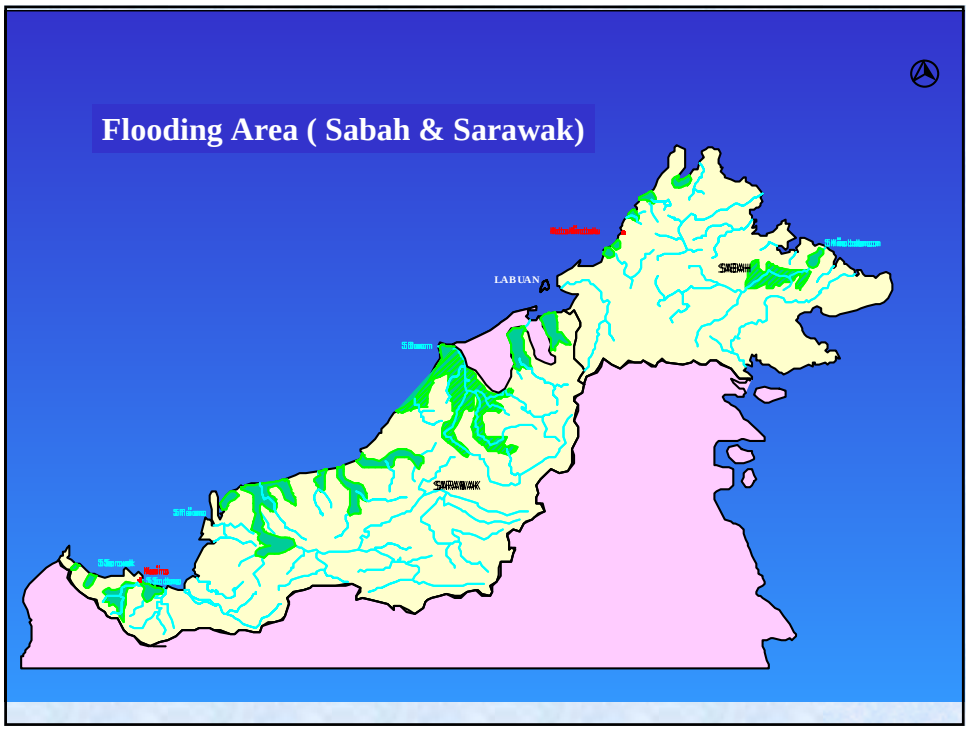
FLOODING ISSUES

- Flooding is a major problem in Malaysia
- The frequency and severity of flooding have escalated as a result of land-use changes such as conversion of forest into agriculture, agriculture to urban areas.
- Two types of flooding: major flooding (the main river overtop and cause widespread flooding of long duration; flash flood (a short duration flood that is very localized).
- Flood condition varies from state to state. Inundation varies from 0.2 m to 5m (extreme cases). Size of flood - <100 ha. to a few thousand ha.
- Total flood-prone areas in Malaysia – 29,800 sq. km. (9%)
- Annual average flood damage RM 100 million (JICA study in 1982)

FLOODING ISSUES

- **Measures in solving flooding problems**:
  - **Curative measures** (e.g. construction of flood storage facilities (dams, retention ponds, etc), flood diversion facilities, river dykes/bunds, river canalization, pumping systems, etc.)
  - **Preventive measures** – through addressing the flood problem by removing or addressing the causes of the problem at source (e.g. through IRBM, LUAS, love our river campaign (since 1993), Stormwater Management Manual (since January 2001) guidelines, etc.
  - **Flood response** – involves pre, 'during' and post flood activities, include flood forecasting and warning systems, public education programmes and mechanism for flood disaster managements.

Flooding Area (West Malaysia)


Flooding Area (Sabah & Sarawak)
LABUAN

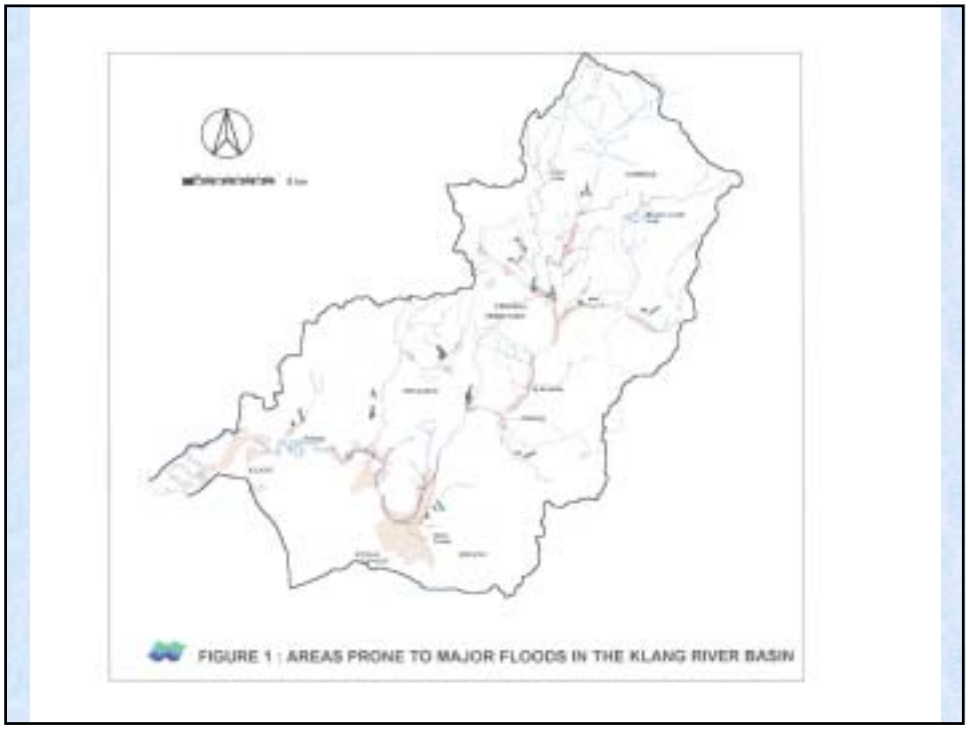
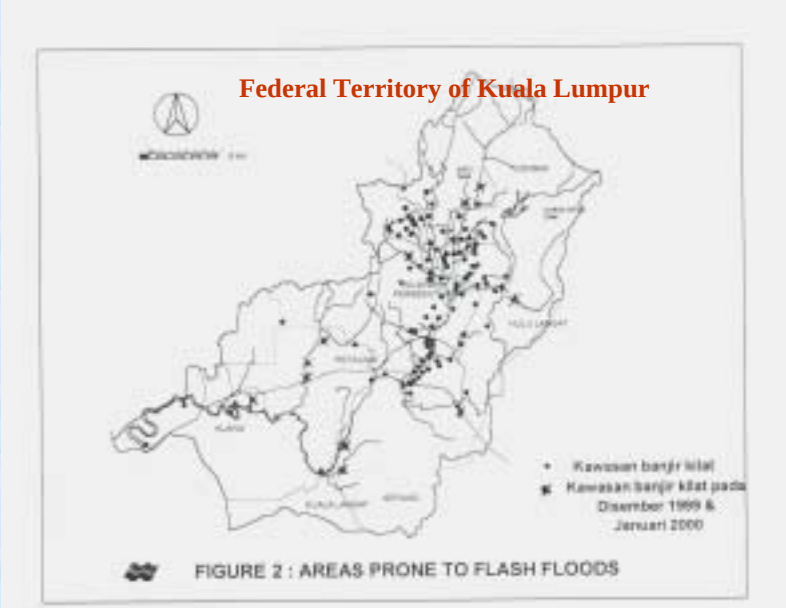


FIGURE 1 : AREAS PRONE TO MAJOR FLOODS IN THE KLANG RIVER BASIN



Flooding area in Federal Territory of Kuala Lumpur in 2001

Flooding area in the state of Terengganu in 2001

Flood

The Padang….. When the Klang river swelled its bank (1949)

Kuala Lumpur flood, 1971

Flood

Shah Alam December 1999

Federal Highway February 2000

Flood

Flood

Flood

14,935 evacuated, 10 schools closed

Flood

Highway closed to traffic during flood

Curative Measures: Flood mitigation / conservation / rehabilitation works

Curative Measures: Flood mitigation/conservation/rehabilitation works




Curative Measures: Flood mitigation/conservation/rehabilitation works




Curative Measures: Flood mitigation / conservation / rehabilitation works




Curative Measures: Flood mitigation / conservation / rehabilitation works





Curative Measures: Flood mitigation/conservation/rehabilitation works




Preventive Measures: Love Our River Campaign

Preventive Measures: Love Our River Campaign

Preventive Measures: Love Our River Campaign

River Adoption (School Category) Sg. Air Merah, Kedah

Preventive Measures: Love Our River Campaign

River Adoption (Community Category)

Sg. Renok, Kelantan

Preventive Measures: Love Our River Campaign

River Adoption (Tourism Category) Sg. Chepor, Perak

Preventive Measures: Love Our River Campaign

River Watch

Preventive Measures: Love Our River Campaign

River Expedition

Preventive Measures: Love Our River Campaign

River Education

Preventive Measures: Love Our River Campaign

River

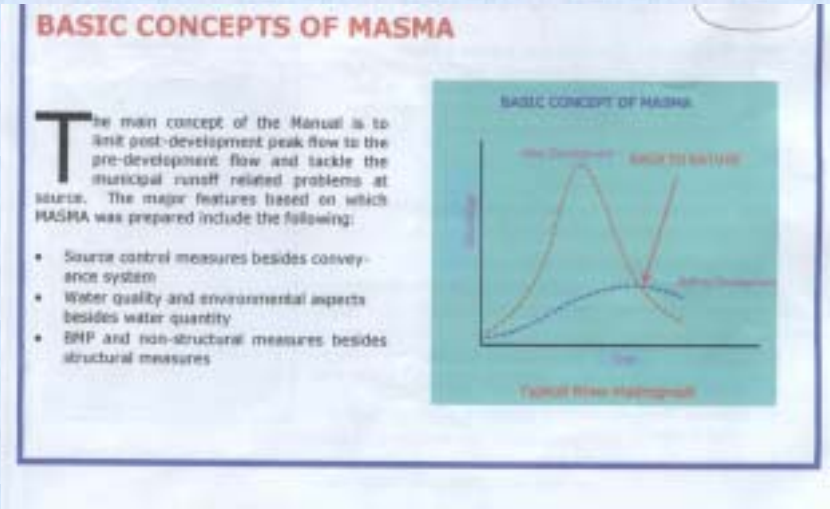
Beautification

Flood Response: Hydrology

Urban Storm Water Management Manual For Malaysia (MSMA)

- Approved by the Government for adoption with effect from 1st January 2001
- It is the comprehensive procedures and guidelines for the planning and design of stormwater systems with the view of achieving minimum impact to the receiving water bodies, effective control of nuisance flooding and enhancement of the urban landscape.
- It gives guidelines on water quantity control at source, water quality improvement and Best Management Practice.

Urban Storm Water Management Manual For Malaysia (MSMA)



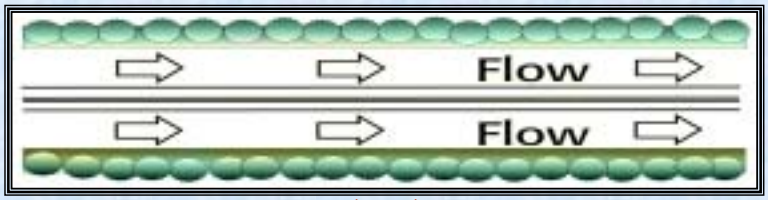
Goal of MSMA

The goal of this Manual is to provide guidance to all regulators, planners and designers who are involved in stormwater management.

Conveyance (rapid disposal) oriented to conveyance and storage

A typical conveyance channel

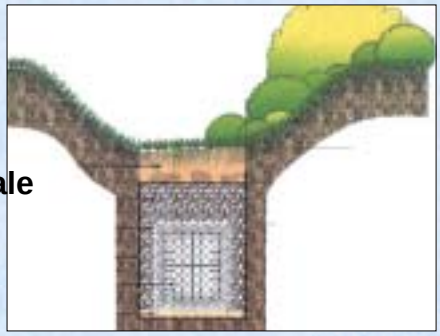
Traditional Channels



Rapid Disposal Approach

Conveyance (rapid disposal) oriented to conveyance and storage

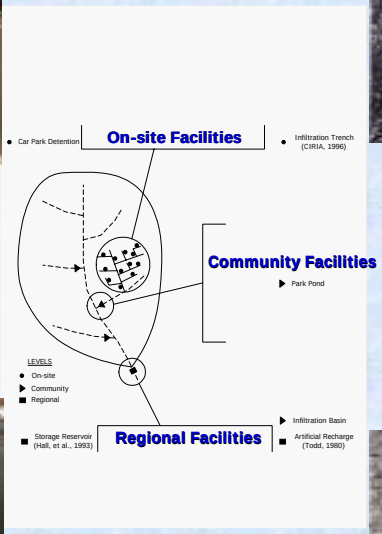
Swale



Diffuse/insinuate type of drain

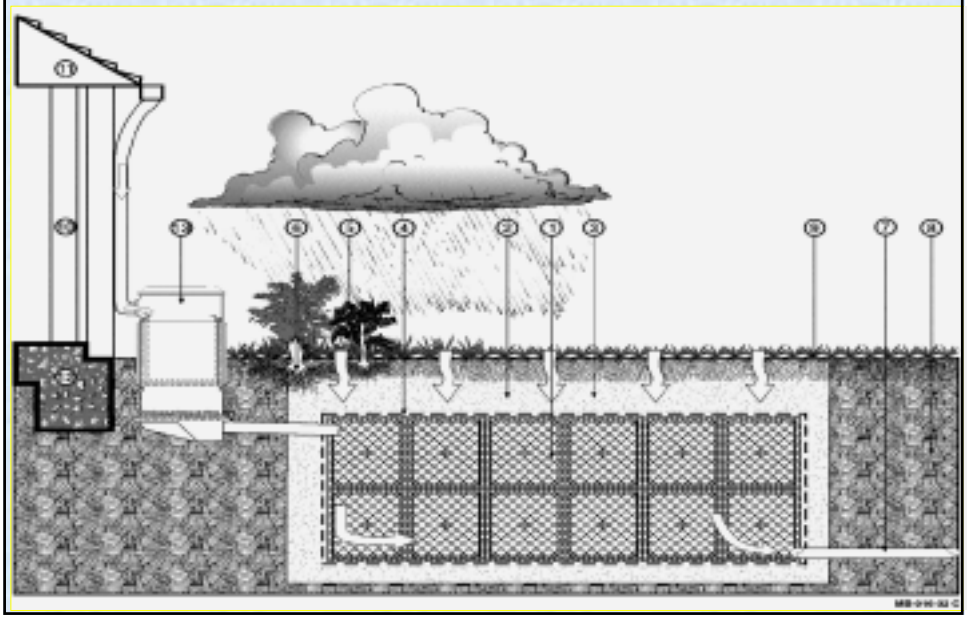
House perimeter drain

Detention/Retention Storage



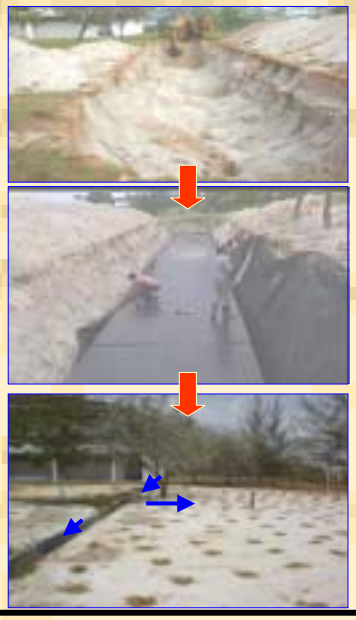
Storage pond

Pervious Tanks



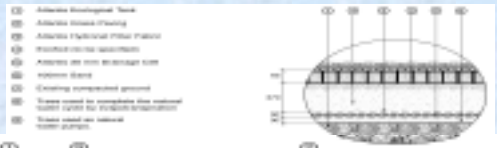
Multi Purpose Hall
(Catchment Area : 3059 m^2)

Installation of the System



Rain harvesting

Car parks



Overseas Award for MASMA

BILATERAL RELATIONSHIP BETWEEN MALAYSIA (DID) AND JAPAN (JICA)

- The bilateral technical cooperation has passes 37 years since first Expert dispatch on river from Japan in January 1965.
- The technical cooperation is aimed at transfer of technology and knowledge that serve socio-economic development.
- In this long years, the Japanese side has assisted the development of river and water resources engineering in Malaysia.
- The dispatch of JICA Water Resources Experts from 1979 to 1985 has produces a splendid JICA Study, the 'National Water Resources Study, Malaysia' in 1982. This comprehensive study has become the starting point of the commendable bilateral cooperation.
- Various flood mitigation studies, river and coastal engineering studies, river management studies, river basin information studies, urban drainage studies have been carried out through JICA's aid. To date more than 20 studies have been completed.
- Many studies had been turn into implementation projects such as the on going river management, flood mitigation projects of Muda river basin in Kedah/Penang states (including construction of Beris dam).

Foreign Assistance: JICA's Aid

CONCLUSION

- As nation developed, the Government has its obligations for the economic growth, and the well being of its people.
- There is a need for strong policies and strategies to enhance the economic growth and to reduce poverty such as the New Economic Policy, Outline Perspective Plan, Five-Year Plans, etc. as used in Malaysia.
- The Plans also need to include the enhancement of the environment, sustainable natural resources (such as water resources) as practice in Malaysia.
- In maintaining macroeconomic stability, emphasis on the eradication of poverty, income distribution and employment restructuring with the aim of building a united and equitable society become important elements.
- Sectoral approach followed by Group Oriented approach and later the Individual approach are found to be effective in helping the poor.

CONCLUSION

- As practice, regulations, standing instructions before, during and after disaster events helps the government agencies and the NGOs to carry out their obligations.
- A disaster relief aid programme, short and long terms measures will ease the burden for those affected.
- Construction of low cost housing projects for the poor in the urban, rural areas and the poor in squatter areas contributed for them to have their own houses in a well plan society.
- Rivers need to be managed in an integrated and holistic approach to safeguard the water resources, the physical environment, to reduce flooding, etc.

CONCLUSION

- In stormwater management, controlling water quantity and the stormwater generated pollution at source need to be practise towards achieving ecologically sustainable development in urban areas.
- The Bilateral Cooperation between countries (in this case, between Malaysia (Department of Irrigation and Drainage (DID)) and Japan (River Bureau, Ministry of Construction and Japan International Cooperation Agency (JICA))) has contributed in the development of river and water resources engineering in Malaysia, as well as in the transfer of technology and knowledge that serve socioeconomic development.

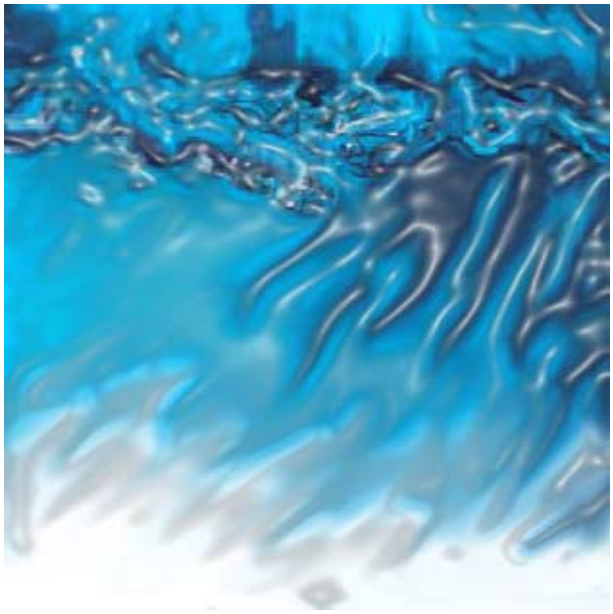

THANK YOU

洪水と貧困（マニラ）Session 4-1

Study on Impact of Flood Control Project to Poverty and Land Use

Kenichi Matsui

Technical Advisor, JBIC mission to Republic of the Philippines
Director of the Construction Division,
College of Land, Infrastructure and Transport
Ministry of Land, Infrastructure and Transport (MLIT), Japan



第 2 次水資源プロジェクト研究計画調査

Study on Impact of Flood Control Project to Poverty and Land Use

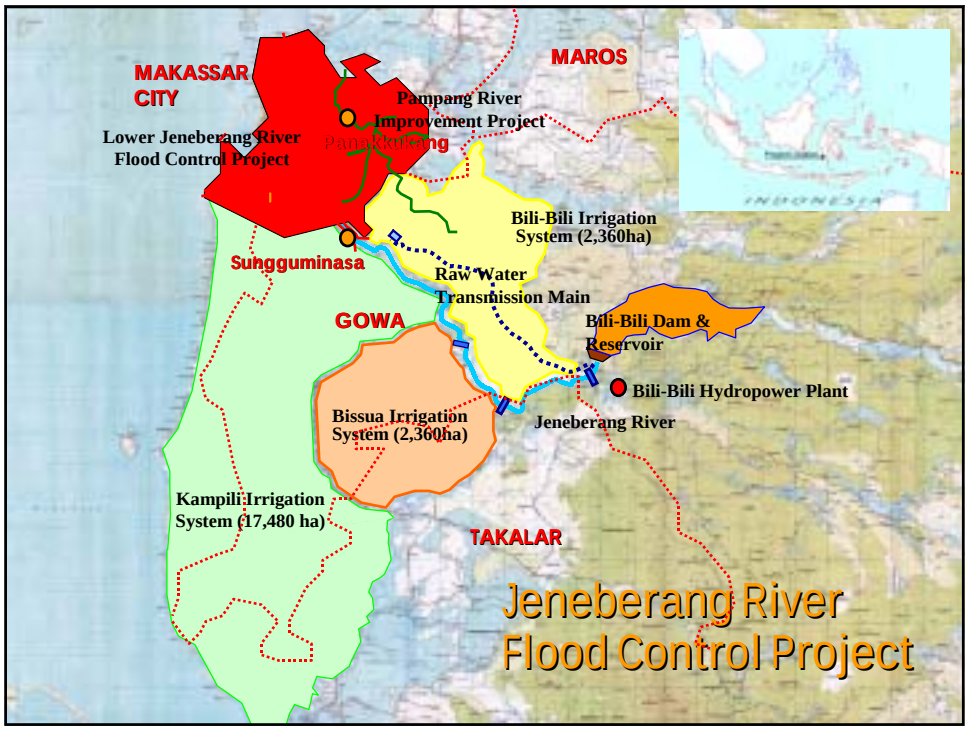
Kenichi Matsui

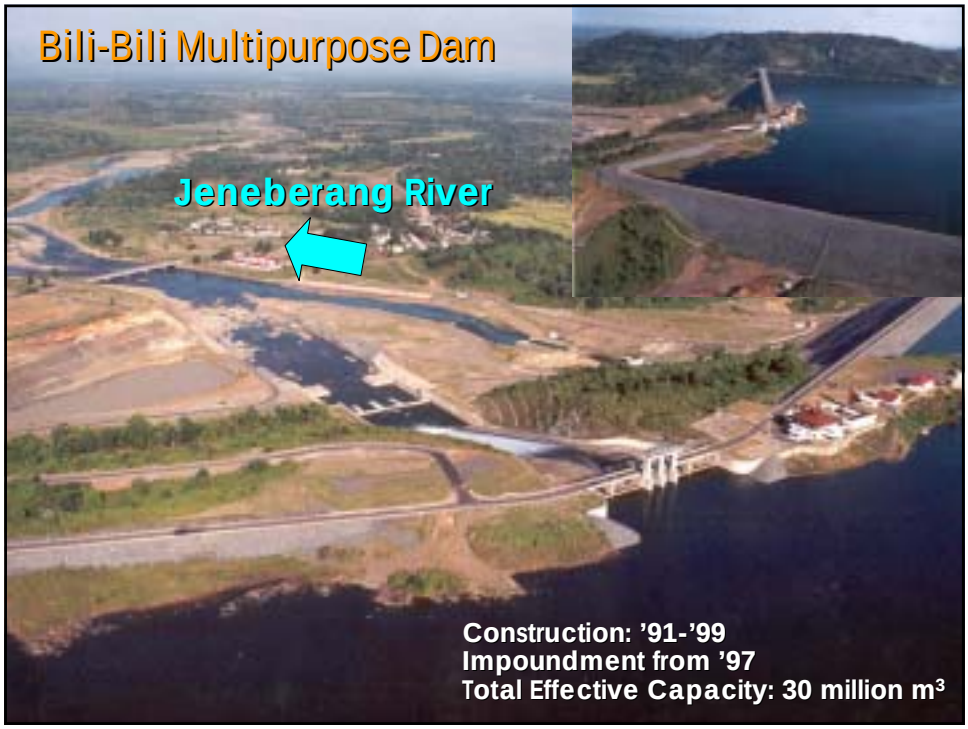
Technical Advisor
JBIC mission to Republic of the Philippines

Director of the Construction Division
College of Land, Infrastructure and Transport
Ministry of Land, Infrastructure and Transport (MLIT), Japan

Objectives

- **Case Study of Flood Control Project and Poverty**
  - **Jeneberang River Flood Control Project, Indonesia**
  - **Mangahan Floodway Project, Philippines**
  - **Greater Colombo Flood Control and Environment Improvement Project, Sri Lanka**
- **Conclusions**


MAKASSAR CITY
MAROS
Pampang River Improvement Project
Lower Jeneberang River Flood Control Project
Panakkukang
Bili-Bili Irrigation System (2,360ha)
Sungguminasa
Raw Water Transmission Main
GOWA
Bili-Bili Dam & Reservoir
Bili-Bili Hydropower Plant
Bissua Irrigation System (2,360ha)
Jeneberang River
Kampili Irrigation System (17,480 ha)
TAKALAR
Jeneberang River Flood Control Project


Bili-Bili Multipurpose Dam
Jeneberang River
Construction: '91-'99
Impoundment from '97
Total Effective Capacity: 30 million m³

Improvement of Flood Area in Makassar City

Before Project | After Project

Sungguminasa

Before Project, 1983 | After Project, 1997

Panakkukang

Before Project, 1983

After Project, 1997

Irrigation System

Before Project

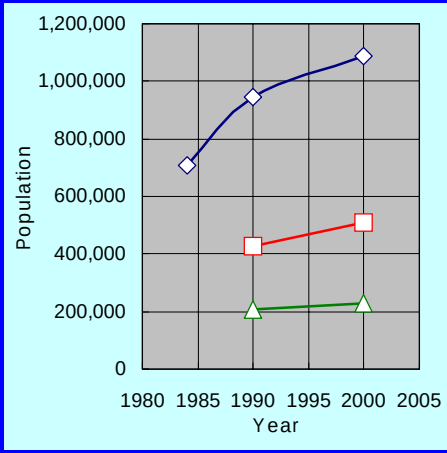
After Project

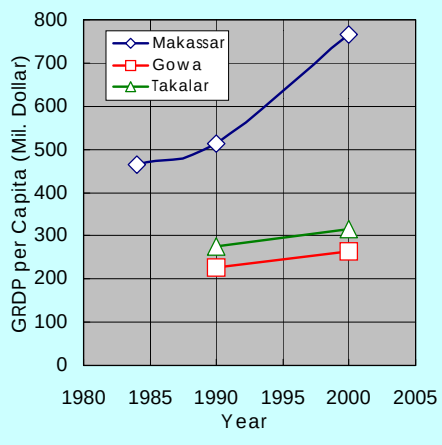
Irrigation Area:

Bili-Bili:	2,360 ha
Kampili:	17,480 ha
Bissua:	3,850 ha
Total:	23,690 ha

Kampili Irrigation System

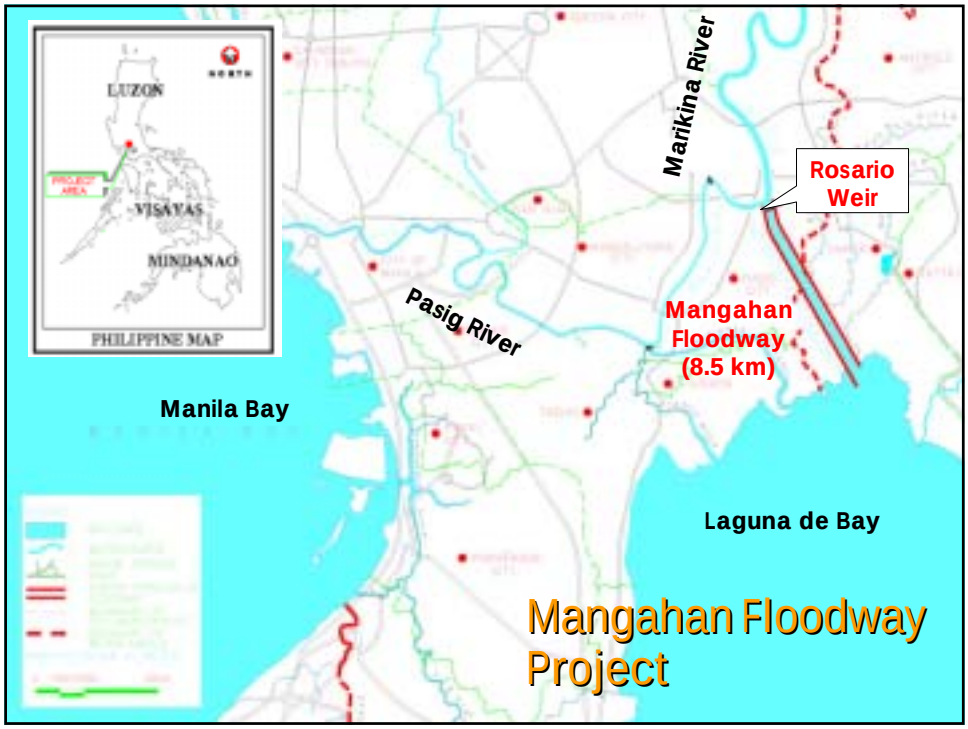
Change of Population and GRDP per Capita



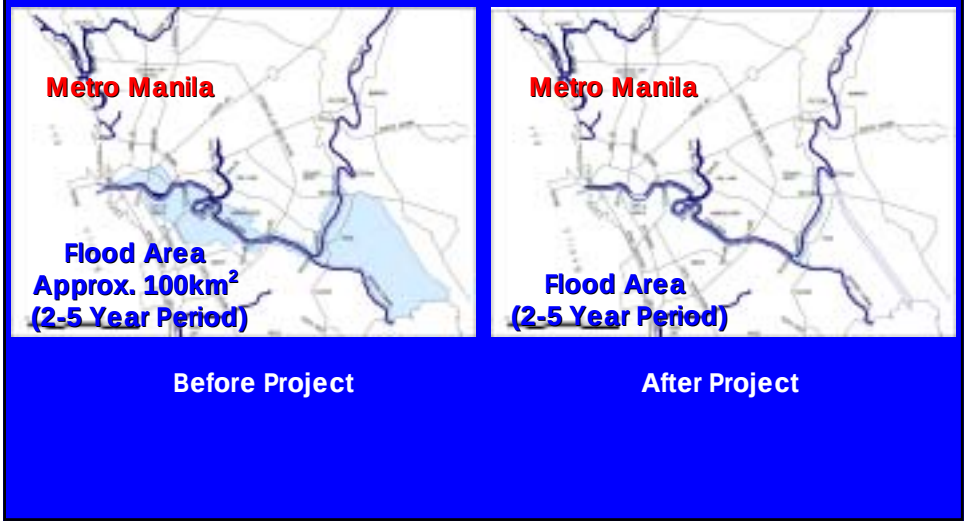


Population **GRDP per Capita**

'88-'93 Construction Lower Jeneberang River Urgent Flood Control
'91-'99 Construction of Bili-Bili Multipurpose Dam



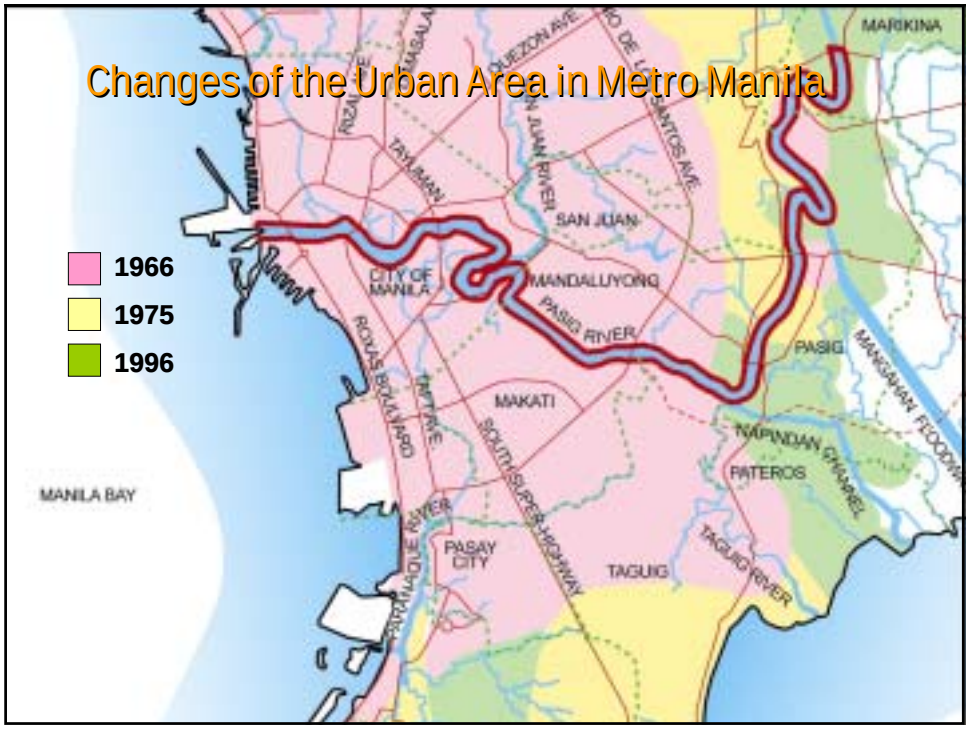
Improvement of Flood Area in Metro Manila



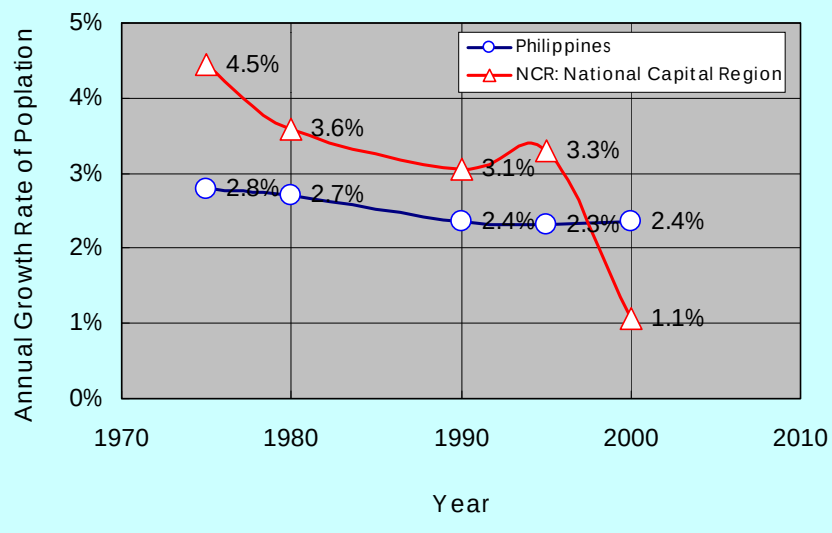
Before Project

After Project

Changes of the Urban Area in Metro Manila

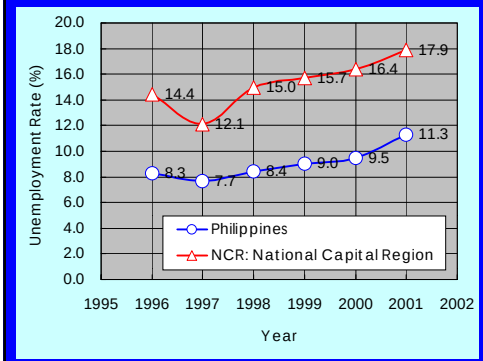


Change of Annual Growth Rate of Population

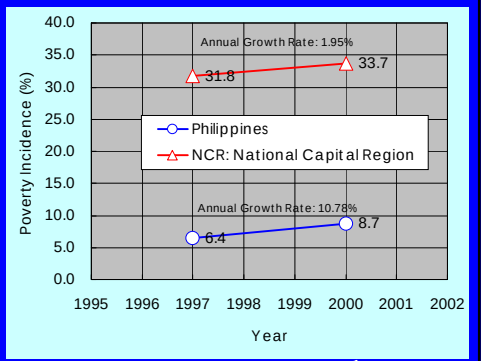


'85 Construction of Mangahan Floodway

Unemployment Rate, Poverty Incidence and Poverty Thresholds



Unemployment Rate



Poverty Incidence [1]

Source: NSCB

Note:

1 The proportion of poor families to total number of families.

2 The annual per capita income required or the amount to be spent to satisfy nutritional requirements (2,000 calories) and other basic needs.

Poverty Threshold (PHP)	1997	2000
Philippines	11,318	13,823
NCR	14,229	17,713

Poverty Thresholds [2]

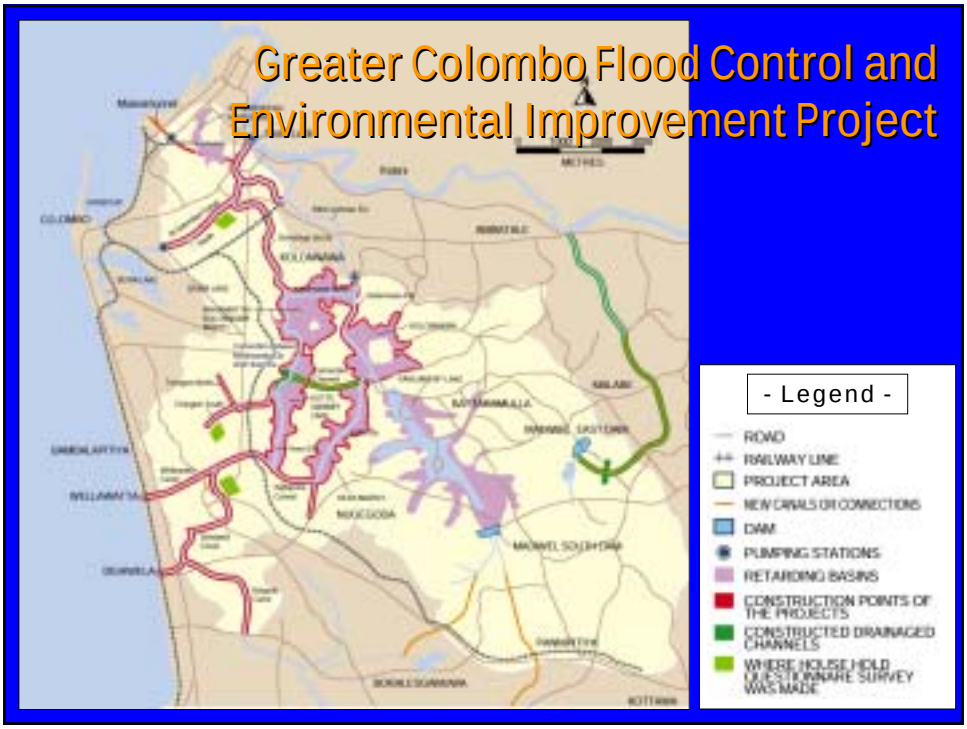
Poverty Dwelling on Riverbank

Poverty Dwelling on Riverbank

Poverty Dwelling on Riverbank

Poverty Dwelling on Riverbank

Greater Colombo Flood Control and Environmental Improvement Project



Decreases in the Frequency, Depth and Duration of Flooding

		St.Sebastian South	Kirillapone	Dehiwala
Frequency of Flood (times/ year)	Before	2- 3	1- 4	1- 3
	After	0- 2	0- 2	0- 2
Maximum Inundation Depth (cm)	Before	75- 100	6- 60	60- 120
	After	0- 20	0	0- 60
Duration of Inundation (days)	Before	3- 4	1hour- 1day	3- 7
	After	0- 2	0	0- 2

Changes in the Housing Environment in Each Zone

Before the Project
(Shanty along the Dehiwala Canal)

Resettlement Zone
(Badowita Area)

Improved Zone
(Along the Dehiwala Canal)

Socio-economic Impact Due to the Project

- Reduction of Flood Losses to the Local Economy
- Increase of Usable Land
- Reduce Water-borne Disease
- Improvement and Acquisition of Social Recognition
- Promotion of Employment

Comprehensive Participation for the Resettlement Program

Improvement of Living Standard in the resettlement area has been achieved through…

- **Participations of NGO, local governmental agency, and politician, which supported residential organization**
- **Flexibility of planning system, which accepted the contributions of numerous actors**

Content of Supports for Residents

1. **Land (50m2)**
2. **Common infrastructure**
3. **Housing loans**
4. **Rs 1,000 of blessing money**
5. **Provision of trucks for moving**
6. **Construction of house foundations**
7. **Compensation for permanent houses**

Conclusions

(1) Poverty reduction can be achieved by the flood control project through application of proper countermeasures with the projects both in urban and rural areas.

(2) Flood control projects in rural areas help also reduce the inflow of poor dwellers into the urban areas.

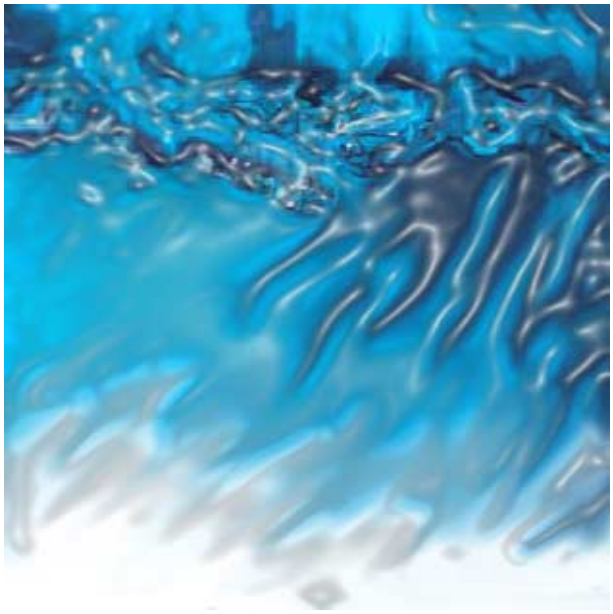
(3) Flood mitigation projects in the future could definitely improve socio-economic condition in the country, particularly for poor families living in urban areas.

洪水と貧困（マニラ）Session 4-2

Flood Management and Poverty in Rural Areas

Ms. Rebecca T. Garsuta

Department of Public Works and Highways,
Philippines



第 2 次水資源プロジェクト研究計画調査

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

Flood Management and Poverty in Rural Areas

Presented by:
Ms. REBECCA T. GARSUTA
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
PHILIPPINES

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Rationale:

The effective and sustainable management of floods and it's disastrous impact especially to the agricultural sector of the economy largely contributes to the productivity and development of rural economies.

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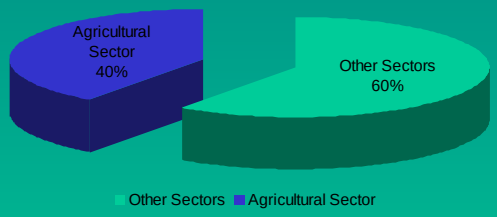
FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

General Poverty Profile of the Philippines:

The agricultural sector employs 40% of the Philippine's workforce accounting for nearly 20% of the GDP and generates 10% of the country's exports.



The incidence of poverty in agriculture is higher than in any other sector of the economy. Poverty Incidence in the rural sector is 54.4% against 25% in the urban sector.

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FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

DPWH Program Objective:

"... protecting the poor involves the formulation and implementation of policies that serve to reduce the probability of shocks, mitigate their impact and improve the ability of the poor to cope with them. In the Philippines, the main sources of vulnerability are (likely to be) related to CLIMATE and economic instability..."

The DPWH in general, aims to provide quality infrastructure facilities and services that will support the NEW MEDIUM TERM PHILIPPINE DEVELOPMENT PLAN (2001-2004) goal of EQUITABLE DEVELOPMENT through sustained growth and REDUCTION OF POVERTY.

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FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

DPWH Program Specific Strategies:

To provide the infrastructure support of the priorities identified by the GMA Administration

- Modernization of Agriculture
- Development of Tourism
- Improvement of Peace and Order
- Decongestion of Traffic

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

DPWH Program Thrusts:

- Improvement of Flood Control in Major River Systems and Basins in the Philippines – to reduce flood damages.
- Improvement of National Arterial and Secondary Roads

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FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Typhoon-Related Damage Profile:

In the last 10 years, the Philippines has suffered an average of 3.5 destructive typhoons per year with damages costing up to P 76.76 Billion mostly incurred from flood damaged property, infrastructure and crops.






Year	Event	Duration (Days)	Affected Region	Dead	Missing	Damage (Billion Pesos)
1991	Mt. Pinatubo	4	3	850	0	10.424
	Uring	4	6 & 8	5101	3000	1.044
	Trining	8	1,2 & CAR	82	22	0.003
1992	Ditang	5	3 & NCR	6	77	0.471
1993	Goring	5	1	75	13	2.774
	Kadiang	8	4	126	26	8.752
	Monang	2	7	272	90	2.34
	Naning	2	4	93	10	1.329
	Puring	6	12	157	52	2.732
1994	Akang	3	4 & 5	45	17	0.08
	Oyang	5	1,3,4,6,7, & ARMM	48	2	0.134
	Katling	4	3,4 & NCR	45	6	0.001
1995	Mameng	4	1,3-8, 10 & NCR	133	130	3.173
	Pepang	4	4,6,7 & 8	116	125	0.424
	Rosing	4	1-5,7,NCR & CAR	916	376	10.819
1996	Gloring	7	1-4	72	24	2.12
1998	Emang/Gading	6	1-4	108	10	3.795
	Iliang	4	1-5	46	63	4.476
	Loleng	9	1 & 2	303	29	5.306
	Norming	4	3-6 & 8	41	37	1.061
1999	Ising	4	8	45	2	1.2
	Flooding/Slide	3	4 & NCR	58	1	0
	Luding	4	1-3 & CAR	10	23	0.158
2000	Biring	5	3 & NCR	12	0	0.05
	Edeng	5	1,3,4,6,CAR & NCR	66	9	1.113
	Reming	7	1-7, CAR & NCR	114	10	3.944
	Seniang	5	3-5, CAR & NCR	64	33	0.733
	Toyang	3	6,7,9,10 & CARAGA	43	5	0.489
	Ulpiang	3	5,6 & CARAGA	39	2	0.888
2001	Feria	5	1-3, CAR, 5-9	188	44	3.586
	Jolina	3	3,4 & NCR	0	0	0.015
	Labuyo	6	I-2 & CAR	2	1	0.071
	Nanang	5	4-10 & CARAGA	236	88	3.246
	Quedang	3	4,6 & 7	5	1	0.005

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Structural Flood Mitigation Measures:

Flood-fighting method of employing engineering intervention systems such as dikes, levees, cut-off channels, diversion floodways, training levees and bank protection. The infrastructure development component of flood control.

INFRA DEVELOPMENT APPROACH


Dikes and Levees


Bank Protection /Revetments


Diversion Works


Dredging / Re-channeling

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

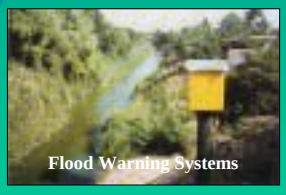
Non-Structural Flood Mitigation Measures:

Flood-fighting method employing the use of flood forecasting and warning systems, flood zoning, reforestation and river management. The social development component of flood control.

SOCIAL DEVELOPMENT APPROACH


Institution Strengthening


Watershed Management


Flood Warning Systems

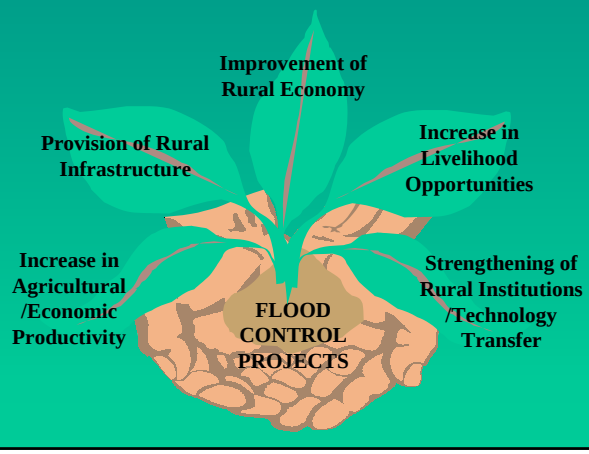

Evacuation / Resettlement

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

The Synergistic Approach:

The inter-relationship between the highly technical engineering aspect of flood control and social development projects balances each other, resulting to a socially and economically sustainable overall project.

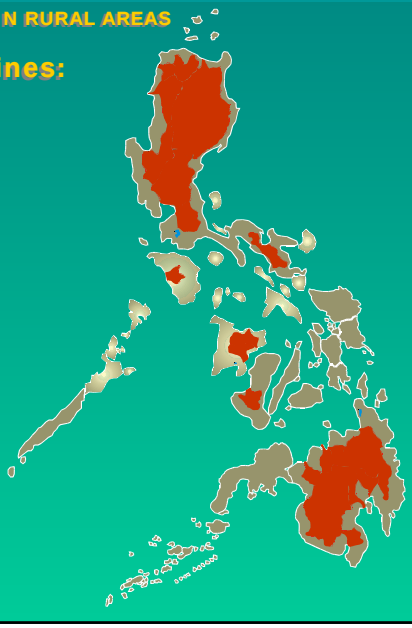


REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Major River Basins of the Philippines:

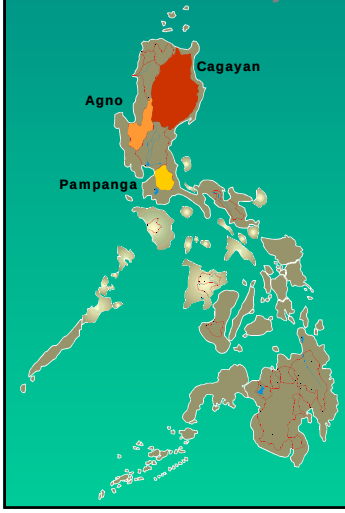
1. Cagayan
2. Mindanao (Cotabato)
3. Agusan
4. Pampanga
5. Agno
6. Abra
7. Pasig-Marikina-Laguna de Bay
8. Bicol
9. Abulug
10. Tagum-Libuganon
11. Ilog-Hilabangan
12. Panay
13. Tagoloan
14. Agus
15. Davao
16. Cagayan de Oro
17. Jalaur
18. Buayan-Malungan
19. Laoag (Less than 1,400 km²)
20. Amnay-Patrick (Less than 1,400 km²)



REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

General Inundation Profile in Relation to Major River Basins:



"About 1,045,680 hectares of land are susceptible to flooding nationwide. The biggest combination of flood prone areas of almost 418,000 hectares is in Cagayan, Agno and Pampanga River Basins. Among these three basins, only the Agno and Pampanga basins have either completed or on-going detailed design works..."

LEGEND:

- Agno River Basin
- Cagayan River Basin
- Pampanga River Basin

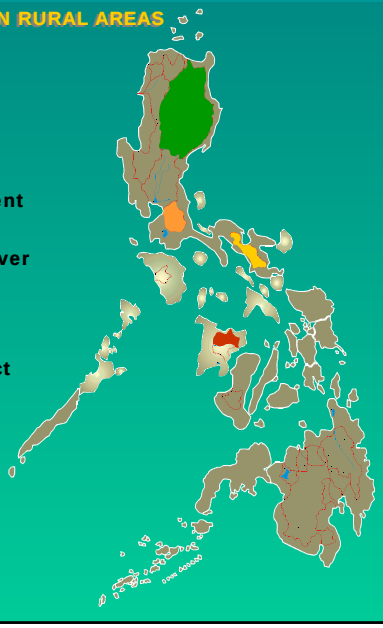
REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Major Flood Control Projects In Large Rural Basins:

Completed Studies:

- ❑ Cagayan River Water Resources Development (JICA, 1987)
- ❑ Flood Control Project for Lower Cagayan River (JICA, 2002)
- ❑ Laguna Lakeshore Urgent Flood Control & Drainage project (OECF, 1993)
- ❑ Mayon Volcano Sabo & Flood Control Project (JICA, 1981)
- ❑ Disaster Prevention Around Mayon Volcano (JICA, 2000)
- ❑ Panay River Basinwide Flood Control (JICA, 1985)



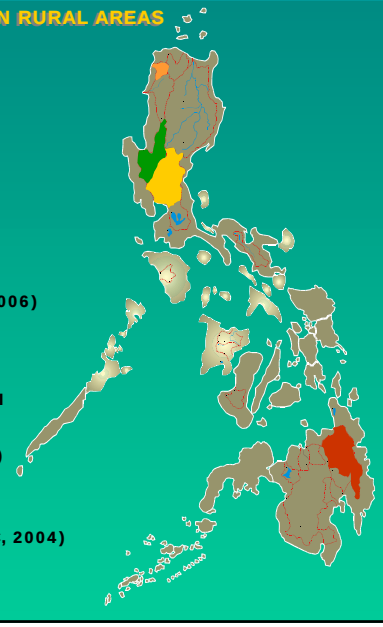
REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Major Flood Control Projects In Large Rural Basins:

Completed or On-Going Detailed Design / Construction:

- ❑ Laoag River Basin Flood Control & Sabo Project (JBIC, 2006)
- ❑ Agno & Allied Rivers Urgent Rehabilitation Project (JBIC, 2003)
- ❑ Agno River Flood Control Project Phase II (JBIC, 2006)
- ❑ Pinatubo Hazard Urgent Mitigation Project Phase I (JBIC, 2001)
- ❑ Pinatubo Hazard Urgent Mitigation Project Phase II (JBIC, 2003)
- ❑ Pampanga Delta Development Project (JBIC, 2001)
- ❑ Lower Agusan Development Project Phase I (JBIC, 1999)
- ❑ Lower Agusan Development Project Phase II (JBIC, 2004)



REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Nationwide Flood Control Projects:

- ❑ Nationwide Flood Control & River Dredging Program (OECF, 1982)
- ❑ Flood Forecasting and Warning System for Dam Operations Phase I (OECF, 1986)
- ❑ Flood Forecasting and Warning System for Dam Operations Phase II (OECF, 1992)
- ❑ Study on Flood Control for Rivers in Selected Urban Centers (JICA, 1994)

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

The Medium-Term Infrastructure Priority Program (2001-2004)

Priority Sub-Sector Activities

MAJOR OBJECTIVES	TARGETS	PRIORITY ACTIVITIES	REGIONS
FLOOD CONTROL 1. To mitigate flooding to tolerable levels in Metro Manila and major river basins	1. To construct/install flood control facilities in Metro Manila and in the 12 major river basins.	1.a To construct dikes, river walls, revetments and installations of pumping stations, channels, dredging and related works in major river basins.	Metro Manila, Regions I, III, IV, V, VI, X, XI, and XII.
2. To protect infrastructure and mitigate sediment-related disasters for sustainable economic development 2.a To prepare study of sediment related disaster prone area 2.b To provide road disaster mitigation information	2. Protection works of endangered national roads/bridges and other flood prone areas/sediment-disaster prone areas	2.a Multi-purpose Evacuation (Request of Grant Aid) 2.b Study of Sediment related disaster prone area (Reciprocal of Development study Grant Aid) 2.c Mt. Mayon Comprehensive Disaster Mitigation Project (Foreign Assistant) 2.d Sediment related Disaster prevention works at CAR (Request of Grant Aid) 2.e Study of West Friatone disaster mitigation (Request of Development study Grant Aid) 2.f Countermeasure of Crater Lake at Mt. Pinatubo (Request of Grant Aid) (Request of Development study Grant Aid)	

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Case Study:

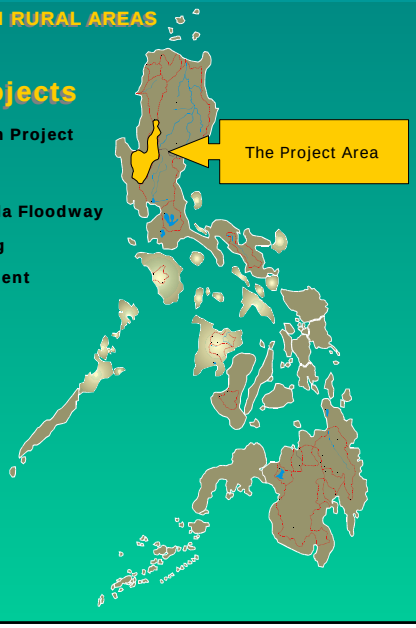
The Agno River Flood Control Projects

Phase I: Agno and Allied Rivers Urgent Rehabilitation Project

Phase II: Agno River Flood Control Project

- Package I: Bayambang Stretch and Alcala Floodway
- Package II: Guide Channel to Bayambang
- Package III: Social Development Component
- Package IV: Hector Mendoza Bridge

Phase III: Alcala – Asingan – San Manuel Stretch



REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Basin Area Description:

The Agno River Basin has a total drainage area of 5,952 sq. km. The upper portion of the basin is in a mountainous terrain with a narrow, confined stem valley. In the lower reaches, the main stem valley is very wide and flat. The hydrology of the lower portion of the basin has been substantially altered as a result of the 1991 eruption of Mt. Pinatubo. The basin is located in a Type 1 climate region and the peak run-off period is typically August.

The Agno River originates from the Cordillera mountains and flows southward through mountainous terrain. After which, the river flows out to a vast alluvial plain and then flows down towards Bayambang, collecting run-off tributaries and joins the Tarlac River, a major tributary of the Agno. At the confluence of the Agno and Tarlac Rivers is the Poponto Swamp Area (approx. 30 sq. km. during the wet season). The swamp functions as a natural retarding basin, thus aiding in the reduction of flood peaks downstream. During the summer, the Poponto Swamp dries up. After joining the Tarlac River, the Agno River turns northwestward collecting run-off from the northern slope of the Zambales Mountains before finally discharging into Lingayen Gulf.


Flooding in Poponto Swamp


Confluence at Wawa, Bayambang, Pangasinan

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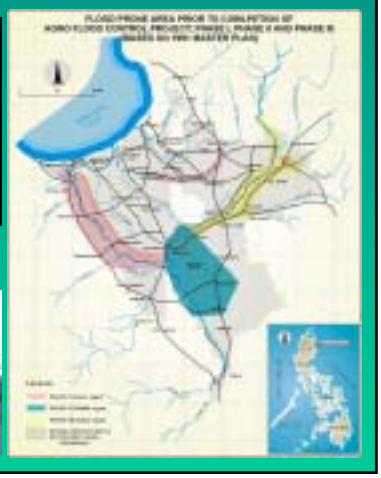
FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Flood Damage Profile:

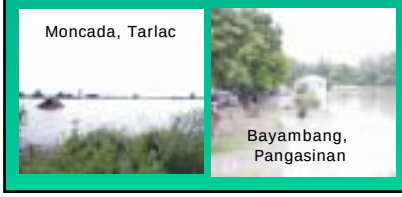
The Agno River Basin had experienced large disastrous floods in 1935, 1936, 1937, 1938, 1943, 1950, 1960, 1968, 1972, 1980, 1984, 1986 and 1992. The flood in 1972, the largest ever recorded, inundated almost the entire flood prone area.

Description of Damages	Year of Typhoon Event		
	1976	1980	1993
Dead/Missing	21	336	49
Houses and Buildings:			
'Totally Destroyed	3917	16510	164174
'Partially Destroyed	4912	47573	444904
Cost of Damages	P 12.2 Million	P 366.3 Million	P 1,085 Million



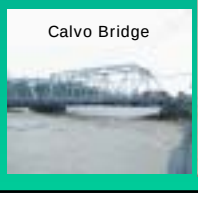
Most recent photos of flooding in the Project Area:

Moncada, Tarlac



Bayambang, Pangasinan

Calvo Bridge



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FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Existing Dike System of Agno River:

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FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Present Flood Prone Area:
203,000 hectares

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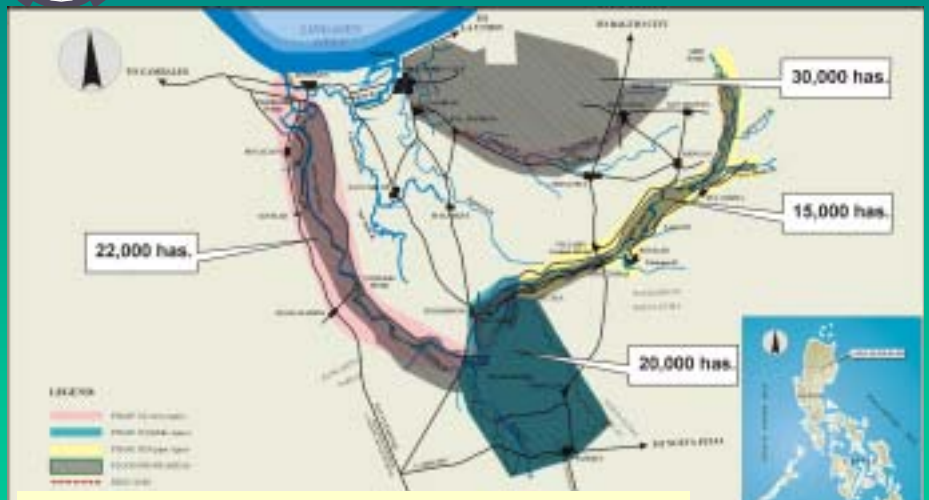
FLOOD MANAGEMENT & POVERTY IN RURAL AREAS



Flood Prone Area after Project Completion:
83,000 hectares (10-year flood design level)

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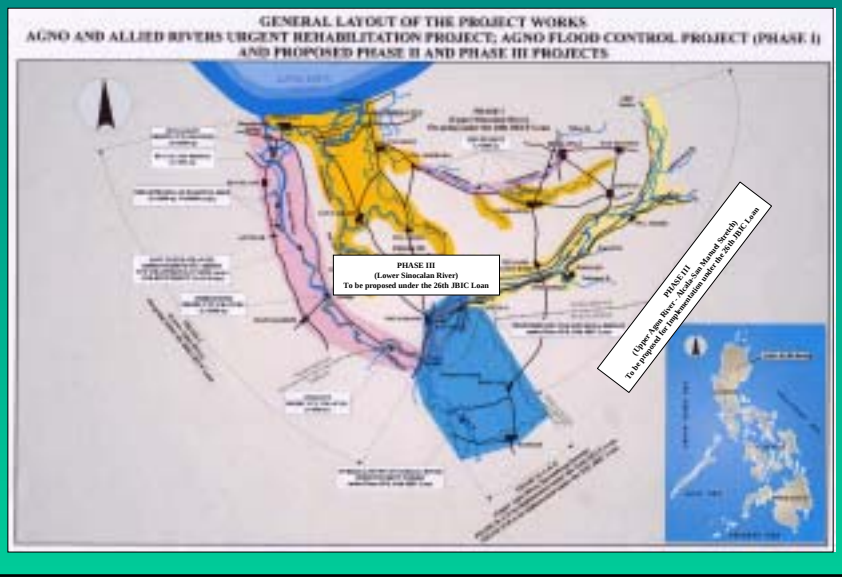
FLOOD MANAGEMENT & POVERTY IN RURAL AREAS



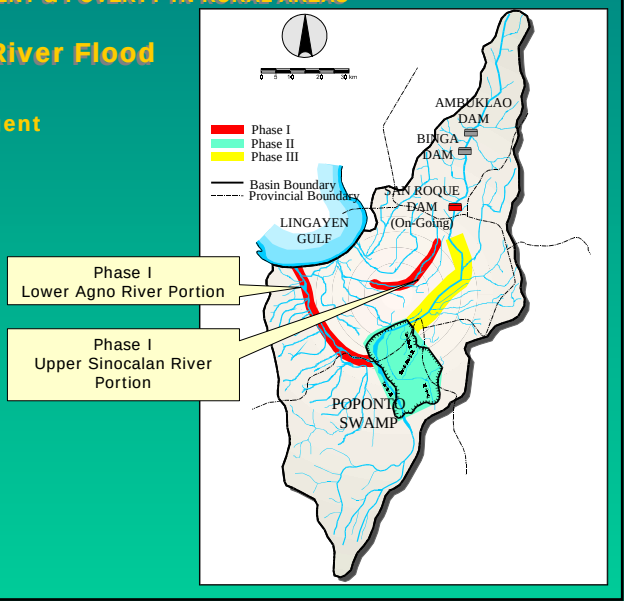
REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Phase I of the Agno River Flood Control Project:

Agno and Allied Rivers Urgent Rehabilitation Project

(AARURP)



EXECUTIVE SUMMARY
For
Agno F/C Phase I Project
(Original, VO Nos. 1 & 2, and SA Nos. 1 to 3, excluding DBRTW)

1.0 The Project

1.1 Project Name/Location : Agno and Allied Rivers Urgent Rehabilitation Project, Province of Pangasinan

1.2 Description : The project involves new channeling and channel improvement by dredging (10.6 million m^3), dike heightening (155,796 m^3), revetment works (16,627 m), and construction of Bugallon Bridge (393 m) in the Lower Agno River and revetment works (1,800 m) in the Upper Sinocalan River (Phase I: Lower Agno River Basin and Upper Sinocalan River)

1.3 Objective : The objective of the Project is to mitigate flood damages in the service area of the lower Agno River Basin and the upper Sinocalan River Stretch.

1.4 Funding Source, Project Cost and Duration

(1) Loan Agreement (L/A) No. : PH-P155(20th Yen Loan Package)
(2) Loan Amount : Y 8,312 Million Japanese Yen
(P 3.46 Billion, P 1.0 = Y 2.40)
(3) Estimated Base Cost of Civil Works : P 1.44 Billion Pesos
(P 1.83 Billion, including DBRTW and TRIIW)
(4) Project Duration (Civil Works) : 57 months (April 1998 - Dec. 2002) Original
63 months (April 1998 - June 2003) Revised

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FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Revetment Works including Setback Dike, Guelew, San Carlos City

Project Cost: P 175 Million

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

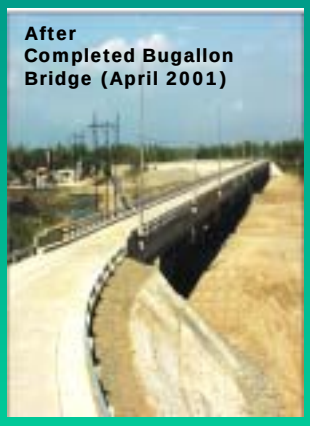
Bugallon Bridge and Shortcut Channel

Project Cost: Shortcut Channel P 65 Million

Bugallon Bridge P 173 Million

Before
Critical Section at
Naguelguel, Lingayen

Proposed Shortcut Channel



After
Completed Bugallon Bridge (April 2001)

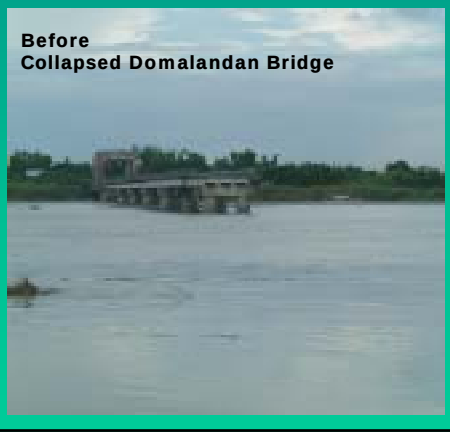
REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Domalandan Bridge River Training Works

Project Cost: P 125 Million

including dredging of Low Water Channel



Before
Collapsed Domalandan Bridge

After
Domalandan Bridge Training Works

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Phase II of the Agno River Flood Control Project:

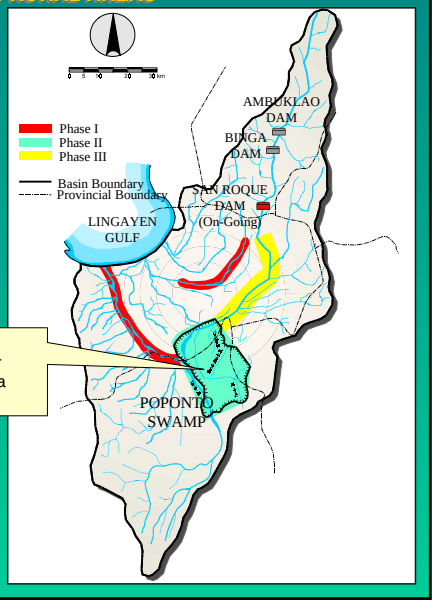
Agno River Flood Control Project Phase II (ARFCP II)

Package I – Bayambang Stretch & Floodway

Package II - Guide Channel to Bayambang

Package III- Social Development Component

Package IV – Hector Mendoza Bridge



EXECUTIVE SUMMARY
for
Agno River Flood Control Project Phase II

1.0 The Project

1.1 Project Name/Location : Agno River Flood Control Project, Phase II / Provinces of Pangasinan and Tarlac

1.2 Description : The Project comprises four (4) packages:
(i) Contract Package I : Bayambang Stretch and Floodway
(ii) Contract Package II : Guide Channel to Bayambang
(iii) Contract Package III : Social Development of Poponto Retarding Basin, and
(iv) Contract Package IV : Hector Mendoza Bridge

1.3 Objective : To mitigate (i) flood damages in the upper Agno River basin located in both provinces of Pangasinan and Tarlac, and (ii) the negative impacts on the existing local communities in Poponto swamp area which may be caused due to implementation of the Project.

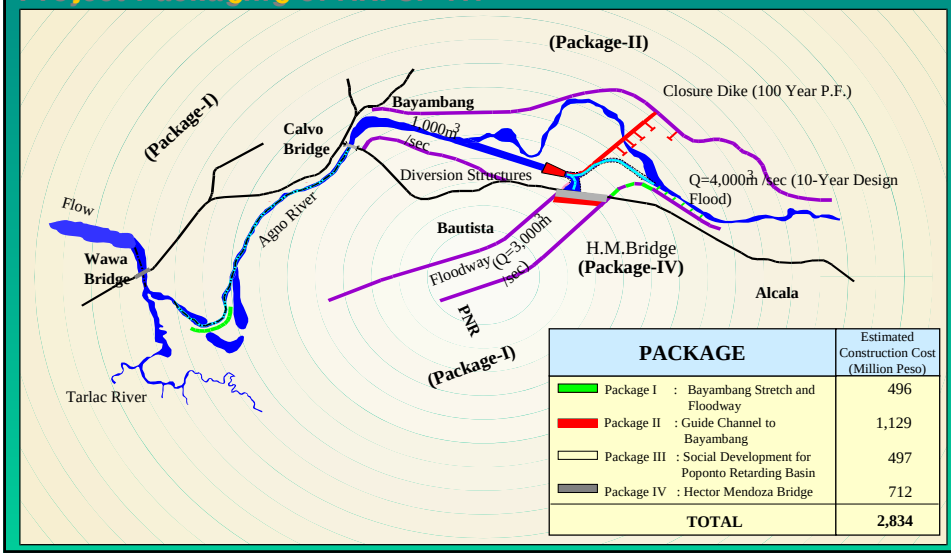
1.4 Funding Sources, Project Cost and Duration

(1) Loan Agreement (L/A) No. : PH-P193 (Phase IIA) and Ph-P223 (Phase IIB)
(2) Loan Amount of Civil Works : ¥ 7,707 Million Japanese Yen (¥ 5,180 + 2,527),
(P 3,181 Million Peso, P 1.0 = ¥ 2.4227 as of Bid Opening)
(3) Loan Validity : 10 September 1998 and 09 September 2006 (8 years)
(4) Estimated Cost of Civil Works : P 2,834 Million Peso (CP-I: P 496 Million, CP-II: P 1,129 Million, CP-III: P 497 Million, and CP-IV: 712 Million)
(5) Project Duration : 45 months (April 2002 to December 2005)
(CP-I: 31.5 months, CP-II: 44.7 months, CP-III: 31.5 months, and CP-IV: 25 months)

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

Project Packaging of ARFCP II:



PACKAGE	Estimated Construction Cost (Million Peso)
Package I : Bayambang Stretch and Floodway	496
Package II : Guide Channel to Bayambang	1,129
Package III : Social Development for Poponto Retarding Basin	497
Package IV : Hector Mendoza Bridge	712
TOTAL	**2,834**

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

On-Going Works of ARFCP II Package III:

Foundation works for Bacquero Norte Evacuation Center in Moncada, Tarlac (July 2002)



Construction of Mound Dike and Evacuation Center in Camangaan West, Moncada, Tarlac (September 2002)



REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

On-Going Works of ARFCP II Package III & IV:

Construction of Baquero Norte Evacuation Site under Package III (September 2002)

Construction of Mound Dike, Baquero Sur, Moncada, Tarlac under Package III (September 2002)

Hector Mendoza Bridge Site at Laoac, Alcala Floodway under Package IV (September 2002)

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

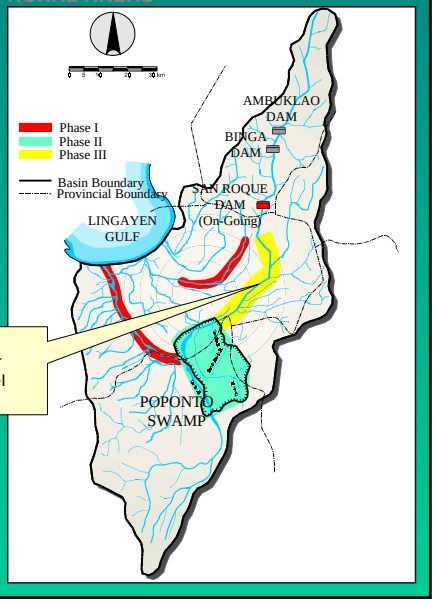
FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

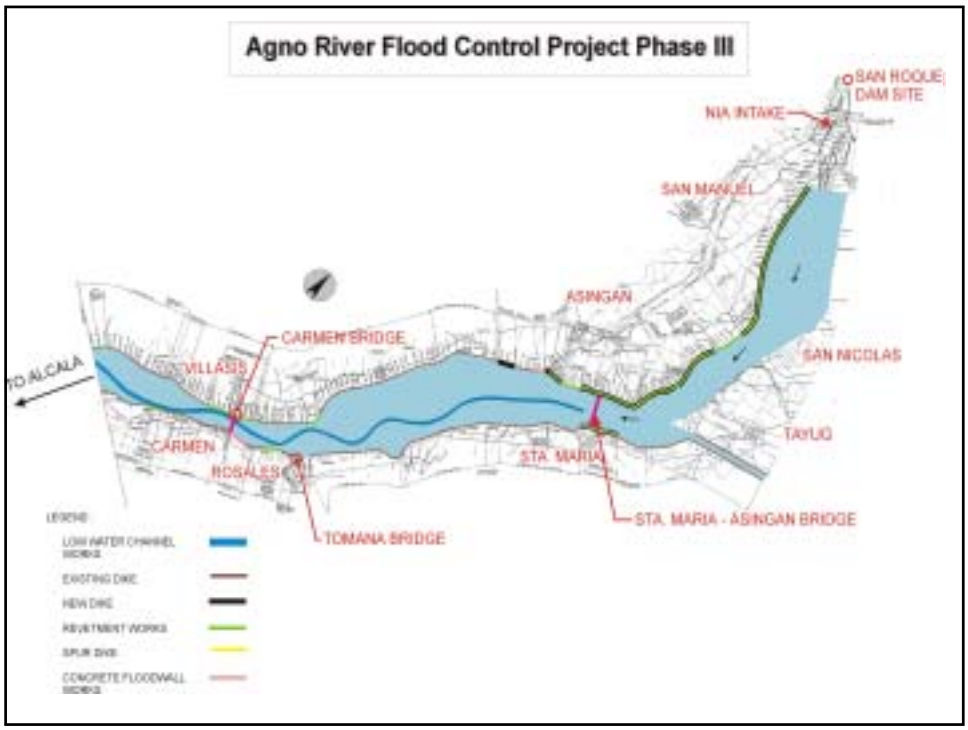
Phase III of the Agno River Flood Control Project:

Upper Agno River

(Alcala-Asingan-San Manuel Stretch)

***For future Yen Loan Package**





REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

EXECUTIVE SUMMARY
For
Agno F/C Phase III Project

1.0 The Project

1.1 Project Name/Location : Agno River Flood Control Project Phase III
(Upper Agno River, Alcala – Asingan – San Manuel Stretch (L = 47 km)

1.2 Description :
1) Channel excavation (about 1.8 million m³)
2) Construction of earth dike (300,000 m³)
3) Concrete flood wall (1.8 km)
4) Revetment works (28 km)
5) Groins with pile type and spur dike type (180 sites)

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

1.3 Funding Source, Project Cost and Duration

(1) Loan Agreement (L/A) No. : For Future Yen Loan Package

(2) Loan Amount : Pesos 3,084 Million (US$1 = Yen 107 = Pesos 42)

(3) Estimated Base Cost of Civil Works : P 2.2 Billion Pesos(FC: P 1.4 Billion, LC: P 0.8 Billion)
New Earth Dike Asingan-San Manuel Stretch (L & R)
P 94.4 Mil : (based on 1993 prices escalated to 2001 prices)

(4) Project Duration : 74 months (March 2003 to May 2009)

2.0 The Consulting Services

2.1 Scope of Works

The Consulting Services is divided into the following two (2) phases:

Phase A : Pre Construction Stage (Review of Detailed Design, Tendering and Contract Award) 14 months (Mar. '03 to May '04)

Phase B : Construction Stage (Construction Supervision 60 months (June '04 to May '09)

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

FLOOD MANAGEMENT & POVERTY IN RURAL AREAS

In Conclusion:

The high incidence of poverty in the rural areas can greatly be reduced by providing effective safety nets for agricultural productivity against climate-related disasters such as floods. Most ideal to agriculture, yet most susceptible to flooding, the vast alluvial plains of the Philippines must be protected from perennial massive flooding if damages to both life and property are to be kept to a minimum.

REGIONAL CONSULTATION WORKSHOP ON POVERTY & FLOODS

Flood Management and Poverty in Rural Areas

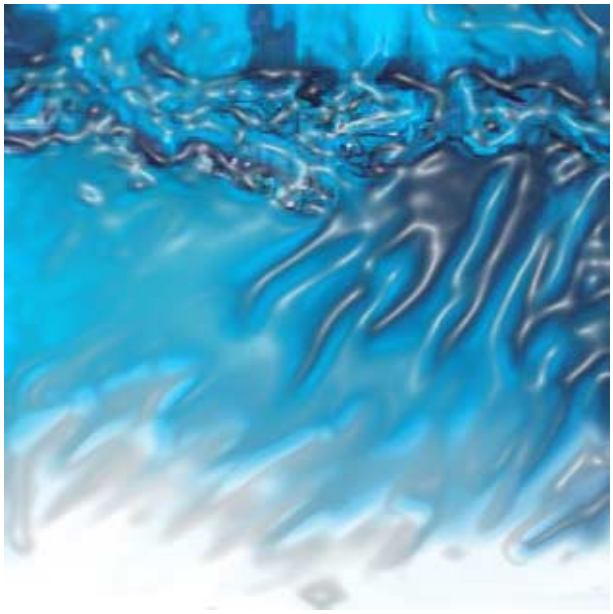
Maraming Salamat Po... MABUHAY!

洪水と貧困（マニラ）Session 4-3

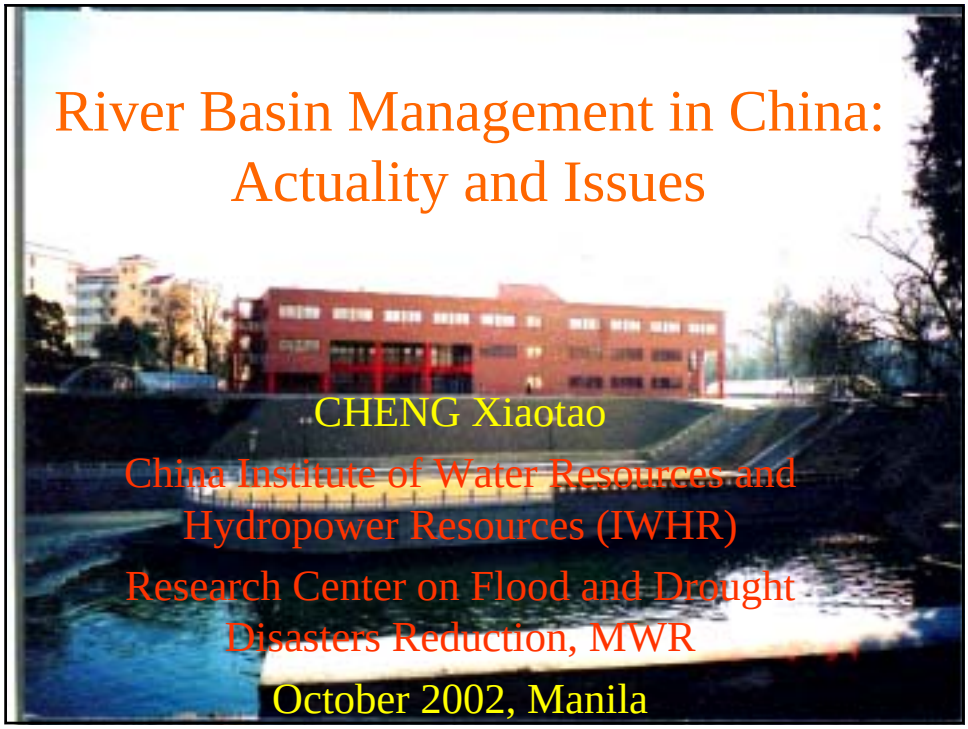
River Basin Management in China: Actuality and Issues

CHENG Xiaotao

China Institute of Water Resources and Hydropower Resources (IWHR)
Research Center on Flood and Drought Disasters Reduction, MWR
the People's Republic of China



第 2 次水資源プロジェクト研究計画調査



River Basin Management in China: Actuality and Issues

CHENG Xiaotao
China Institute of Water Resources and Hydropower Resources (IWHR)
Research Center on Flood and Drought Disasters Reduction, MWR

October 2002, Manila

Contents

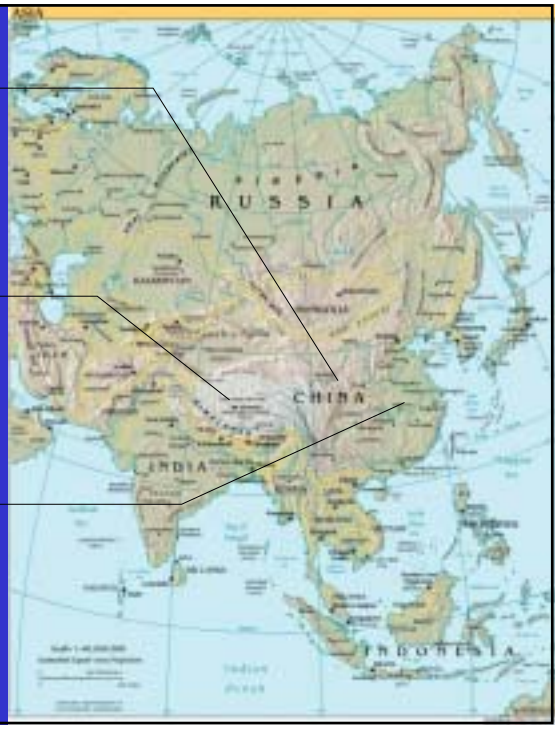
- Introduction
- The Current River Basin Management Institution
- The major issues Existing in River Basin Management in China
- Conclusions

Introduction

The second step: plateaus & basins with elevation between 1,000- 2,000m.

The first step: Qinghai-Tibet Plateau with elevation higher than 4,000m.

The third step: vast plains & hills with elevation lower than 500m.



Introduction

China has about 50,000 rivers with an area larger than 100 km^2, among which more than 1,500 rivers cover an area larger than 1,000 km^2. The total basin area of the river flowing into the sea accounts for 2/3 of the total area of Chinese territory, and the remaining 1/3 belongs to the inland river basins.

Seven River Basin Water Resources Commissions

- Song-Liao River Water Resources Commission, 1982
- Haihe River Water Resources Commission, 1979
- Taihu Basin Authority, 1984
- Huaihe River Water Resources Commission, 1950
- Yellow River Conservancy Commission, 1950
- Chang Jiang Water Resources Commission, established in 1950
- Pearl River Water Resources Commission, 1979

Introduction

Introduction

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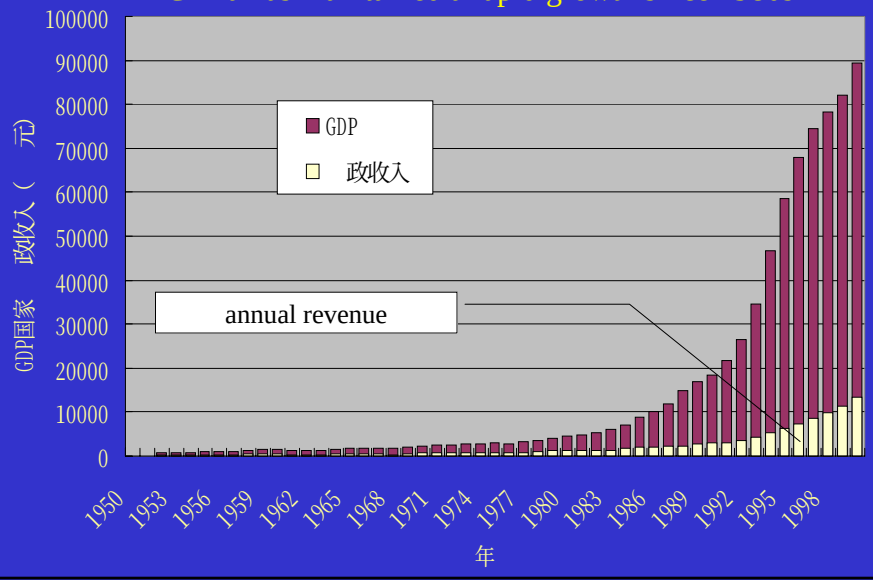
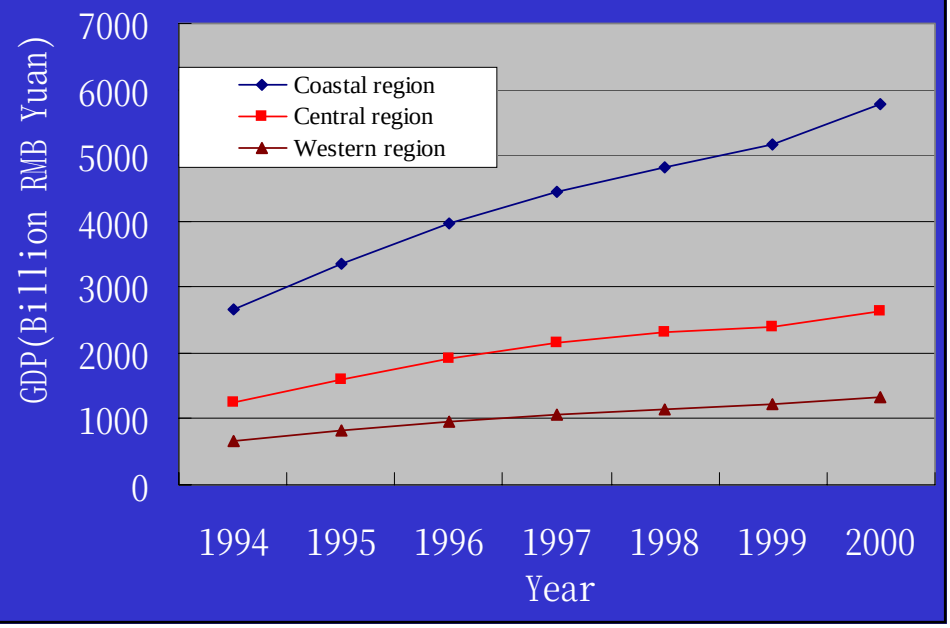
China has maintained a rapid growth since 1980s



Introduction



The Flood- prone Areas in China

The total areas: 1.06 million km^2,

(11.2%);

Population involved: 840 million,

(66%);

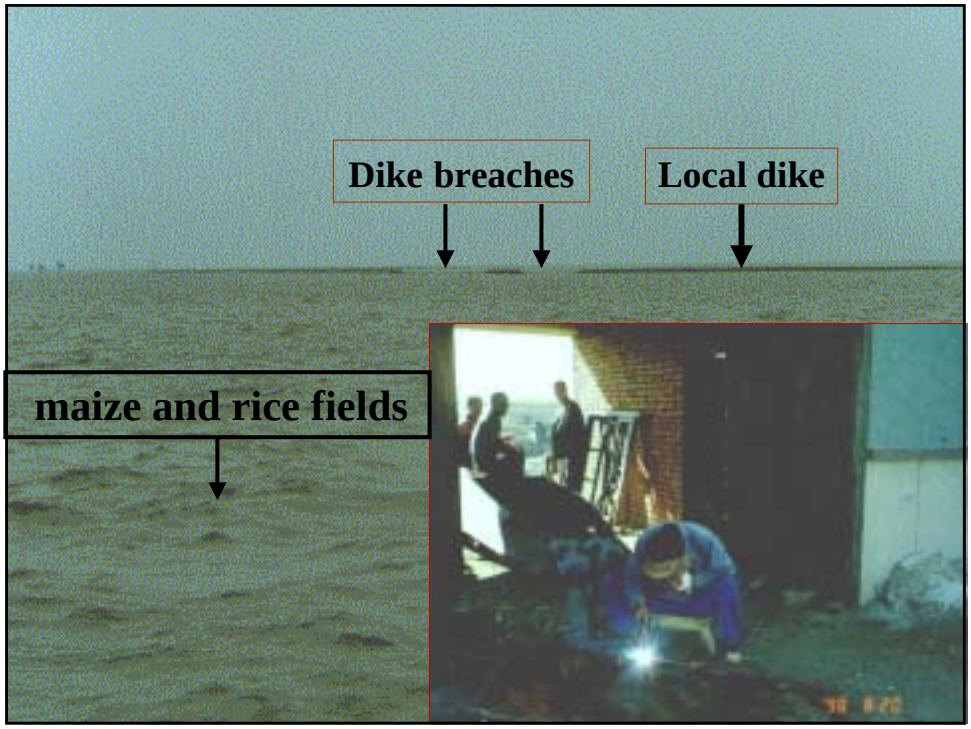
GDP produced:6,562.8 billion Yuan,

(80%);

Number of City: 407

(61%)

Flood-prone areas are the major regions of China's social and economic activities.


Dike breaches
Local dike
maize and rice fields

Detantion areas in Huaihe River Basin

Poverty, high density of population, high risk of flooding.

2 The Current River Basin Management Institution

2.1 Elementary establishment of the flood management institution

- According to the Flood Control Law of 1998 in China, flood prevention activities should be implemented in the unified planning and carried out in different levels, taking the institution of combining river basin management and administrative division management.

laws and regulations concerned with flood damage reduction

- Water Act (1988)
- Flood Fighting Regulation (1991)
- Water Course Management Regulation (1988)
- Guidelines for the Security and Construction in Flood Detention Areas (1988)
- Flood Control Law (1998)
- Statute of Compensating for Flood Detention Areas Application (1999)
- Schemes of the Critical Activities against Exceeding Floods for Yellow, Yangtze, Huaihe and Yongding rivers authorized in resent years, and so on.

2.2 Achievements of Flood Zoning for the Whole Nation

- In order to serve for the flood management, China has made flood zoning for the whole nation as an important fundamental work in the Tenth Five-Year National Flood Control Planning. The outcomes of flood zoning are divided into Flood zone, Transition zone and Non-flood zone (see Table 2 and 3).

The Flood Zoning Achievements for the Whole Nation (statistic data in 1999)

	Flood Zone	Transition Zone	Non-Flood Zone	Calculated area
Total area (10^3 km^2)	1059.5	5691	2706.6	9457
Percentage (.)	11.2 .	60.18 .	28.62 .	100 .
Population (10^6 person)	836.844	416.319	5.92 74	1259.09
Percentage (.)	66.46 .	33.07 .	0.47 .	100 .
GDP(10^9 Yuan)	6562.79	1594.28	34.02	8191.09
Percentage (.)	80.12 .	19.46 .	0.42 .	100 .
Density of Population (people . km^2)	790	73	2	133
GDP per capital (Yuan . person)	7842.3	3829.5	5739.7	6505.6

Flood Zone distributed in Seven Major River Districts (statistic data in 1999)

Name	Area		Population		GDP	
	km^2	.	million	.	billion Yuan	.
Songhua River	133662.00	12.62	20.7161	3.92	180.688	4.09
Liaohe River	63418.44	5.99	15.2458	2.88	157.032	3.55
Haihe River	135012.56	12.74	88.5591	16.76	704.416	15.94
Yellow River	45938.88	4.34	22.5035	4.26	137.597	3.11
Huaihe River	209344.47	19.76	142.7012	27.01	623.438	14.11
Changjiang	210081.10	19.83	113.3274	21.45	784.615	17.76
Taihu Lake	31927.65	3.01	23.7491	4.49	407.287	9.22
Pearl River	39939.73	3.77	20.8048	3.94	438.950	9.93
Sum up	869324.82	82.05	447.607	84.71	3434.023	77.7l

Major flood detention areas for the Yangtze River, Yellow River, Huaihe River and Haihe River

River	Number	Area (km^2)	Cultivated land (10^3ha)	Population (10^3)	Storage capacity (10^9m^3)
Middle & Lower reach of the Yangtze River	40	11,866	549	5,686	63.7
Lower reach of the Yellow River	6	9,169	605	4,707	7.8
Huaihe River	27	3,912	240	1,621	8.6
Haihe River	25	9,560	570	4,143	17.0
Total	98	34,507	1,964	16,157	97.1

2.3 Assessments for the Current Flood Control Capacities of the Major River Basins

- **Yangtze River**
- **Yellow River**
- **Haihe River (including the Luanhe River)**
- **Huaihe River**
- **Songhau River**
- **Liaohe River**
- **Pearl River**

3 The major issues Existing in River Basin Management in China

- The flood zone is not only the area with high risk of flooding, but also the area with highest density of population and properties. Today, the regions with high speeds of economic development are almost concentrated within the flood zone.
- Even progress have been made in the development of flood prevention system in China, we still have many issues existing in river basin management, someone will be discussed in this report as follows.

3.1 Incompletion of Flood Control System

- Only 1% of 590 thousand km^2 of flood protective areas have reached the standard at or above 100-year flood.
- Some key flood control projects in the flood control plans for major rivers have not been constructed. Some key projects are constructing, such as Three Gorge Dam and Xiaoliangdi Dam, but the accessorial works need to be completed further.

3.1 Incompletion of Flood Control System (continue)

- Most of the main dikes along the major rivers are formed and enhanced gradually in the long history with weaker treatment of foundation and a mass of hidden troubles.
- Large parts of the dams were built in 1950s and 1960s with inherent shortages and aging issues after operated in about 30 to 40 years. Among the 85 thousand dams, there are about 1/3 dams operating with “sickness” and threatening the securities of the down streams.

3.2 Weakness of Flood Management

- Unwise human activities in the flood prone area that increase the risk of flood damages have not been restricted effectively.
- Necessary performance measure enacted by the local authorities are still weakness in implementing the flood management related laws.

3.2 Weakness of Flood Management (continue)

- **The objects for the river basin management commissions are mainly restricted within the river but not really the river basin.**
- **There is no stable source and mechanism of the national investment for the development of flood prevention system, especially for the managements and maintenances.**
- **The flood forecasting and warning system and decision support system are still at the lower level.**

3.3 Insufficiency of Countermeasures for Exceeding Floods

- Although the Schemes of the Critical Activities against Exceeding Floods for Yellow, Yangtze, Huaihe and Yongding rivers have been authorized, the detailed performance measures still should be prepared.

3.3 Insufficiency of Countermeasures for Exceeding Floods (continue)

- However, there are no available critical schemes against exceeding floods for other major river basins, yet.
- The Schemes of the Critical Activities against Exceeding Floods for major rivers have not been adjusted according to the significant changes in the flood control situations.

4 Conclusions

- Living and developing with floods, is a basic situation of China from the past to the future. Enhancing river basin management is a complicated and formidable challenge that requires persistent efforts.
- Today, China is undergoing a tremendous transformation characterized by changing from the traditional agricultural society to the modern society, and from the planned economics to the market economics.

4 Conclusions (continue)

- On the one hand, the rapid development and urbanization has brought and will sequentially bring new issues on flood management and flood damage reduction;
- on the other hand, along with the perfection of legal system and management system, improvement of flood control system, and increase of economic level, a stronger capacity will be reliable on the river basin management.

4 Conclusions (continue)

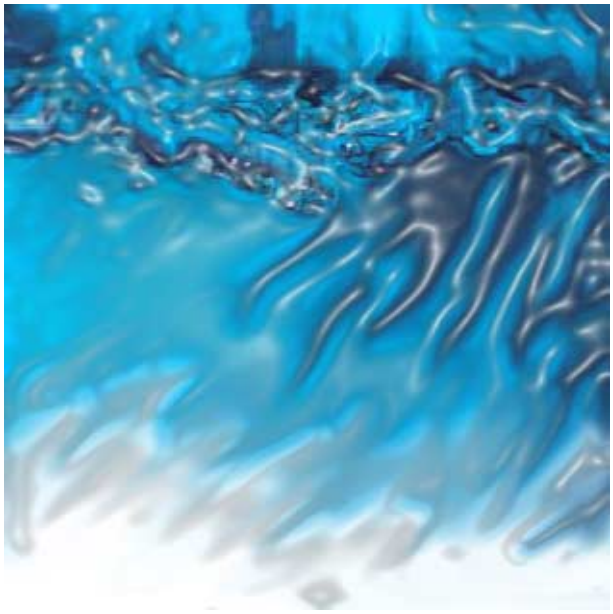
- In the field of river basin management, we still have a long way to go. It is necessary for us to combine the experiments from advanced countries with the real situation of our own in searching a new way of comprehensive and integrated river basin management.

洪水と貧困（マニラ）Session 4-4

Flood Disaster and the Specified flood Detention Areas in China

Wang Xiang

Office of State Flood Control and Drought Relief Headquarters,
the People's Republic of China



第 2 次水資源プロジェクト研究計画調査

Flood Disaster and the Specified flood Detention Areas in China

Wang Xiang

Office of State Flood Control and Drought Relief Headquarters, the People's Republic of China

October, 2002, Manila

Contents

1. Introduction: Flood Control and Drought Relief in China
2. Function of specified flood detention areas in the flood control and drought relief system
3. Case study: Dahuangpuwa Detention Area in Haihe River Basin
4. Prospects in the future

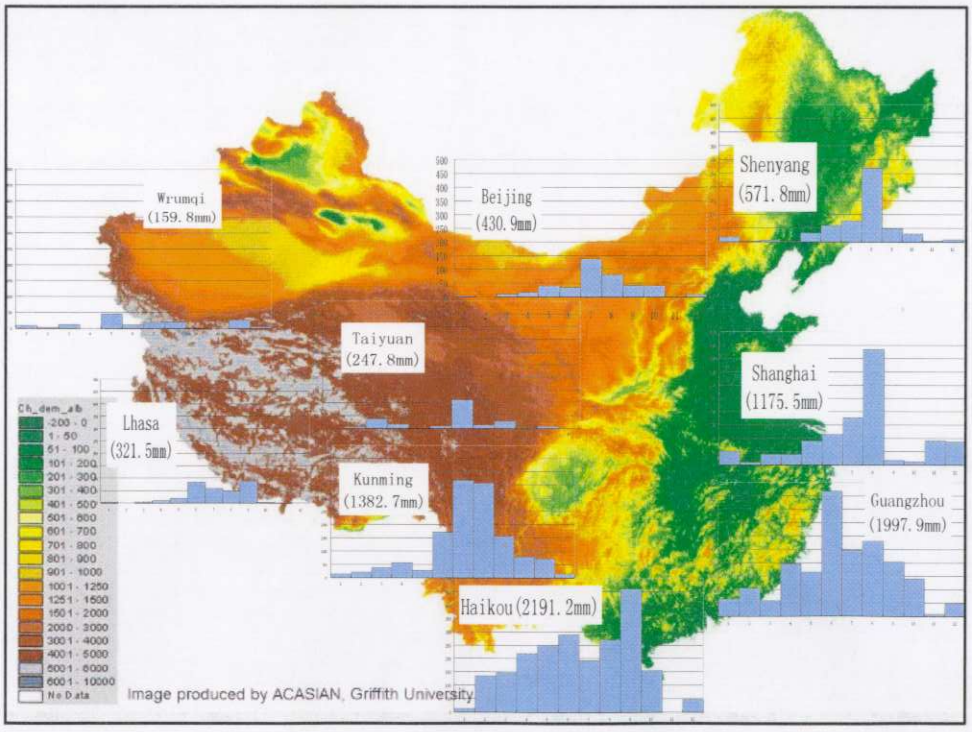
Introduction

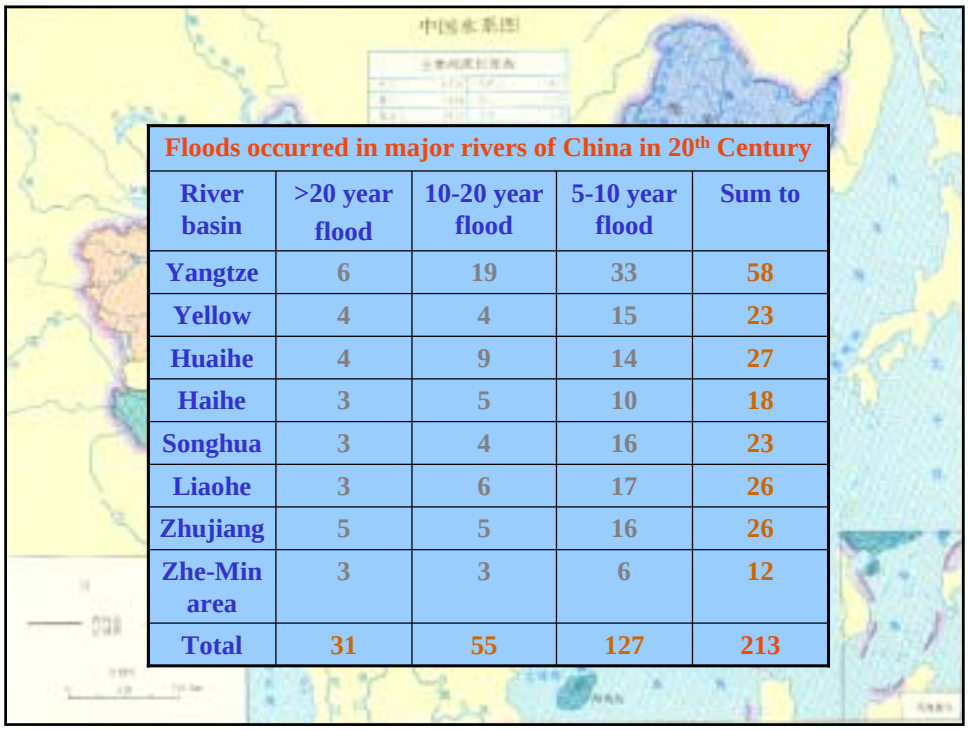
善为国者必先除五害。水一害也，旱一害也，风雾雹霜一害也，疠（瘟疫）一害也，火一害也，此谓五害。五害之属水为大。

——管子·度地篇

A man who is adept at running a state should eliminate Five Hazards ahead. One is flood; one is drought; one is harmful weather including storm, fog, hail and frost; one is pestilence, and one is fire. These are called the Five Hazards. Flood is the most severe one among the Five Hazards.

Guanzi, On the Land Administration





Floods occurred in major rivers of China in 20th Century				
River basin	>20 year flood	10-20 year flood	5-10 year flood	Sum to
Yangtze	6	19	33	58
Yellow	4	4	15	23
Huaihe	4	9	14	27
Haihe	3	5	10	18
Songhua	3	4	16	23
Liaohe	3	6	17	26
Zhujiang	5	5	16	26
Zhe-Min area	3	3	6	12
Total	31	55	127	213

2. Function of specified flood detention areas in the flood control and drought relief system

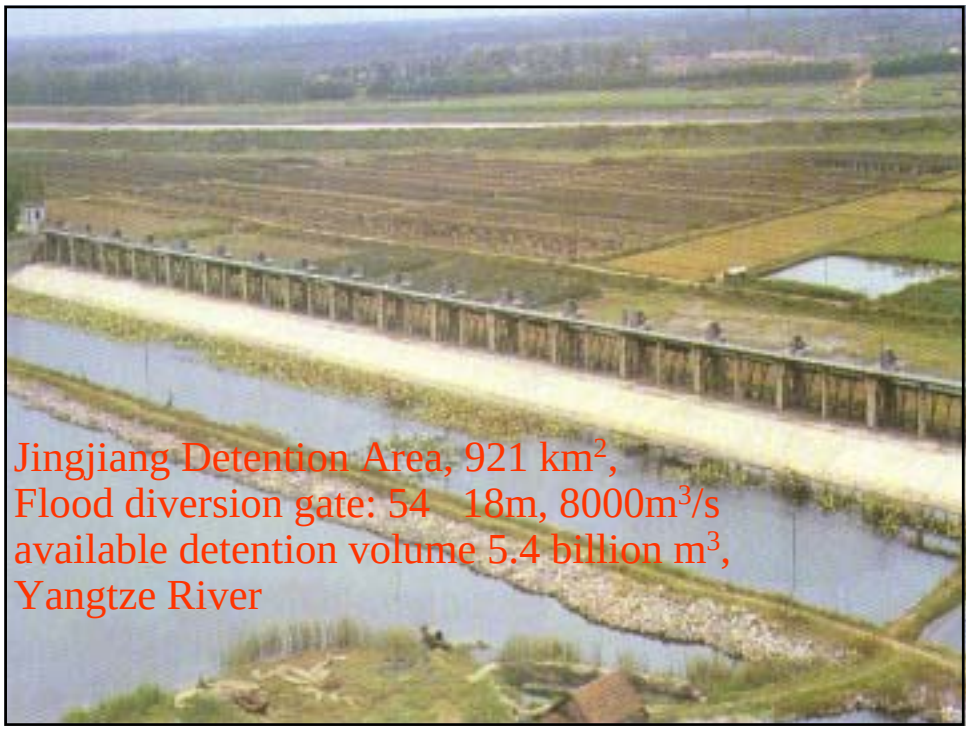
- Flood detention areas is one of the important part of flood control system in China;
- Within major river basins, there are 98 specified flood detention areas with total area of 34,616 km^2 , that equal to the area 6 times of Shanghai, or 55 times of Singapore;
- and with total farmland of 1.97 million ha, which equal to the total area of farmlands in Zhejiang province, and 733,362ha more than that of Fujian province.

Specified Flood Detention Areas in China

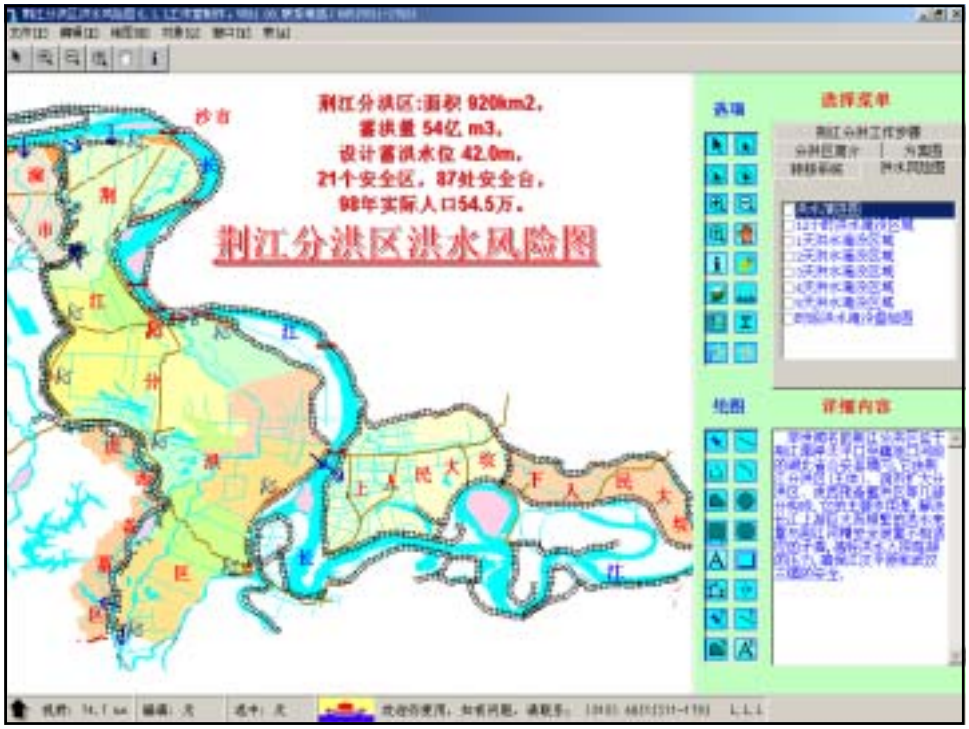
No.	Number & Name of River Basin	Total areas (km^2)	Total Farmland (10^3ha)	population (million)	Total property (10^9 yuan)	Total volume (10^6m^3)
1	6 in Yellow River basin	9,166	605	4.95	29.5	8,700
2	40 in Yangtze River Basin	12,327	569	6.89	118.8	60,800
3	26 in Huai River Basin	3,132	190	1.42	16.0	8,600
4	26 in Haihe River Basin	9,991	608	4.83	124.6	19,900
Total	**98**	**34,616**	**1,972**	**18.09**	**288.9**	**98,000**

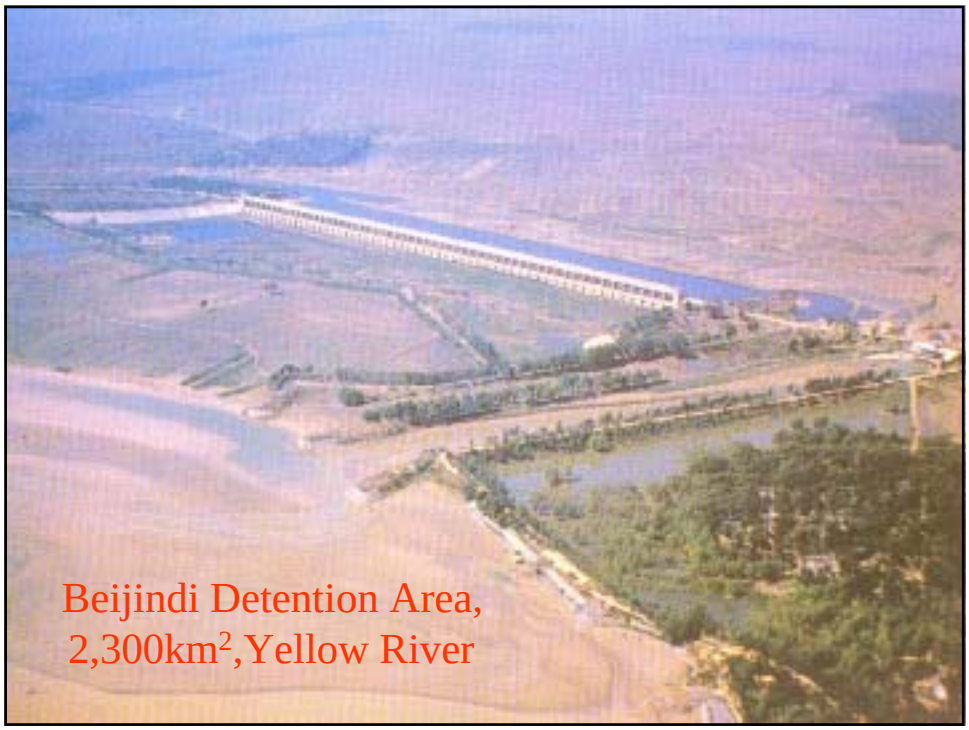
Flood Detention Area Management

- Legislations
  - the Guidelines for the Security and Construction in Flood Detention Areas (1988)
  - Statute of Compensating for Flood Detention Areas Application (2000)



Jingjiang Detention Area, 921 km^2,
Flood diversion gate: 54　18m, 8000m^3/s
available detention volume 5.4 billion m^3,
Yangtze River





Beijindi Detention Area, 2,300km^2,Yellow River

2.1 Flood Control

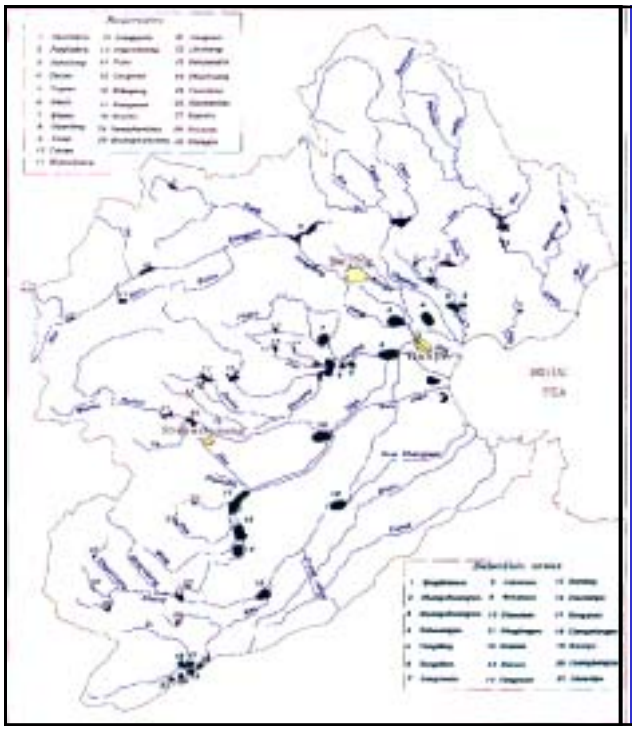
- Examples:
  - Jingjiang flood detention area diverted the flood 3 times in 1954.
  - Dujiatai flood detention area diverted floods from Han River 9 times in the past 50 years.
  - Dongping Lake diverted floods twice in 1958 and 1982, ensuring the safety of the levees in the downstream of Yellow River.
  - From 1950 to 2000, the specified flood detention areas of Huaihe River have been used in 29 years.
  - The flood detention areas in Haihe River Basin were used in 1963 and 1996 floods

2.2 Drought Relief

- The excessive floods storied in the specified flood detention areas may re-supplied the underground water, which is benefit for solving the water shortage problem. in northern China;
- Some flood detention areas of Haihe River in August 1996, not only ensured the safety of developed areas and large cities, but also re-supplied underground water in the areas nearby. In the coming four years, serious drought happened continuously, and the underground water supplied in 1996 alleviated the drought greatly.

2.3 Ecological Improvement

- As a result of rapid development, many rivers dried up in the downstream and the ecological environment was damaged seriously.
- Zhalong swamp is a flood detention area actually. In 2001, Songliao River Water Resources Commission of Ministry of Water Resources and Heilongjiang Administration of Water Resources adopted structural methods to divert the water of Nen River to Zhalong swamp to renew the natural ecological environment.



3. Case Study:

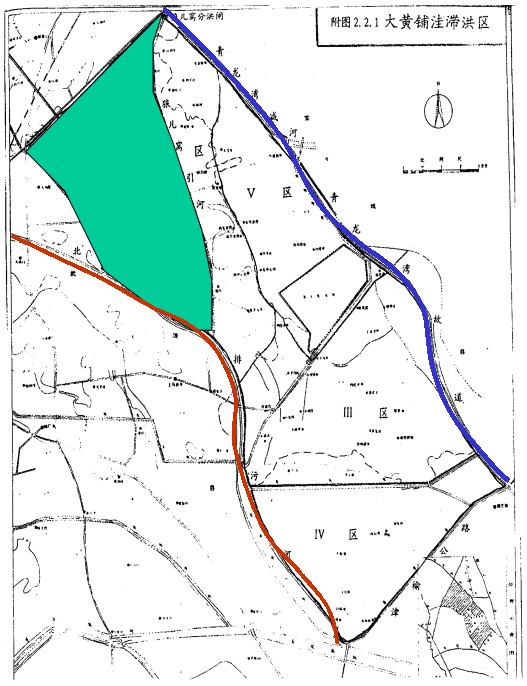
Detention areas in the Haihe River Basin: 26 detention areas, 9,991 km^2, used in 1963 and 1996.

Scheduled project

Presently, five sub-divisions exist for flood diversion according to different flood stages

For the first stage, a 50 km^2 wetland will be restored, about 2000 people need to be removed(three villages)

Key problem is the water source:wastewater from Beijing wastewater conveying channel, the other is the flood discharge in Qinglongwan River



4. Prospects in the future

- For the 21 Century, MWR has proposed new strategies in water-control, which stressed the significance of maintaining a harmonious relationship between human beings and water resources.
- Giving way to the flooding will be the aim of our structural actions. Thus, the flood detention areas are playing key roles in this aspect.

Prospects

- The construction and management of the flood detention areas are to be put into agenda.
- Giving way to the floods and in the meantime ensuring the operation schemes executed normally are both crucial.
- In general, for the serious shortage of water resources in China, floods are both menace and resources for us. Through the intensified construction and management of the flood detention areas, it becomes possible to make use of flood resources.

Prospects

- The objectives are:
  - ensuring the normal implement of the flood operation schemes;
  - making sure that the flood detention areas discharge floods properly;
  - avoiding the life loss and reducing property losses when discharging floods;
  - ensuring that people in these areas would live and produce normally when floods are not discharged.

Prospects

- Main aspects of the construction and management of the detention areas:
  - setting up a complete flood detention project system. In the frequently used flood detention areas, facilities of flood entrances and outlets should be constructed;
  - building a self-contained security facility system, which is used for the people's evacuation when discharging floods to avoid life losses.
  - establishing a reasonable compensation guaranteed system, to ensure ordinary life and properties after utilizing these areas;
  - establishing a complete law system to ensure that all activities inside these areas will be appraised impersonally;
  - intensifying the management of the detention areas to ensure that they are in good conditions and can work normally.

Prospects

- Countermeasures :
  - revising and improving the overall layout of these areas;
  - investing more capitals;
  - reinforcing the construction of the levees and flood entrance and outlet facilities;
  - enhancing the security construction of the areas;
  - planning and promulgating the correlated policies and laws;
  - completing the compensation works after discharging floods;
  - improving the management.

Prospects

- With a rapid development of socio-economic, the environment protection is more emphasized in China.
- In the near future, the construction and management in the specified flood detention areas will be strengthened, and these areas will place a significant role in the flood control system in China.

Thank you

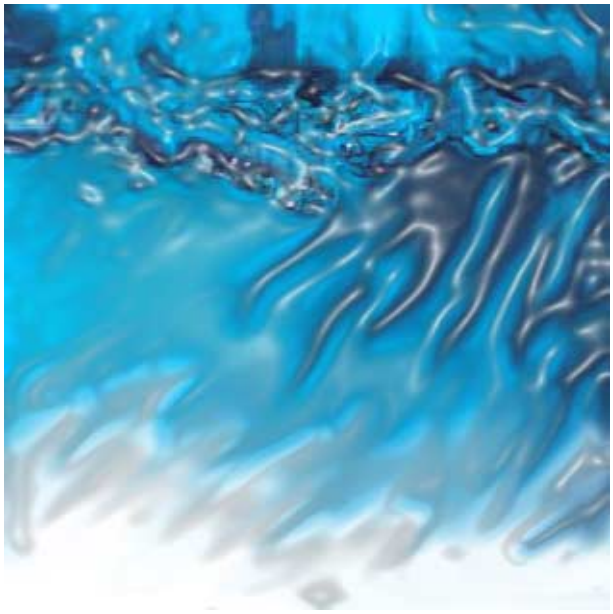
洪水と貧困（マニラ）Session 4-5

Flood and Poverty: The Nepalese Context

Damodar Bhattarai
Senior Divisional Engineer

Sagar Raj Goutam
Engineer

Department of Water Induced Disaster Prevention
Ministry of Water Resources HMG/N



第 2 次水資源プロジェクト研究計画調査

Flood and Poverty: The Nepalese Context

Regional Consultation Workshop on Poverty and Floods

Manila, Philippines

17-19 October 2002

Damodar Bhattarai
Senior Divisional Engineer

Sagar Raj Goutam
Engineer

Department of Water Induced Disaster Prevention
Ministry of Water Resources HMG/N

Some Features

- Population: 23.25 million
- Annual Population Growth Rate: 2.24% P.A
- Agriculture share in GDP: >35%
- Per Capita Income: US$220 P.A
- Population below poverty line : 38%

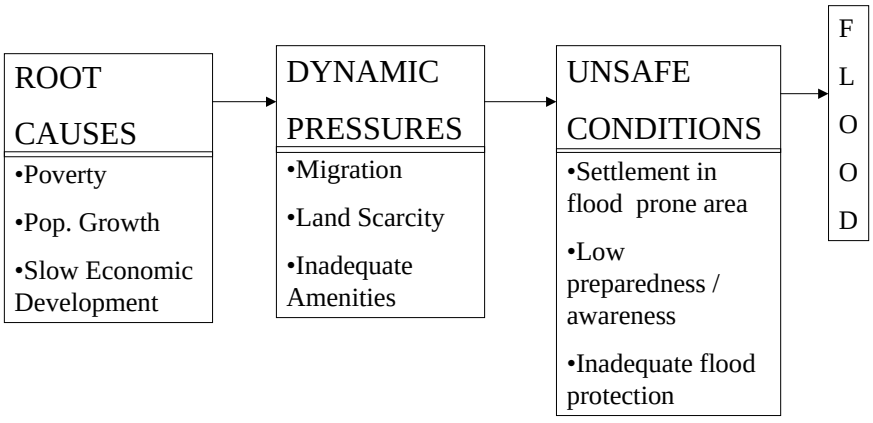
The Flood Problem

- Average Annual Precipitation: 1700mm
- Total Average annual runoff: 220 billion m^3
- Average loss of lives annually: 250

During the monsoon season of 2002

No. of People			Affected Families	Houses Destroyed	Livestock loss
Dead	Missing	Injured			
444	39	108	55338	21559	3610

Factors Contributing to Floods



Factors Contributing to Floods….Contd

- Heavy precipitation within short span of time
- Heavy localized precipitation resulting flash floods
- Breaking of temporary debris dam caused by landslide
- GLOF
- Deforestation, improper land use practices
- Drainage congestion
- Ad-hoc river control works

Attempts at Poverty Reduction

- 10th plan prioritizing improvements on water, agriculture and other social sectors
- Establishment of PAF
- Institutionalize WID Management
- Endorsing Water Resources Strategy
- Formulation of National Water Plan
- DWIDP as Lead Agency For Water Induced Disaster Prevention

Activities of DWIDP

• Prepare and implement water induced disaster management and plan
• Conduct Risk/Vulnerability mapping and zoning
•Strengthen the disaster networking and information system
•Carryout community awareness / education on disaster management
•Activate Inundation Committee(s)
•Prepare and implement flood plain action plan
•Implement disaster reduction / mitigation measures
•Strengthen Institutional Setup and capacity.

Conclusion

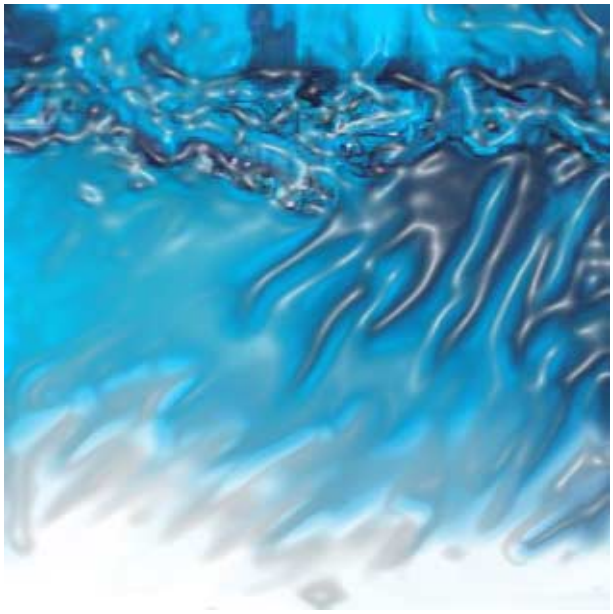
- Promotion of non structural measures
- Use of river control embankments as a road for transportation
- Promotion of agro forestry
- Promotion of flood plain forestry
- SABO works for catchment management
- Water risk reduction and management through technical exchange and joint collaborative research between / amongst Bangladesh, Bhutan, China, India and Nepal.

洪水と貧困（マニラ）Session 4-6

Land Degradation, Natural Disasters and Poverty, A Comprehensive Approach to Break the Vicious Cycle in Arid and Semi-Arid Region

Forood Sharifi, ME., Ph. D

Watershed Management Deputy, MJA,
Iran



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Land Degradation, Natural Disasters and Poverty, A Comprehensive Approach to Break the Vicious Cycle in Arid and Semi-Arid Region

Forood Sharifi

ME., Ph. D

Watershed Management Deputy, MJA, IRAN

P.O. Box 14155-6163, Tehran, Iran

Content of Presentation

- Problem statement and objectives
- Vicious Cycle of Poverty
- How to reverse or to slow down the dangerous trend
- Breaking the Vicious Cycle of Poverty
- Considering the potentail capacity of watersheds
- Impelmenting a management system
- Providing international support and assistance
- Concluding remarks

Under natural conditions in the watershed, livestock and plant life establish an environment in balance for their interactions. If man succeeds to conserve this balance through his proper management, it will be possible to produce and supply the necessary meat and dairy products while also utilizing soil, water, and plant resources in the watershed.

- **Maintaining a reasonable balance between livestock numbers and range carrying capacity will prevent devastation caused by overgrazing.**
- **Proper grazing intervals will reserve the opportunities for plant regeneration.**
- **Maintaining the vegetation cover will reduce soil erosion and the ensuing damages while also increasing natural groundwater recharge.**
- **Improved vegetation cover for higher forage supply will improve the income and, consequently, the living conditions of the local communities and tribes.**

A balance must always be kept between the livestock numbers and vegetation cover in the range. Meat and dairy products can be produced and supplied while soil, water, and plant resources in the range are optimally exploited provided that man maintains this natural balance through his proper management practices.

Every year, the tribes used to migrate from summer to winter grazing areas late in winter. This migration was usually associated, among the tribes, with pleasure and merry-making ceremonies such as making fire and passing the livestock through the fire.

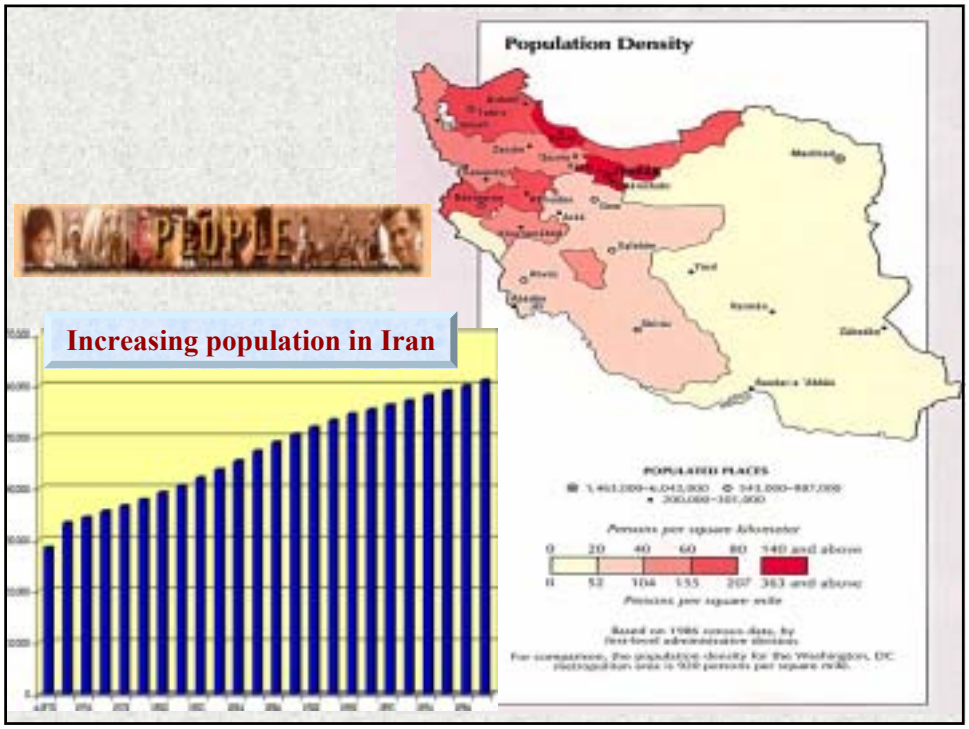
The nomads used to shorten the distance to their destination by entertaining themselves with different amusements and ceremonies along the way over a period of 2 to 2.5 months. The duration of the trip allowed enough time for forage in the spring and fall ranges to grow while the forage in the summer grazing area also grew and a balance between the livestock and the range plant regeneration capacity was maintained.

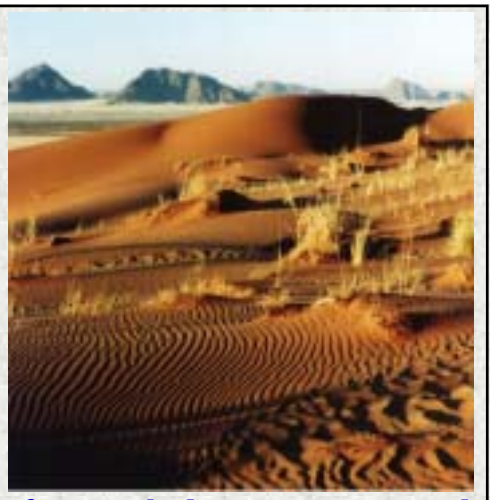
The beautiful and green nature imbued with flowers and plants brought health and vitality to the livestock, which also meant happiness and livelihood to the ranchers and tribesmen.

Arriving at the summer quarters and setting up tents along the streams and springs among the plants and flowers ready for their animals to graze on relieved the nomads from the fatigue of the long journey they had made. They could stay there long enough to regain their energy to pave the way back to their point of origin.

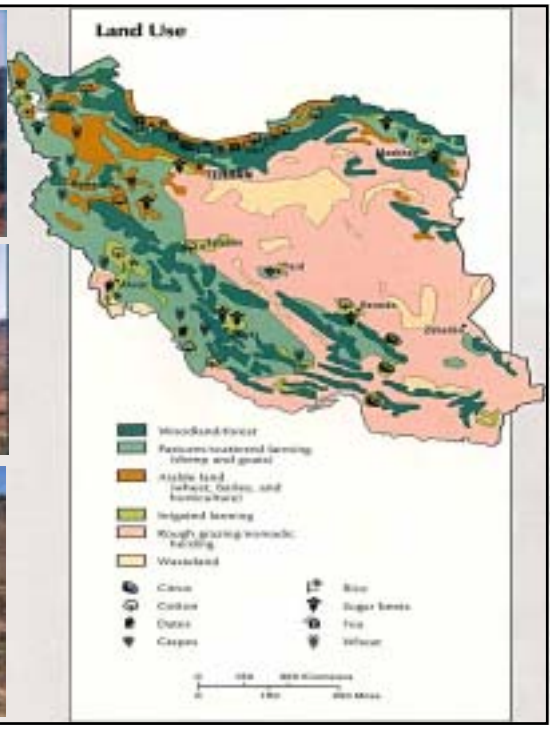
Proper watershed management practices and the balance between the livestock numbers and the range carrying capacity brought relief from all worries and bestowed the tribesmen with peace to enjoy the environment when they engaged themselves in hunting and recreation.

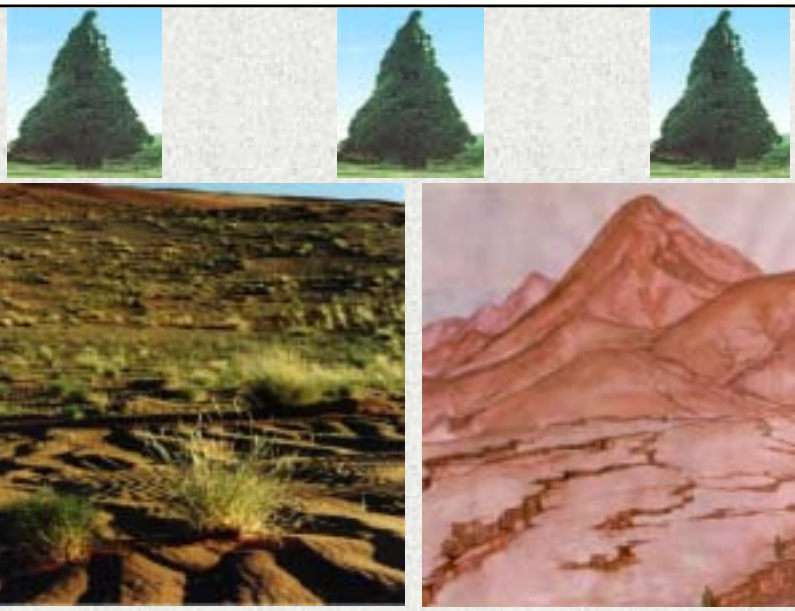

THE TREND IN THE
DEGRADATION OF
NATURAL RESOURCES


Population Density
PEOPLE
Increasing population in Iran



Ignorance of proper methods of watershed management and exploitation by people causes these resources to soon change into dry deserts devoid of life and vitality. It is even more unfortunate that some ignorant people seeking their personal benefits plough this barren land for dry farming and, thus, cause more severe land degradation through soil erosion.

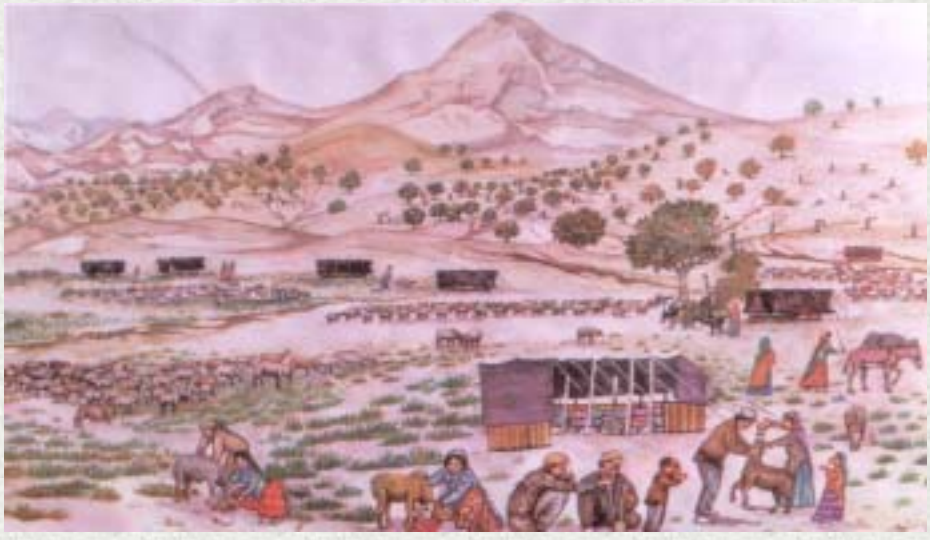




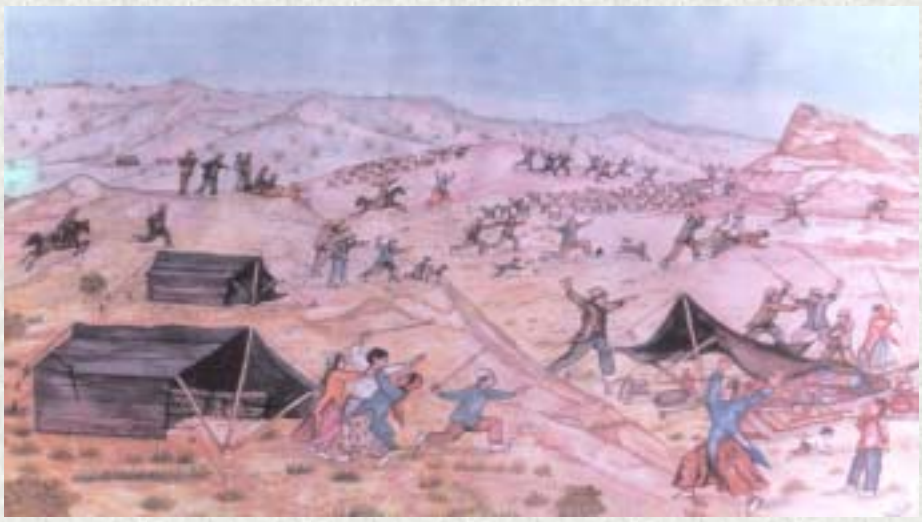
Uprooting of the bushes, cutting of the trees, and overgrazing ultimately turn ranges and forests to bare and barren lands where no trace of plant and animal life can be found.

Soil erosion gains a more severe trend year after year so that a considerable quantity of valuable and fertile soil is lost after each rainfall. Impoverished vegetation cover forces livestock breeders to turn to tree buds and foliage as well as irrigated pastures. Forage shortages can lead to weak animals plagued with malnutrition and illness, resulting in reduced productivity and tribal income.

Once the vegetation cover on watershed is degraded, rain water will not seep into soil only but forms fast runoff flowing in small streams which ultimately join each other to create destructive floods. The floods may then demolish and wash away all facilities such as roads, bridges, downstream villages, farm lands, and installations along their course.



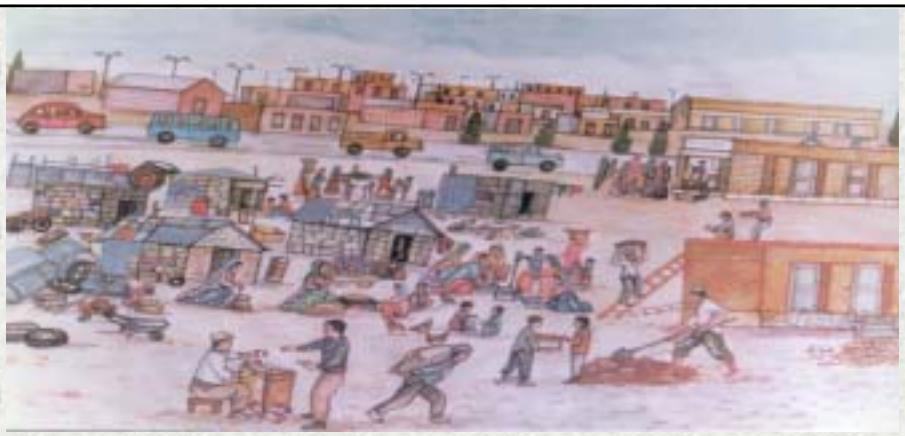
If cattle are allowed to graze at the beginning of the growth season, palatable species will gradually become extinct as a result of overgrazing to be replaced by woody, invader plants.



Soil erosion and lower catchment productivity follows range degradation. This will, in turn, lead to larger range area requirements by tribesmen to feed their livestock, which only means encroachments on neighboring catchment and involvement in tribal conflicts across the region.

Signs of erosion due to land degradation and overgrazing

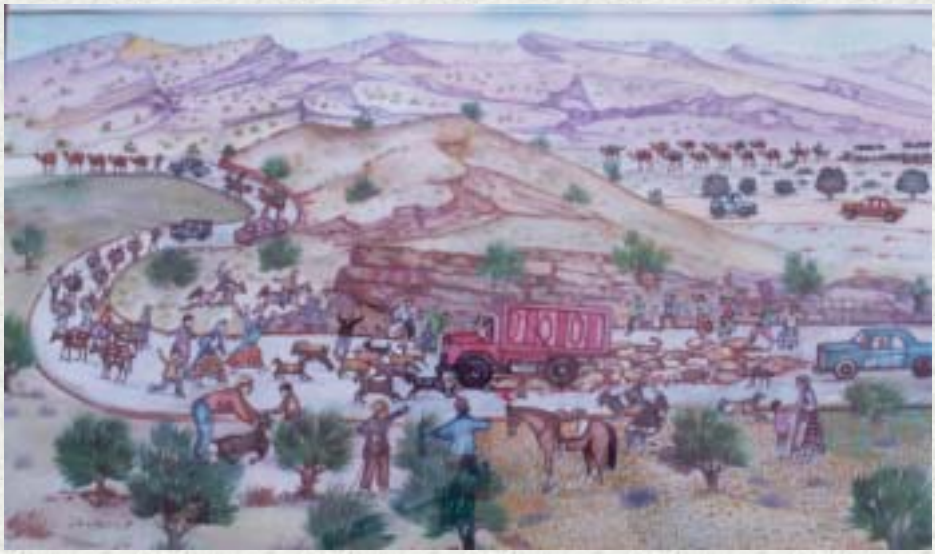
Continued catchment devastation means the depletion of forage plants. The tribes will then have to sell their livestock and to immigrate to cities.



The immigrating tribesmen, who were once livestock breeders, cannot normally find decent employment in urban areas because of their lack of skills on demand in cities; this leaves them with meager opportunities for low-income jobs such cigarette selling, construction labor, and the like. They will have to live in illegal, low-income urban suburbs where there are ample chances for involvement in illegal behavior, crime, and corruption, adding to other urban problems such as food and water shortage, housing and transportation.

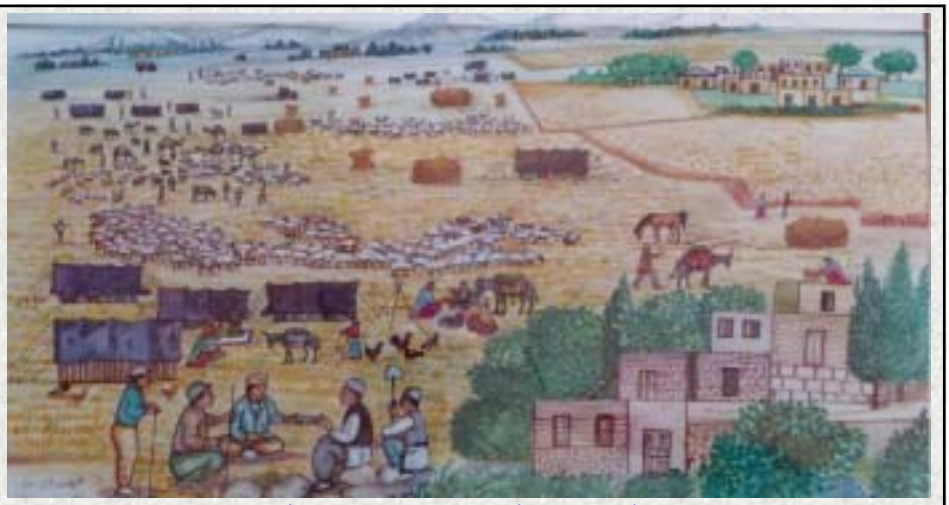
The insufficient and unsuitable plant cover in the summer grazing area and the problems expected on the way to the winter grazing quarters leaves little hope for the tribesmen to take joy in starting their journey so that they prefer to choose a shorter itinerary along highways and through small towns. There is no pleasure of passing through ranges on the way anymore.

The obligation to pass through rural areas and farm lands sometimes causes conflicts with local people. These casual conflicts inflicts the tribesmen with more worries about their food security.



Traveling along motorways and through urban and industrial areas cause excessive fatigue and considerable loss of livestock weight. Also, some of the livestock animals die along the way for various reasons including road accidents.

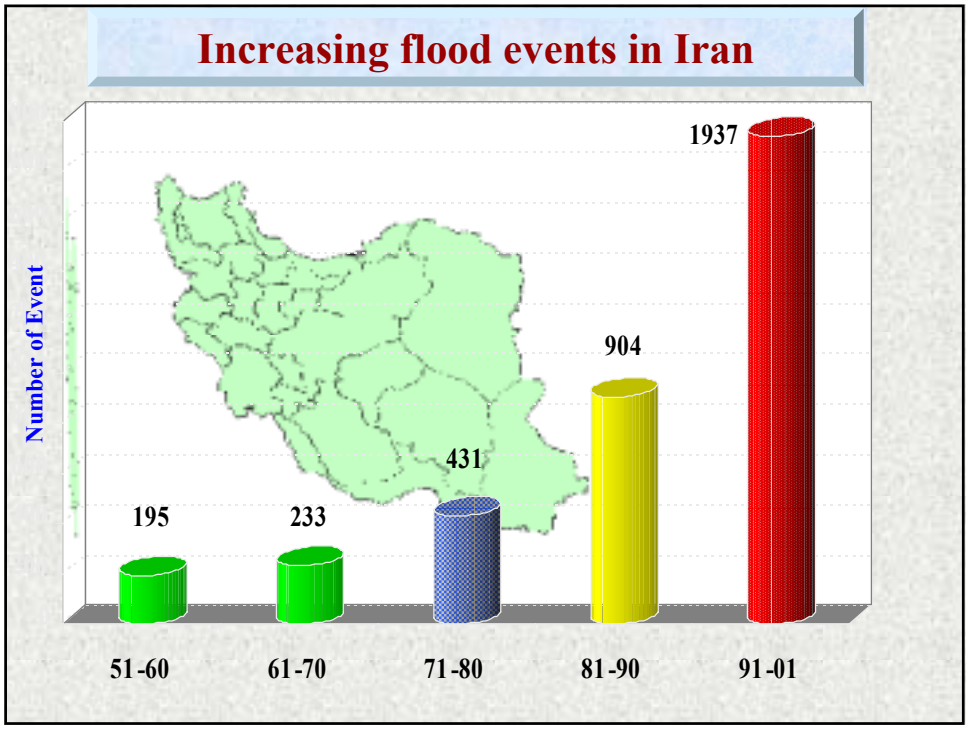
Another cause of death tolls among the cattle is the lack of feed and excessive fatigue over the 15 to 20 days of the journey, which is augmented by poor or inadequate forage and cold weather in the winter grazing area.

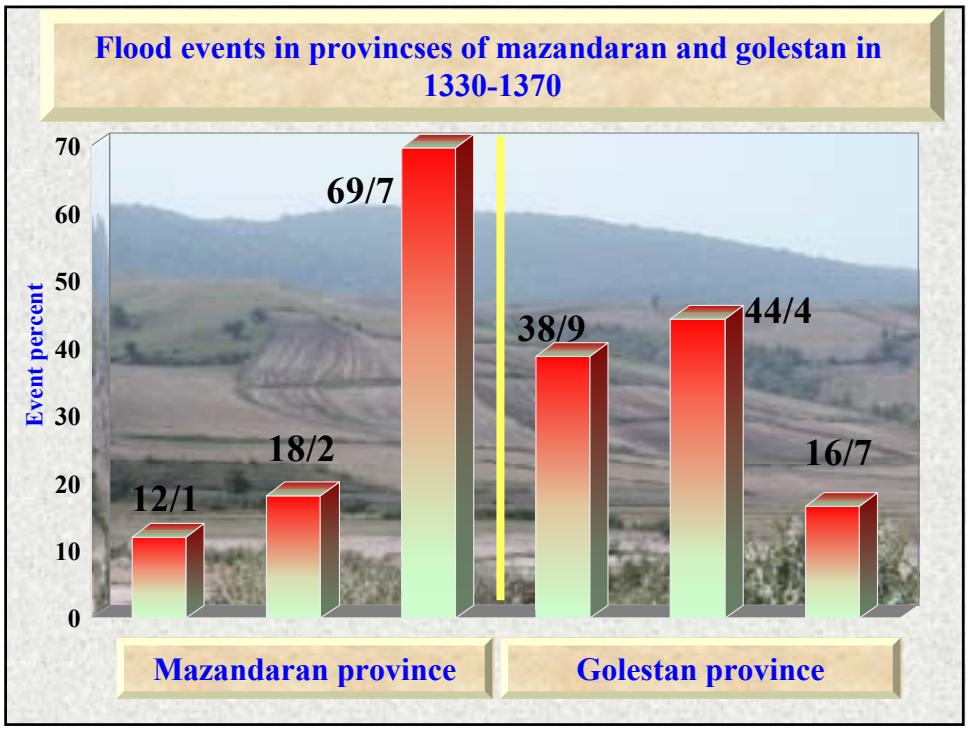


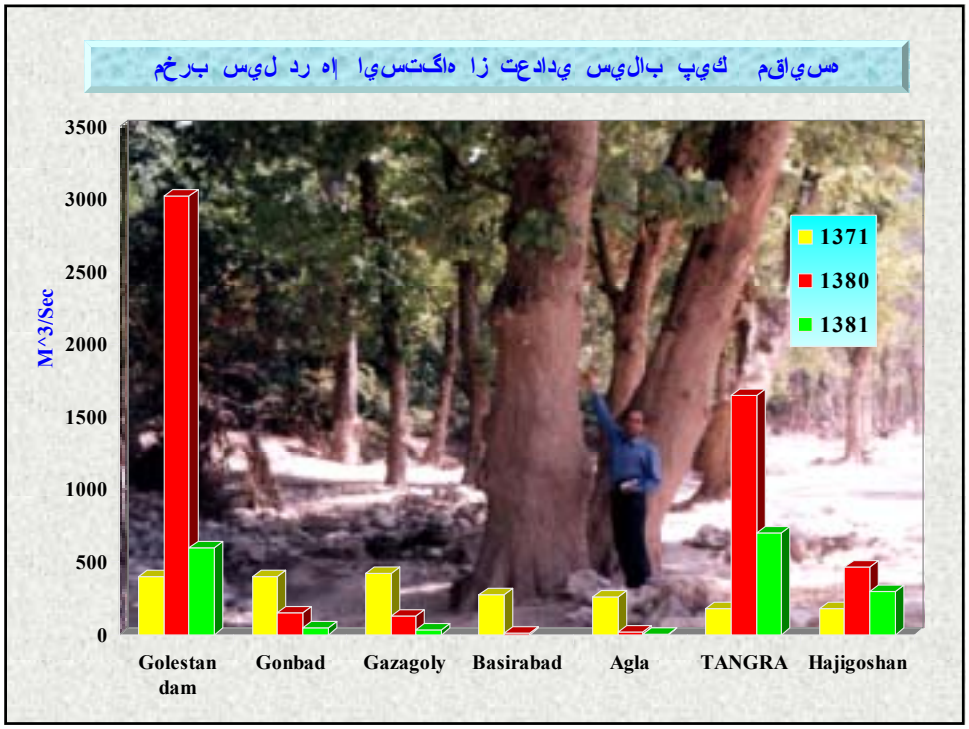
The young plant cover in the summer grazing areas is browsed and grazed by the trampling animals over a short period of time, which not only causes the soil to be compacted but also leaves no chances for the plant cover to grow, flower and seed. The tribesmen who must naturally wish to spend all the summer long on these ranges are anxious to leave because of inadequate supply of forage for their animals and also in the hope that they will earn money when they give their range on lease to wheat growers.

Historical Floods in Iran

- In the last 50 years, about 3700 events of flooding have been reported
- Among them some 53% occurred during the last 10 years.
- During the last 20 years, the number and the peak of flood events and their damages have increased.



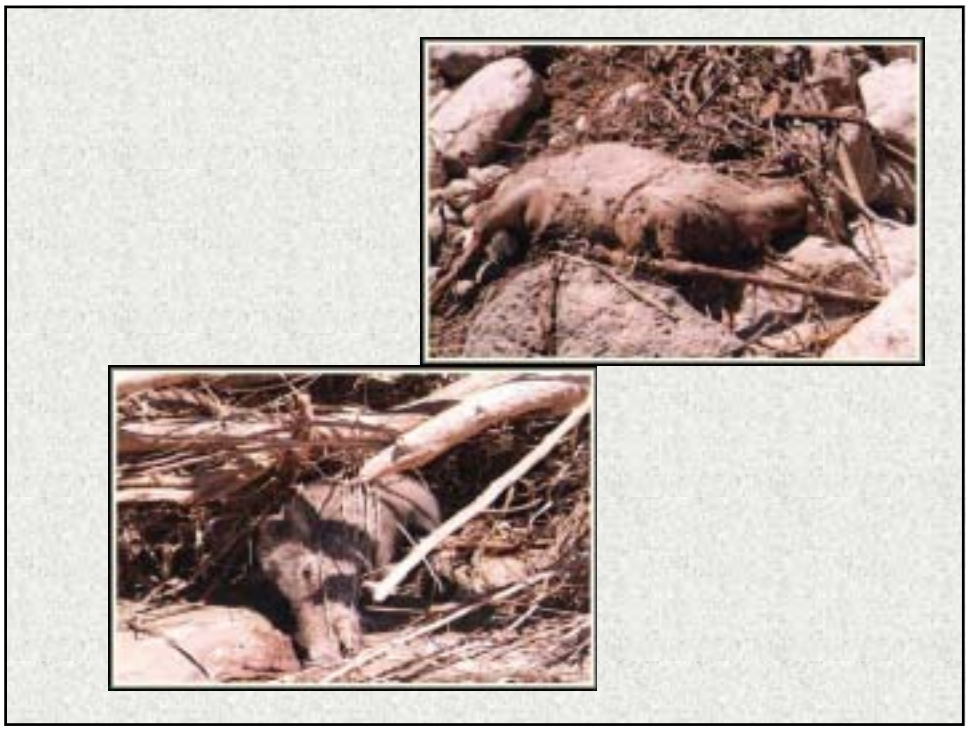

Flood events in provincses of mazandaran and golestan in 1330-1370
Event percent
70
60
50
40
30
20
10
0
12/1
18/2
69/7
38/9
44/4
16/7
Mazandaran province
Golestan province


مقايسه پيك سيلاب تعدادي ايستگاه از سيل در اه مخرب
M^3/Sec
3500
3000
2500
2000
1500
1000
500
0
1371
1380
1381
Golestan dam
Gonbad
Gazagoly
Basirabad
Agla
TANGRA
Hajigoshan

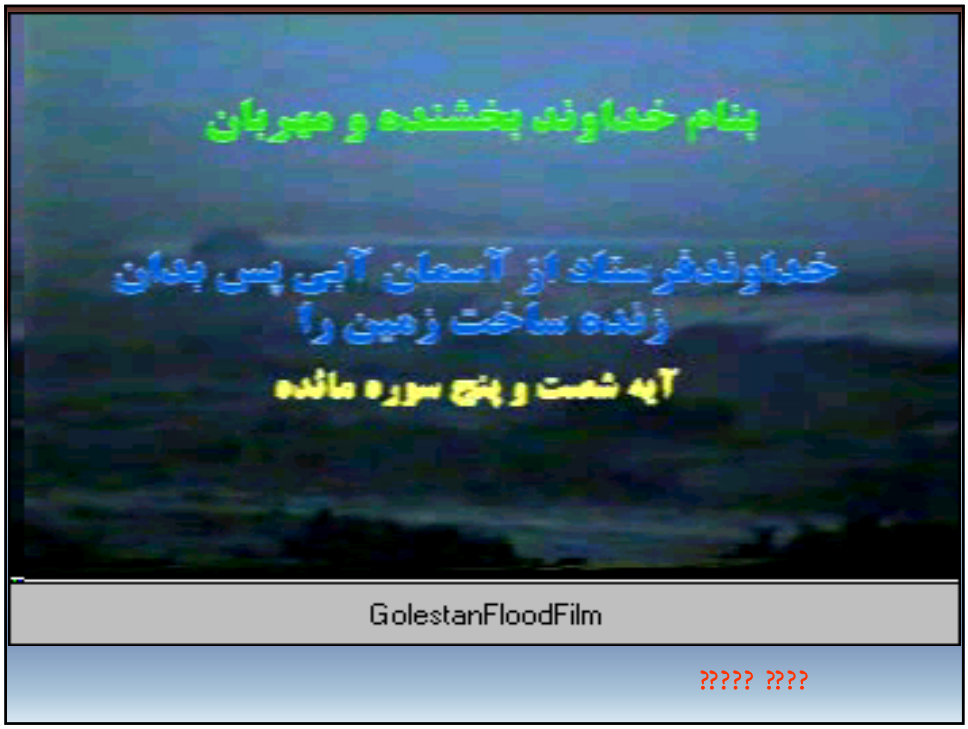
Looking for missing bodies

26 people ridding on this tractor died due to lack of flood training.

Vehicles being carried by the flood



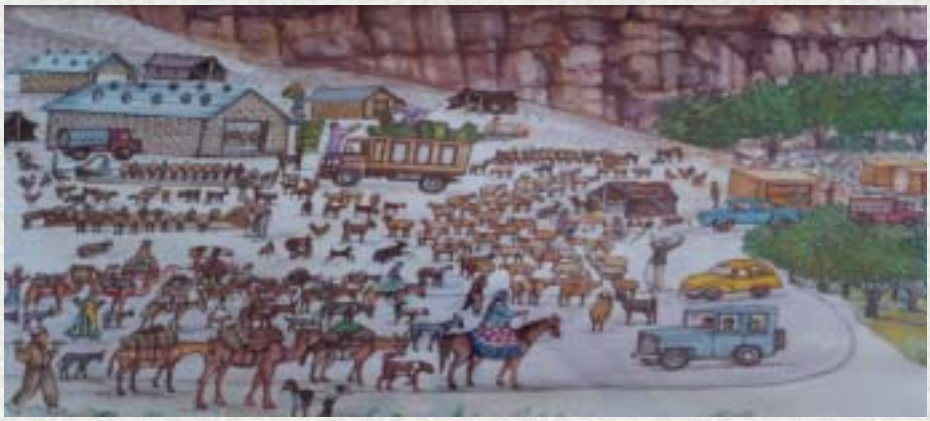

Flood damage in Golestan Catchment Aug. 2001-2002


بنام خداوند بخشنده و مهربان
خداوندفرستاد از آسمان آبی پس بدان
زنده ساخت زمین را
آیه شصت و پنج سوره مائده
GolestanFloodFilm
????? ????

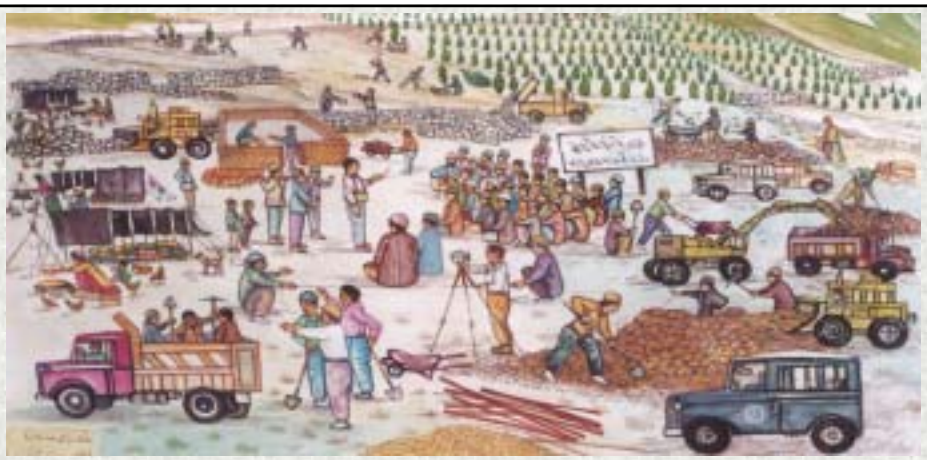
Break the vicious cycle ?

Vegetation cover must be rehabilitated and methods must be applied to control water and provide conditions for its infiltration into soil. Tree and shrubs must be planted. Implementation of such measures and practices that will ultimately lead to the soil and water conservation and that will create an environmental balance is called Watershed Management.

Implementation of watershed management practices and rehabilitation of vegetation cover will provide the conditions for proper resource exploitation led by scientific management. It is essential know that rehabilitation is not enough but that exploitation must be guided by technical and scientific considerations. Otherwise, degradation and desertification will occur again and the investments will be wasted. It is even more essential to prevent rather than cure; i.e., technical consultation must be sought in the maintenance and conservation of range lands prior to their degradation to save ourselves the task and burden of implementing rehabilitation schemes.

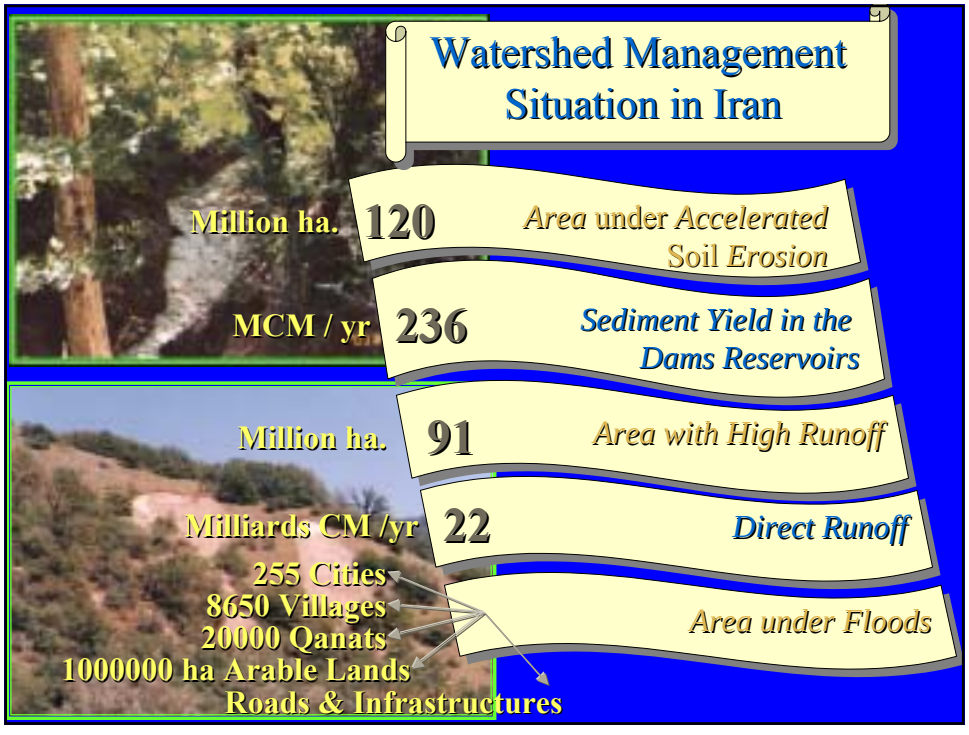


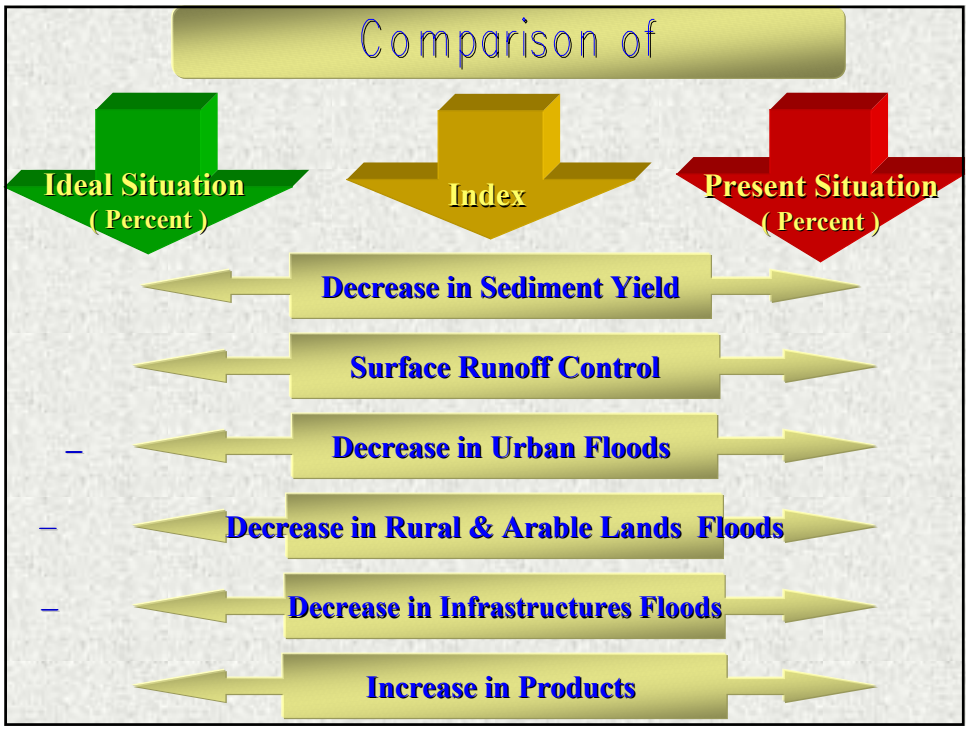
Regarding the depletion of the vegetation cover in the summer quarters due to early and heavy overgrazing, it may be wise to establish cooperatives of tribal livestock growers. These cooperatives will be assigned the mandate to secure resources (animal feed) for the temporary settlement of the tribes in fall and spring grazing areas for periods of 1 to 2.5 months. The purpose will be to allow time for the plants in the summer grazing areas to grow mature, flower and seed. This should also have definite contributions to soil and water conservation in the range. The only requirement is allocation of part of the farmlands to the cultivation of forage to be supplied to livestock growers at affordable prices.



Life and livelihood in all communities depend on soil conservation and watershed management as the cornerstones to all other activities in the society. Permanent settlements bring with them life and livelihood to nature. The settlement of tribes and their engagement in forage production on farmlands will be effective measures contributing to the conservation of soil, water and renewable natural resources.

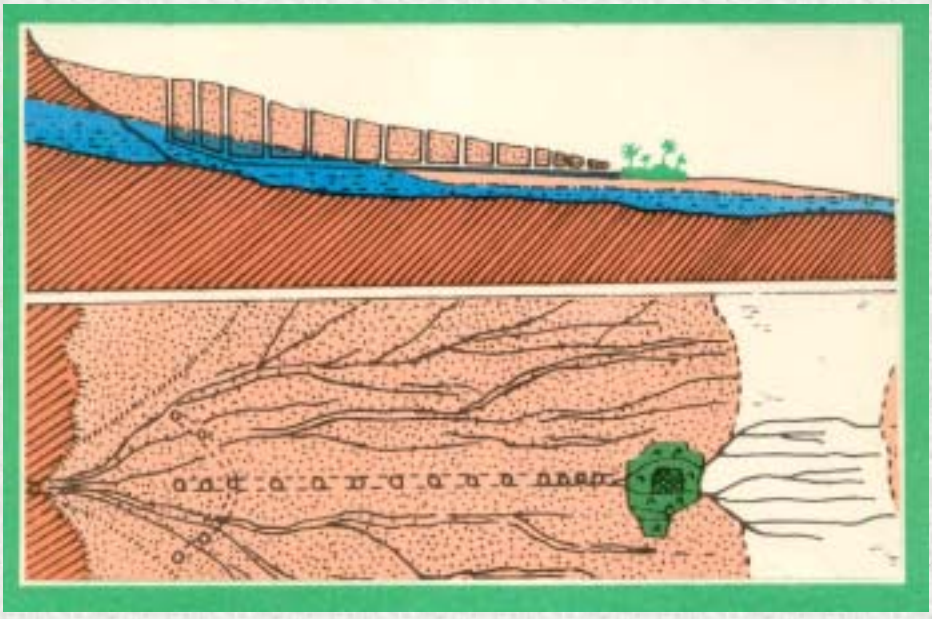
The permanent settlement, forage production, potential recognition of the tribes have positive and good effect on the soil, water and renewable natural resources conservation and life continuance.



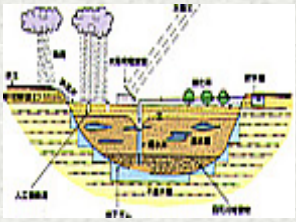

Comparison of
Ideal Situation
(Percent)
Index
Present Situation
(Percent)
Decrease in Sediment Yield
Surface Runoff Control
Decrease in Urban Floods
Decrease in Rural & Arable Lands Floods
Decrease in Infrastructures Floods
Increase in Products

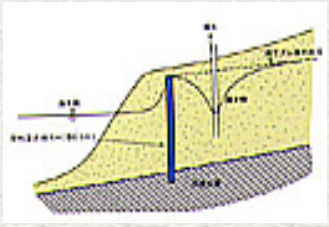
Improve of Veg. Canopy Cover in Rangelands

Ghanat System Invented by Ancient Iranian

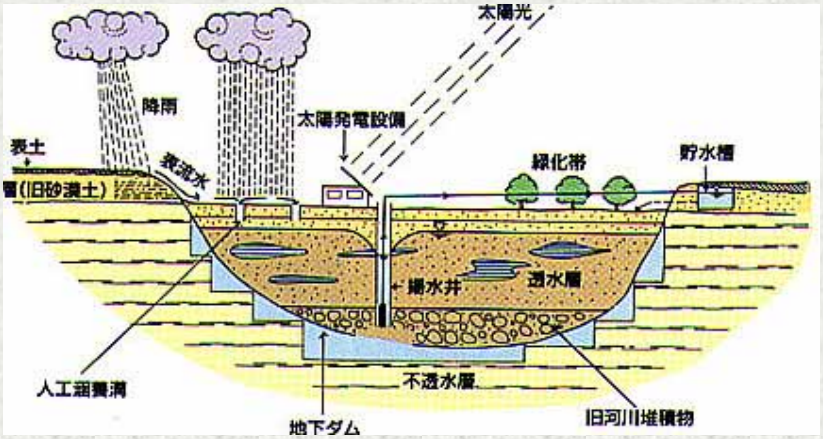


Underground dam

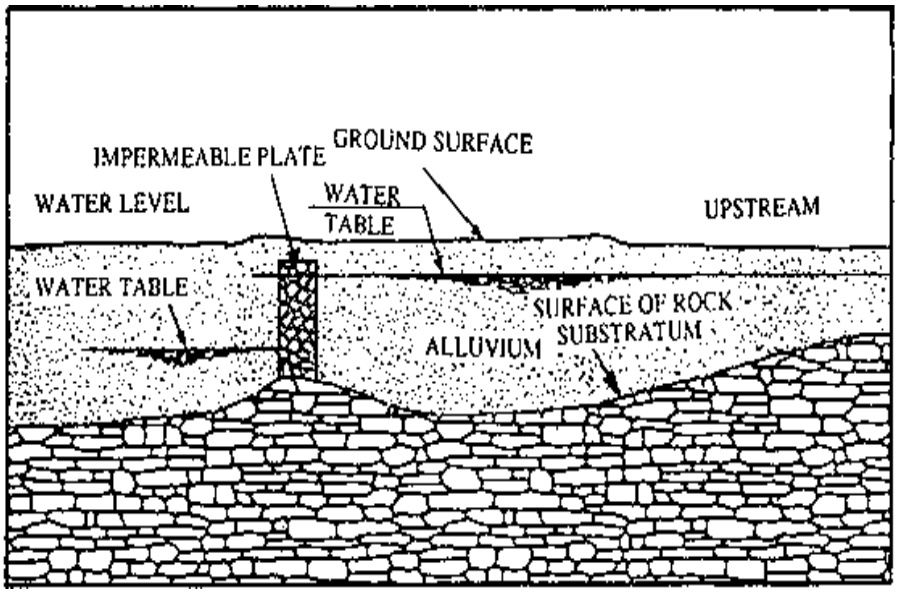




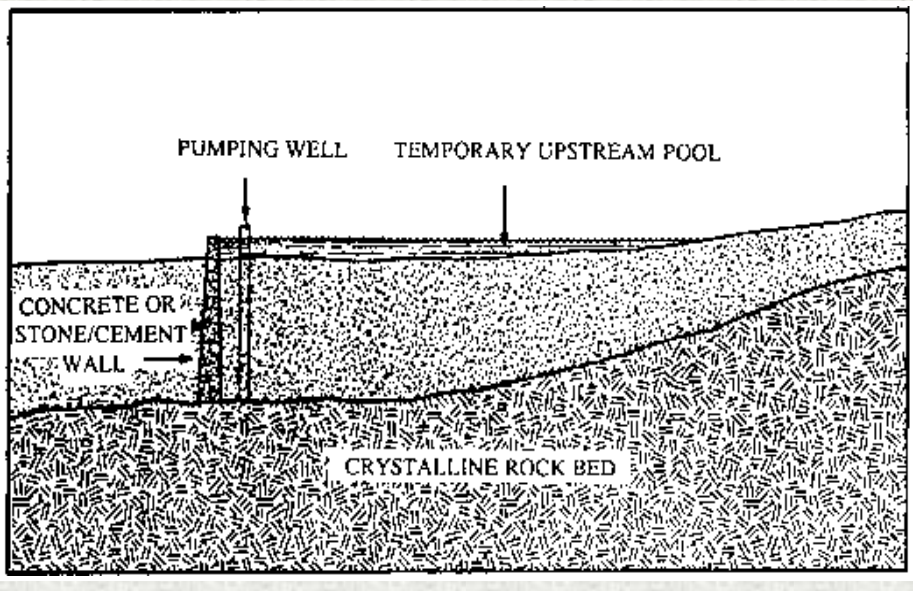
Underground dam



Under ground dam(type 1)

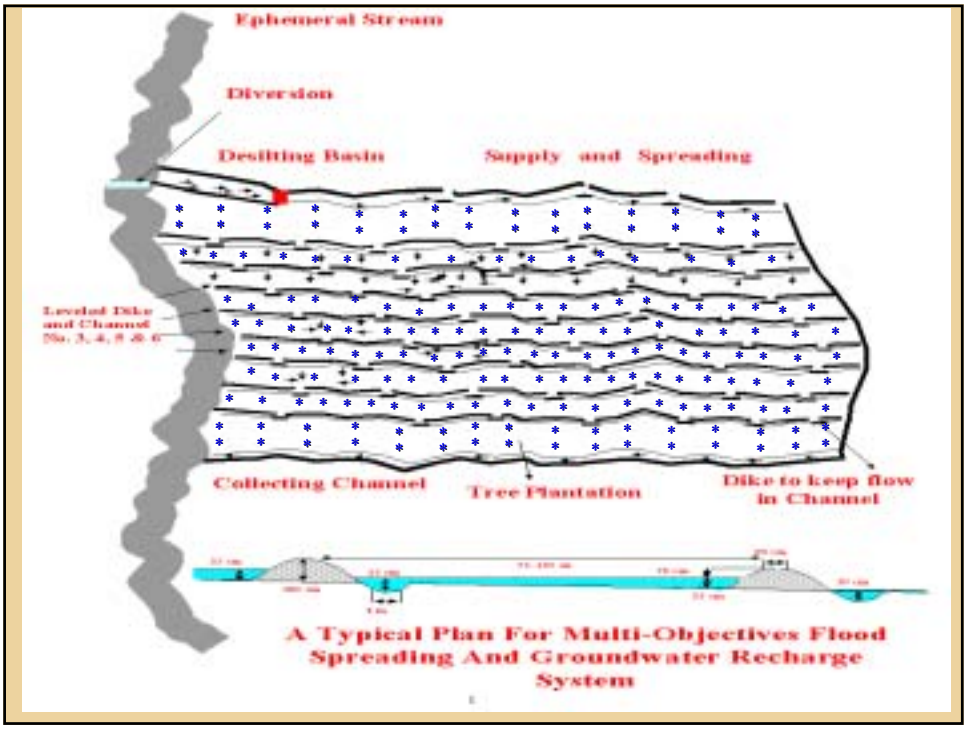


Under ground dam(type 2)



GREEN BELT
To combat desertification

A millet field, an example of rainwater-dependent farming



Executive Strategies in the Third 5 years Plan

1- Preparation of Watershed Management Master Plans
2- Development in NGOs and Stackeholder Communities
3- Conservation of Critical Areas , participation
4- Increase in Local People Incomes, Employment Op.
5- Implementation of Watershed Management Pilot Projects
6- Conservation Priority in the Watershed of Dams
7- Investments in the Mountain Area
8- Investments in the Area with High Natural Potentials
9- Improvement in Natural Vegetation Cover (in Valleys)
10- Landuse planning and Implementation

Emphasis on Governmental Founds

Lack of Local People Participation

Emphasis on Mechanical Measures

Scattered Projects

Lack of Comprehensive Plans

Lack of Multi-Objective

Are some reasons for failures in achieving the watershed management goals and objectives

Breaking the Vicious Cycle of Poverty

- The key issues relating to fight against the vicious cycle at national and regional level for reducing the poverty include:
- Sustainable management of natural resources, reforming and decentralization in water resources control.
- Watershed management and soil and water conservation practice.
- Increasing irrigation efficiency.
- Sustainable increase in crop and livestock production.
- Mitigation of drought for example by establishing regional network for drought mitigation and flood warning.
- Combating desertification.
- Improving quality added and value added of agricultural products.
- Adoption of quality standard and reduction of post harvest crop losses.
- Control of plant pest and livestock disease.

Considering the potentail capacity of watersheds

- Potentail capacity of watersheds is limited.
- Impelmenting a management system.
- Strengthening the intersectoral coordinating institutions.
- Identifying critical and strategic watersheds.
- Sectoral approach must be abandoned in favor of, inetrsectoral approach.
- Priority given to supplying water for communities settled.
- Decentralized rather than centralized investments.
- Transfer of experience from other countries.
- Centralized investments in constructing large dams or establishing centralized agricultural sites may not be considered as solutions to rural community problems.

Instead, these communities always look for ways to mitigate dry spells and periodical droughts through water storage in underground reservoirs,through preservation of soil moisture, or through storage of water in places as near to their residence as possible.

Impelmenting a management system

- Establish and support public education centers for more awareness and good practice.
- Providing international support and assistance in sustainable watershed management.
- Establishing a set of comprehensive laws.
- Construction of small check dams.
- Small recharging ponds for flood control and warning system.
- Flood spreading for groundwater recharge.
- Underground dam construction.
- Water harvesting activities.
- Demand driven strategy for sustainable development of watersheds with empowerment of people and active participation and partnership of local communities to ensure productivity and sustainability.

Any successful approach should closely be involves community sectors at grass-root levels, including NGOs, women and youth, in formulation, planning and implementation as well as launching awareness to sensitize all stakeholders to understand the impacts and to identify their roles.

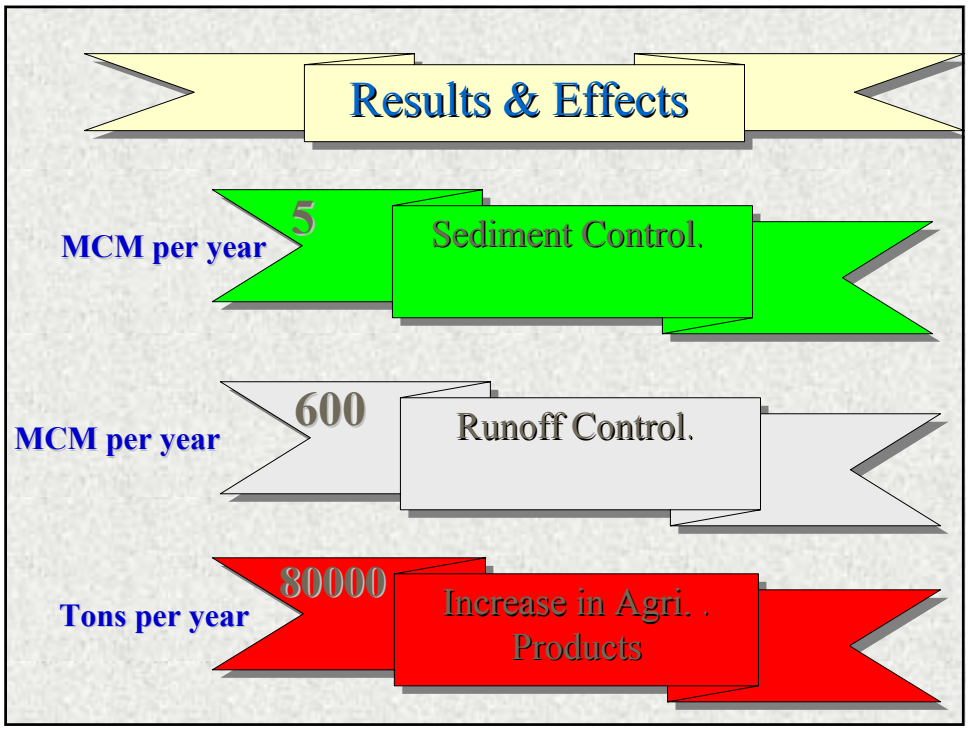
Providing international support and assistance

- Increasing investment in agriculture by assistance of international bodies.
- Establishment of intra-regional economic and technical cooperation.
- Establishment of International Alliance against poverty.
- Establishment of hazard and risk information and mapping system.
- Formulation of regional strategies for catchments management for highlighting the common problems facing natural hazards in the catchments.
- To enhance the exchange of information and expertise among the regional countries.

Concluding remarks

- Break the vicious cycle is possible only by recognizing the things that cause the cycle and expand it.
- The future emphasis must be directed towards increasing the efficiency of water management and increasing water productivity and producing more crops per cubic meter.
- international and regional cooperation and assistance in sustainable watershed management should be expanded.
- The agriculture strategies should be modified.

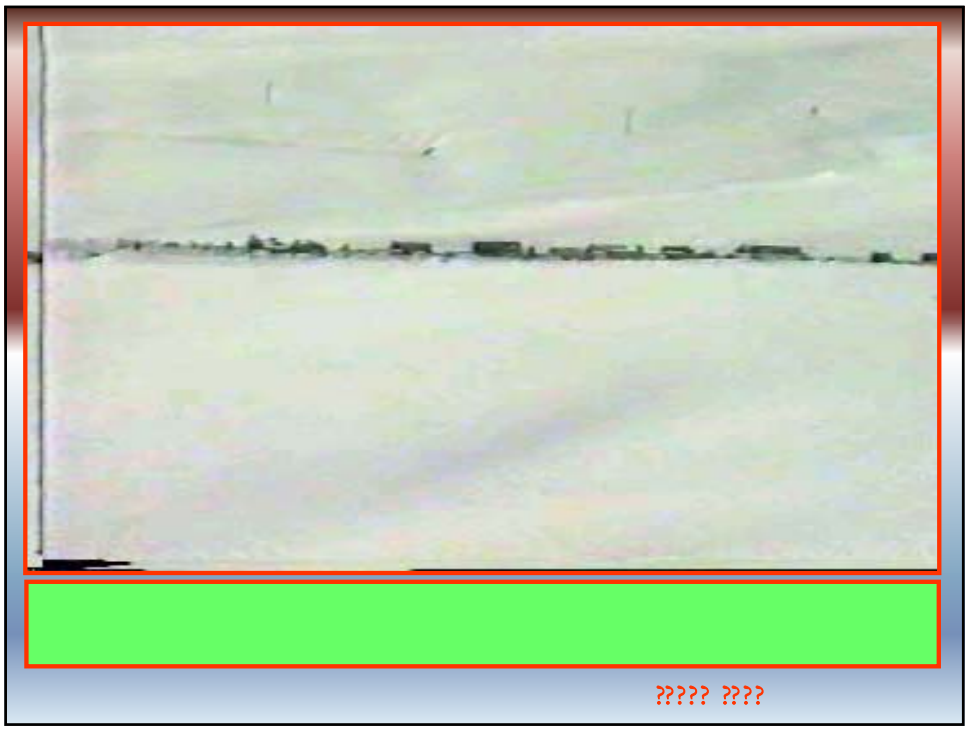
High dependency on rain fed agriculture with high variability in rainfall the people are subjected to heavy fluctuations in income. The agr. Strategies should be developed based on comparative advantage and improve resource use efficiency in relation to irrigation water which is the most limiting factors for increasing productivity.


Results & Effects
MCM per year
5
Sediment Control.
MCM per year
600
Runoff Control.
Tons per year
80000
Increase in Agri. .
Products


The Underground Garden


THE END


????? ????



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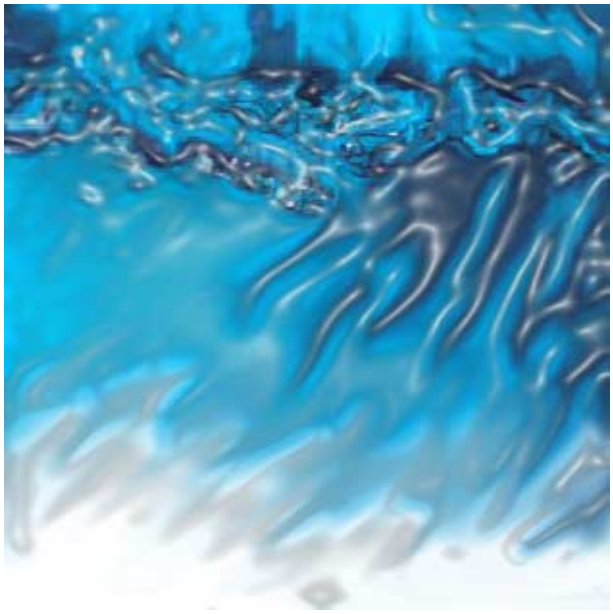
洪水と貧困（マニラ）Session 4-7

Integrated River Management in Japan

Toshihiro Sonoda

Ministry of Land, Infrastructure and Transport, Japan



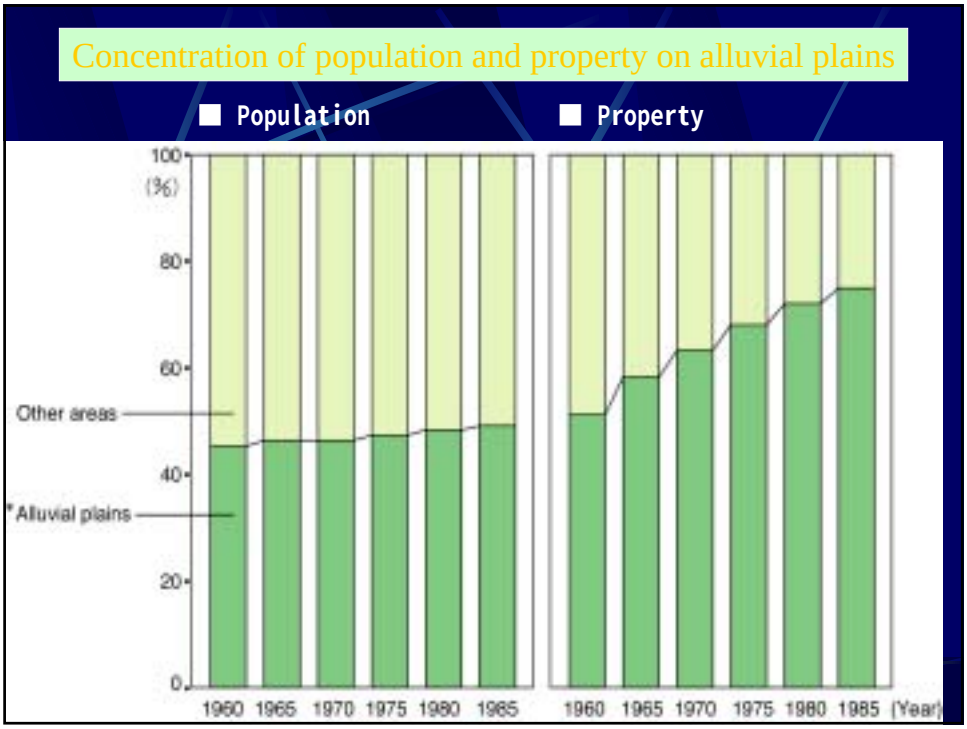
第 2 次水資源プロジェクト研究計画調査

Integrated River Management in Japan

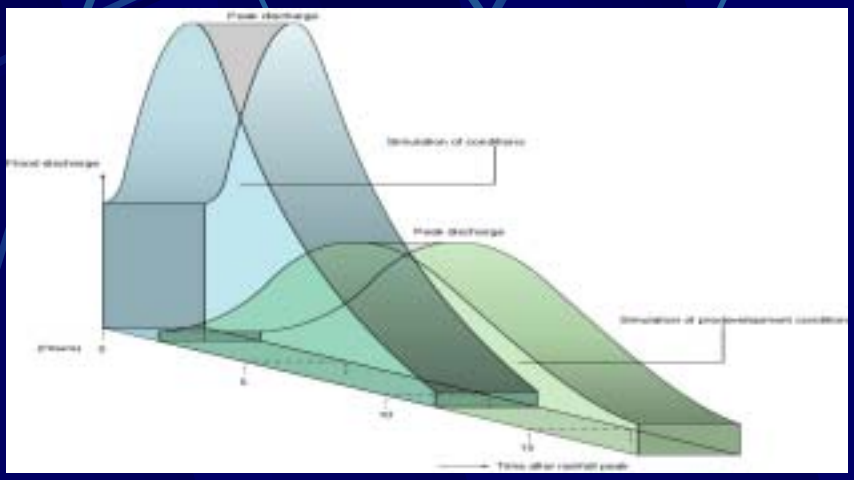
Toshihiro Sonoda

Ministry of Land, Infrastructure and Transport
Japan

Concentration of population and property on alluvial plains



Change of Flood peak discharge to development



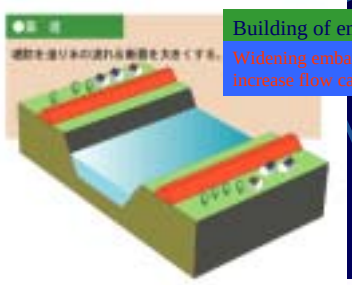
The reduction of the area for natural permeation of rainwater, which resulted in a shortened time of flood concentration and increased flood discharge by changing the run-off patterns.

Integrated Flood Management Measures

Integrated Flood Control Measures

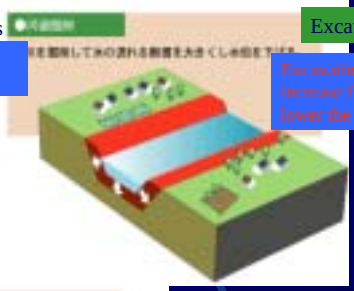
- **River Improvement**
  - •Channel Improvement
  - •Construction of Retarding Basins, Floodways
- Runoff Control
  - Retention Areas
    - •Preservation of Undeveloped Areas
    - •Construction of Storage Facilities, Infiltration facilities
  - Storage Areas
    - •Preservation of Farmlands and Undeveloped Areas
    - •Control of Landfill
  - Low-lying Areas
    - •Development of Drainage Facilities
    - •Construction of Storage Facilities
- **Damage Mitigation Measures**
  - •Warning and Evacuation System
  - •Flood Fighting at community level
  - •Dissemination of Flood Risk Maps
  - •Appropriate Land Use and Floodproofing
  - •Flood Insurance

Traditional flood control measures: River improvement and dam construction



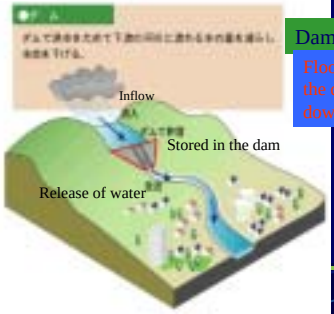
Building of embankments

Widening embankments to increase flow capacity .



Excavation of channe

Excavating channel to increase flow capacity and lower the water level.



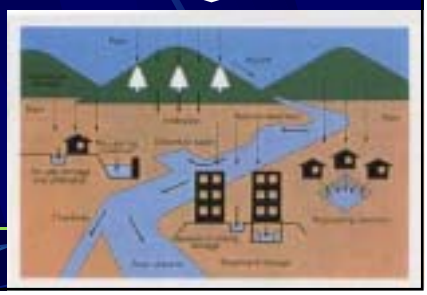
Dam

Flood waters are stored in the dam to reduce the quantity of flood flow to be transported downstream and to lower the water level.

Concept of Comprehensive Flood Control

Before development

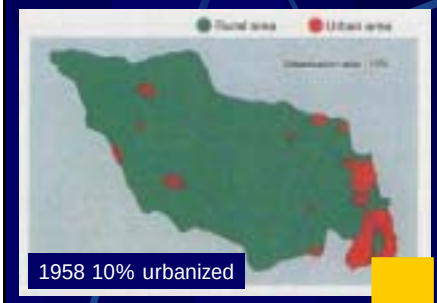
After development



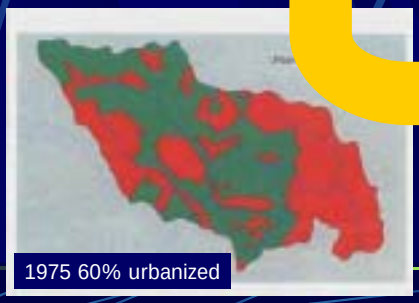
Flood Control Measures with Facilities in the Basin

Conservation & Restoration of Natural Function of the Catchment

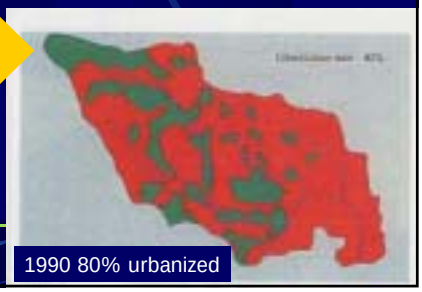
Case Study ～Tsurumi River～



1958 10% urbanized



1975 60% urbanized



1990 80% urbanized

Rapid Urbanization in the Tsurumi River Basin

in the Western part of Tokyo Metropolis

Catchment Area : 235km^2

Main Stream Length 42.5km

Flood Damage

Tsurumi River

Discharge Distribution Plan

Tsurumi River Basin

- Design Flood Discharge (1,820m³s)
  - Distributed Discharge (Basin) (670m³s)
    - Water Retention Area (170m³s)
    - Water Storage Area (370m³s)
    - Low-lying Area (130m³s)
  - Distributed Discharge (River) (1,150m³s)
    - Channel Discharge (950m³s)
    - Retarding Basin (200m³s)

Example of Implementation

■ River Measures

Multipurpose retarding basin

The Yokohama International Sports Stadium

In order to avoid hindering flood control capacity, the piloti method (elevated-floor style) has been incorporated in the construction of the Yokohama International Sports Stadium.

Example of Implementation

- River Basin Measures

Outflow Control Facilities

The Kirigaoka Regulating Reservoir

The storage function of the adjusting pond and the filtering of the well serve to both control outflow and process the drained water

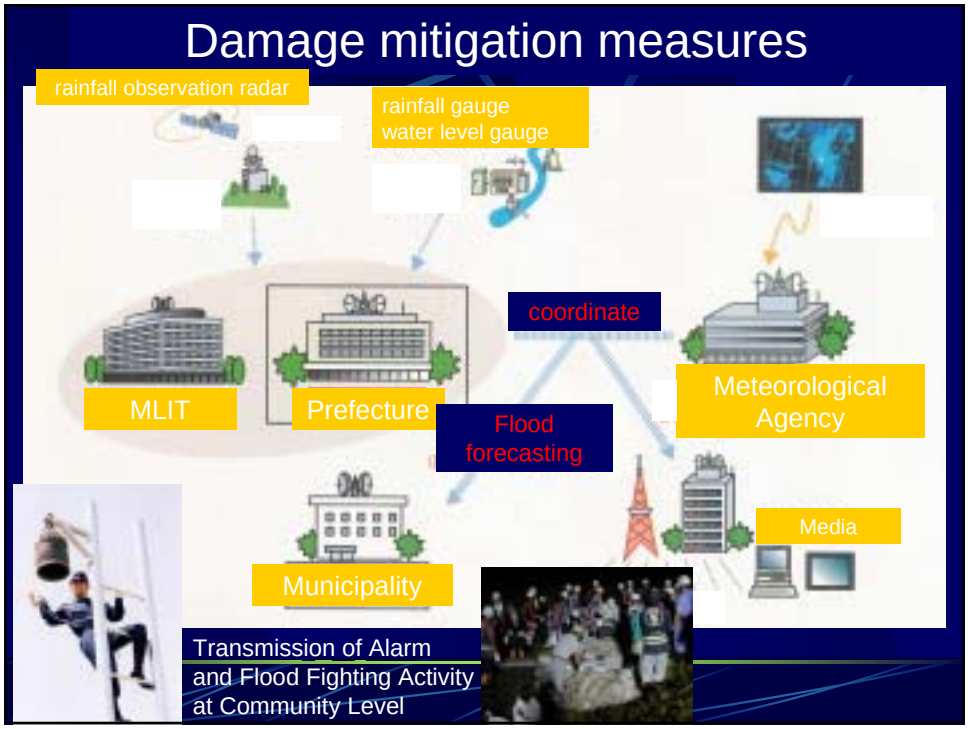
The Kirigaoka at Flooding Timer

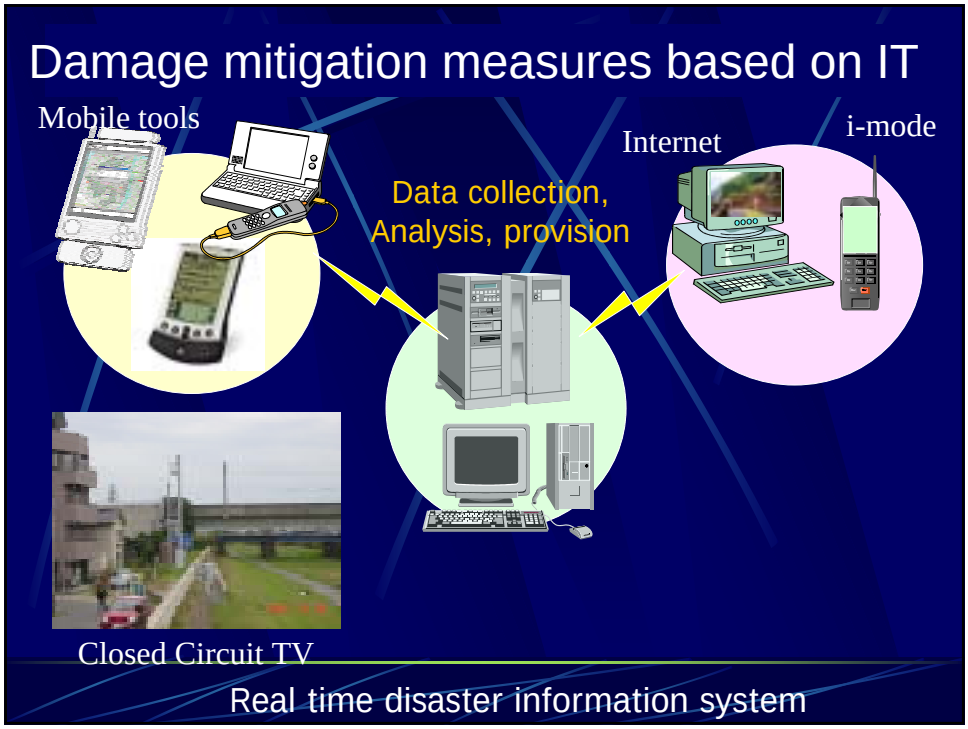
Example of Implementation

- River Basin Measures

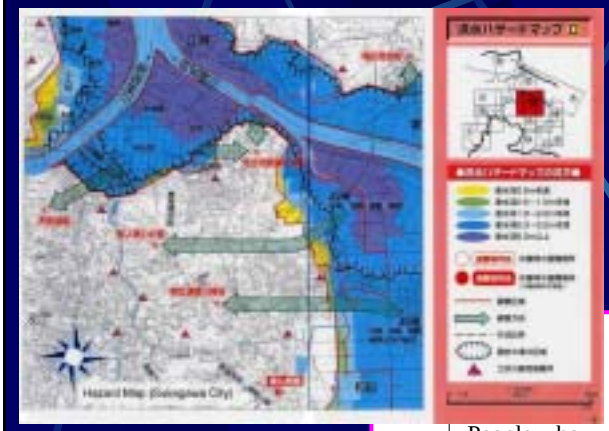
Piloti Style (Elevated-Floor) Construction

The piloti method (elevated-floor style) is used to minimize damage even if the building is inundated.

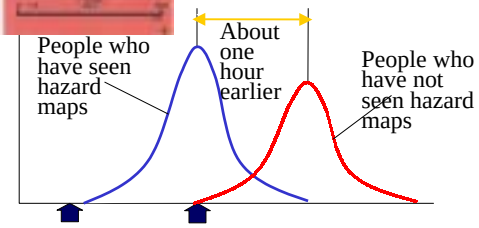

Damage mitigation measures
rainfall observation radar
rainfall gauge
water level gauge
coordinate
MLIT
Prefecture
Flood
forecasting
Meteorological
Agency
Media
Municipality
Transmission of Alarm
and Flood Fighting Activity
at Community Level


Damage mitigation measures based on IT
Mobile tools
Internet
i-mode
Data collection,
Analysis, provision
Closed Circuit TV
Real time disaster information system

Hazard Map (Sukagawa City)



People who have seen hazard maps start evacuation about one hour earlier than those who have not



Comprehensive Flood Management

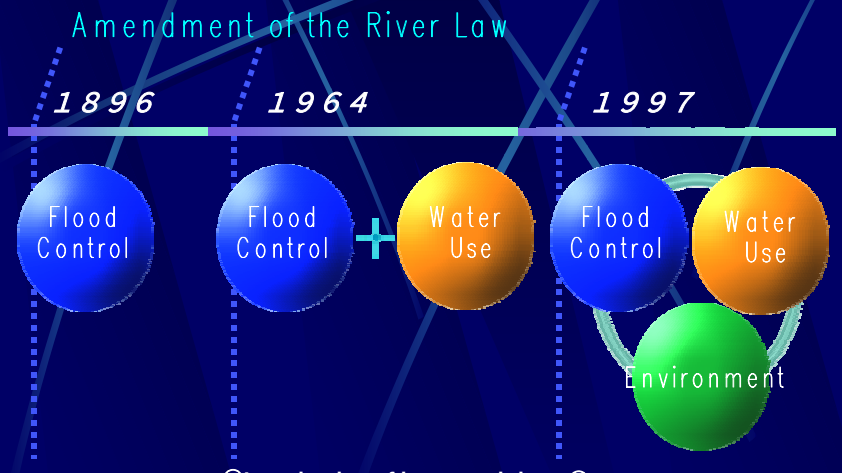
・Comprehensive flood management by a proper combination of structural and non-structural approaches to fit to each basin is needed.

・Comprehensive flood management is especially effective in urbanizing areas, where conventional river improvement is difficult or not effective.

Each measure has its feature. Consideration of differences between measures from many aspects, such as cost, mitigation of damage, contribution to basin development etc. is needed.

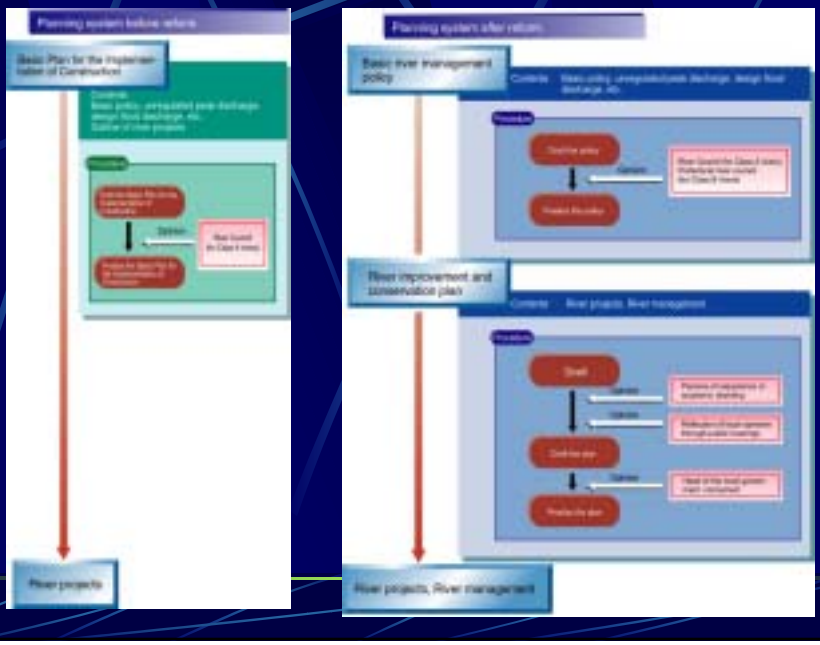
Concept of Integrated River Basin Management

Changes in Institutional Frameworks for River Administration



- Introduction of integrated river system management
- Enhancement of water-use regulations
- Improvement and conservation of river environment
- Introduction of plans reflected by public opinions

Changes of Planning Processes for River Management



Conservation of river environment in the Kushiro Wetland
～Kushiro River (Hokkaido)～

○Recent expansion of economic activities has considerably reduced the area of the wetland.

○The long-term objective is to restore the wetland to the condition at the time of its designation for inclusion in the Ramsar List of Wetlands of International Importance in 1980. In the short term,the state as of 2000 will be maintained.

Area of the wetland 245.7km²
Area covered with Alnus japonica 21.0km²

Area of the wetland 194.3km²
Area covered with Alnus japonica 71.3km²

Research on Symbiosis of the Natural Environment with Human Society

The Aqua Restoration Research Center (near Nagoya)

The world's largest experimental facility devoted to research on the conservation and restoration of the natural environments of rivers and lakes.

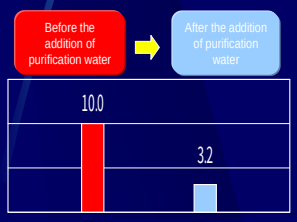
Research on various phenomena can be performed by controlling the water velocity, water depth and other conditions in three 800 m long experimental rivers.

Restoration of clear water by river purification

Adding purification water and dredging improved the water quality and attracts tourists
～ Example of the Matsue Canal (Shimane Prefecture) ～

Severe water pollution in the Matsue Canal in 1975

The Matsue Canal after the addition of purification water began in 1996



The addition of purification water reduces BOD (biological oxygen demand) to 1/3 of its previous level

Use of the river by pleasure boats (1997) attracts tourists (about 200,000/year)

Conclusion

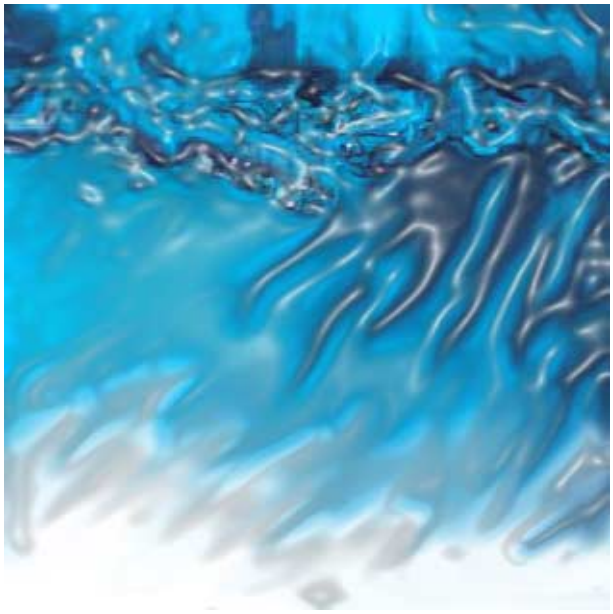
- Upon conducting comprehensive flood management including basins, diverse elements, such as water utilization and environmental conservations should be considered.
- Integrated river basin management is a key to achieve sustainable development.
- By encouraging the participation of residents on a variety of levels, their attention should be called for solving challenging problems.

洪水と貧困（マニラ）Session 4-8

Background of proposal for establishing network Contents and tentative schedule of IFNet

Akira Sasaki

IFNet Preparatory Unit
“Water In Rivers” Secretariat,
Japan



第 2 次水資源プロジェクト研究計画調査

International Flood Network (IFNet)

Background of proposal for establishing network
Contents and tentative schedule of IFNet

Akira Sasaki

IFNet Preparatory Unit
"Water In Rivers" Secretariat

- Overview of Flood Damage -

Flood Damage of Europe on This August

<Russia>

- Heavy rain burst dike and reservoir at the coast of Black Sea. (13 Aug. AP)
- 400 houses destroyed, 12,000 flooded. (13 Aug. AP)
- 59 people killed. (14 Aug. AP)

<Czech>

- 50,000 people evacuated in Prague. (14 Aug. CNN)
- 8 people killed in Czech. (14 Aug. Mainichi)

Boys help their comrade in Novorossiisk, Russia

<Germany>

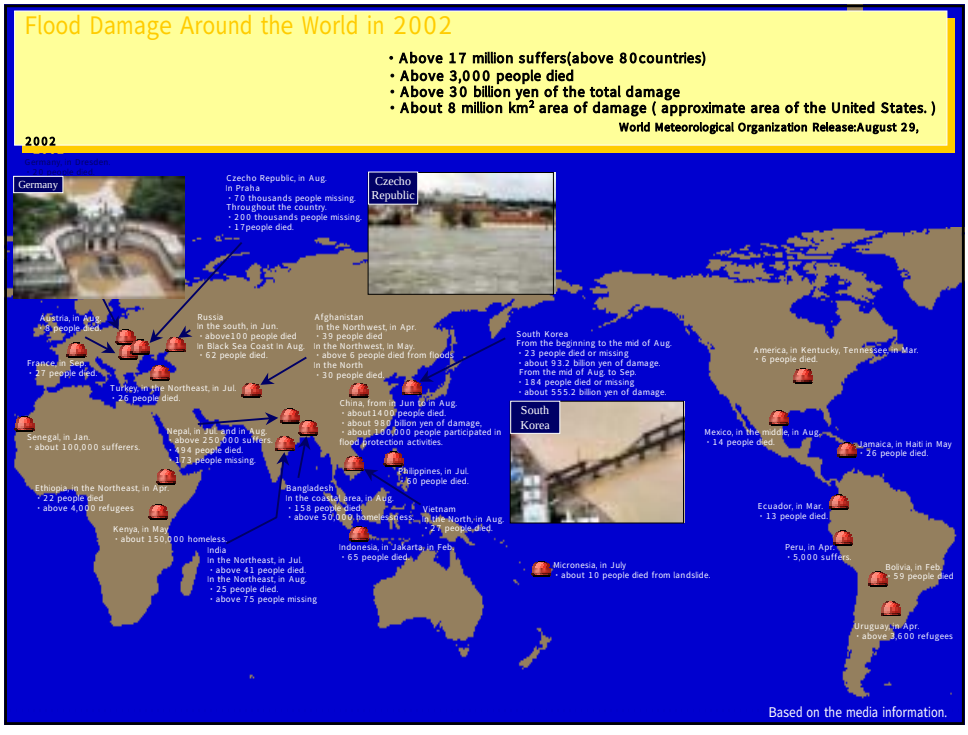
- 120,000 people evacuated. (16 Aug. Reuter)
- Four million affected, over 100,000 evacuated. (19 Aug. BBC)
- 15 people killed in Saxony. (19 Aug. Mainichi)
- Estimated damage to be at least 15 billion euro. (19 Aug. Mainichi)

<Total in Europe>

Evacuee: over 300,000

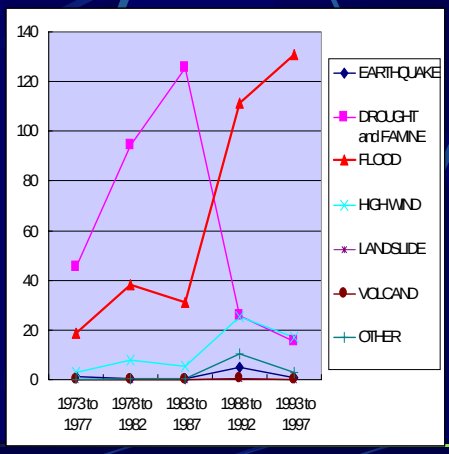
Victims: 111

Town of Glauchau in Saxony, Germany



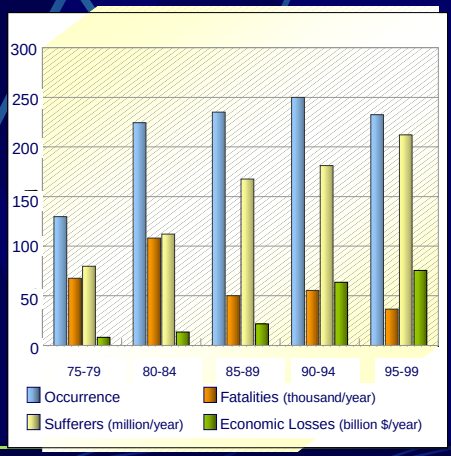
Recent Natural Disaster

Fig.-1 Affected by type of disaster and by period (1973～1997)



Source：CRED, "World Disasters Report 1999"

Fig.-2 Average occurrence and damage of natural disasters (1975～1999)



Source：Asian Disaster Reduction Center, "Data book of Asian Natural Disasters in the 20th Century"

- Flood related Activities・Organizations -

- MLIT, Japan
- WMO/ESCAP　Typhoon Committee
- WMO・GWP：Associated Program of Flood Management (APFM)
- Mekong River Committee：Flood Strategy
- ADB・JICA：Flooding and Poverty

- Necessity of Establishing Network -

- It is necessary to consolidate the suggestions among flood-related activities so as to be adopted as the international agenda on WWF3.

Idea of IFNet

< Objectives >

- Establishing floods high on the international agenda.
- Assisting activities to break the vicious circle of poverty and environmental degradation caused by floods and lead to a safe and secure life from a global viewpoint.

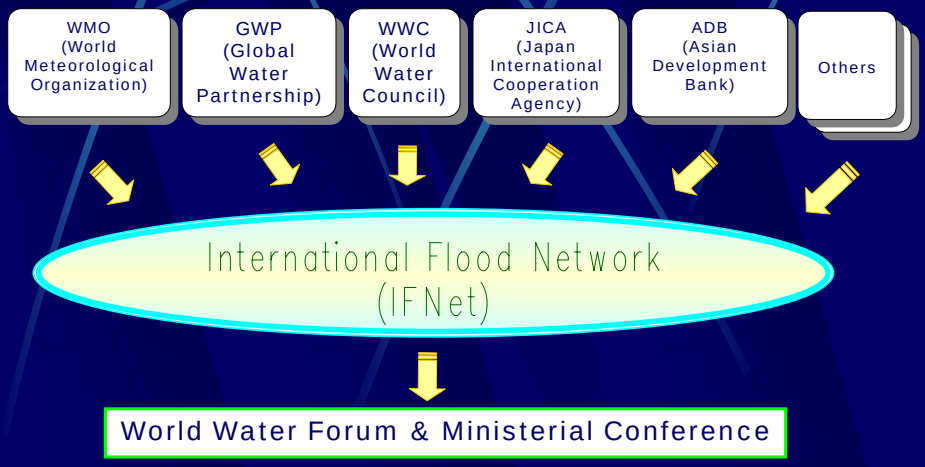
< Activities >

- **Exchanging information**, experience, technical knowledge and future plans among international organizations, national governments, the private sector and non-governmental organizations.
- **Raising public awareness of floods** by compiling and disseminating information and views on such as health, ecology, food production, culture, education, gender etc.
- **Feeding the recommendations of "Floods" group through to the Ministerial Conference** of World Water Forum to establish floods high on the international agenda.

< Participation >

- There will be **no pre-requisite for participation** in the Network.
- It will be open to representatives of local and national governments, research and educational institute, individuals involved in flood-related activities, etc.
- It is desirable that prospective participants have an established policy and programme of activities related to floods.

International Flood Network Image

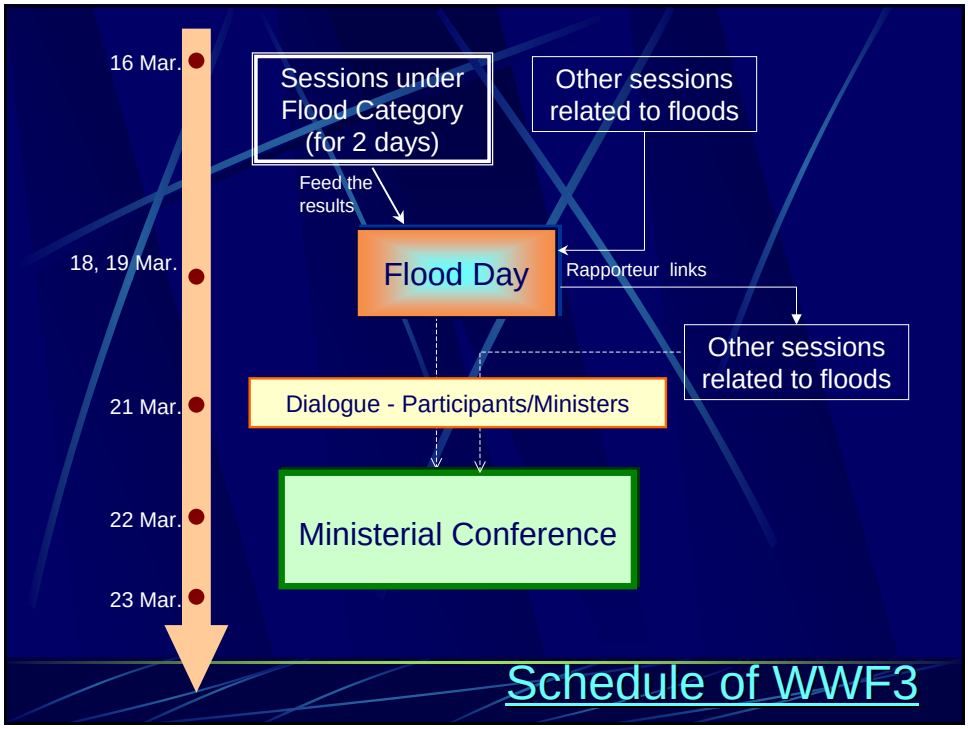


Schedule for Establishment of IFNet

20 & 21 May 2002 (The Hague)	The 1st Preparatory Meeting
30 August 2002 (Johannesburg)	IFNet Pre Meeting in WSSD
10-13 September 2002 (Beijing)	Second International Symposium of Flood Defense
22-26 September, 2002 (Dhaka)	Workshop on Water and Poverty
October 2002 (Manila)	Regional Workshop by JICA & ADB
November 2002 (Kyoto)	The 2nd Preparatory Meeting
March 2003 (Kyoto)	Session on “Floods” at the WWF3 Establishment of IFNet

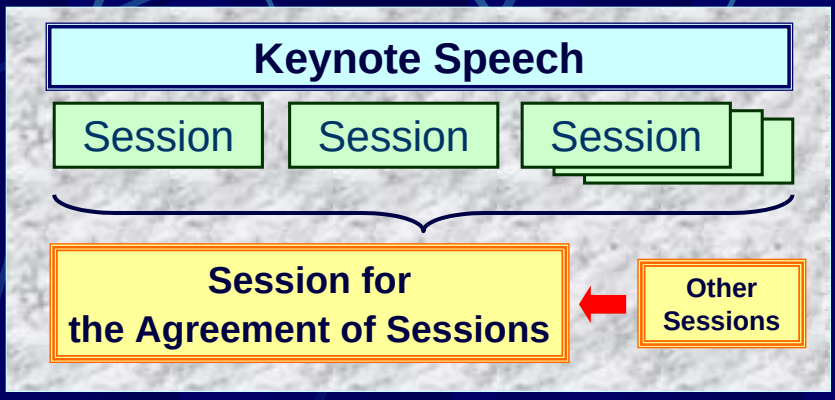
"Floods" group in WWF3

	Session Title	Convener
1	International Flood Network	Mr. Ryosuke KIKUCHI
2	Integrated Flood Management	Mr. Arthur ASKEW
3	Cities and Flood Risks	Mr. Mihir BAHATT
4	Dialogue on Mitigation on Recurrent Floods in Cities	Mr. Carlos TUCCI
5	Flood Mitigation in Urban Areas	Mr. San Hwang JIN
6	Flood Vulnerability Reduction and the People	Dr. Q. K. AHMAD
7	Poverty and Flooding	Mr. T. Sonoda / Mr. Ian FOX
8	Integrated Flood Management in Vulnerable Delta Regions	Mr. Anne van Urk Mr. Dick de Bruin
9	Flood Mitigation	Mr. Ryosuke KIKUCHI
10	Flood Warning Dissemination	Mr. Hans C. AMMENTORP
11	Sediment-related Issues	Mr. Masao OKAMOTO
12	Spatial Development on Water and Wetlands in Europe (SPID'O)	Mr. Chris ZEVENERGEN
13	The flood control measure over the Kamo River in Kyoto, a Historical City	Mr. Etsuo Nishimura



Schedule of WWF3

Session on "Floods" at WWF3



Feed information and recommendations through to the Ministerial Conference.

Logo Contest

Theme：Choose one of the followings;

1. Design reflecting flood or water
2. Design reflecting IFNet's objectives or activities

Design： Color (within 15×15cm) , Works unpublished, Explanation of your design within 100 words.

*Your designs will not be returned.

How to send： by air-mail post or e-mail with your name, address, telephone number, and e-mail address.

Copyright：The copyright of design chosen will belong to Infrastructure Development Institute (IDI).

Deadline：**October 31, 2002**

Announcement：The winner will be informed and announced on the website.

Prize：*US$1,000－(One prize only)*

The "Water in Rivers" Secretariat

The Infrastructure Development Institute Japan

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