# Introduction on adaptation measures in Tsurumi river



8. Adaptation measures Outline of Tsurumi River (Urbanization and population increase) in Tsurumi River Rapid economic growth has turned Urbanization ration has increased natural area into urban area by 75% in 50years 1958 10% 1966 20% Typhoon Karinogawa in Sep 1958 450,000 700,000 QUILLE IT 1975 60% Present 85% Typhoon No.17 in Sep 1976 1,200,000 1,880,000 **Natural Area Urbanization** Population **Urban Area** 

# Outline of Tsurumi River (Effect of urbanization)

8. Adaptation measures in Tsurumi River

- Population increased by1.4 million in 50 years
- 85% of river basin area urbanized
- ·Typical urban river



- Discharge into river has become faster
- Peak runoff has becomes bigger



# Basic strategy for controlling inundation damage (Runoff allocation)

30m<sup>3</sup>/s

# Runoff allocation by target rainfall

# Peak runoff without discharge control ••• <u>2,110m<sup>3</sup>/s</u>

- → Allocation in river basin: 250m<sup>3</sup>/s
  - Existing and newly developed rainfall storage and infiltration facilities 205m<sup>3</sup>/s Rainfall storage and infiltration measures by municipalities 15m<sup>3</sup>/s
    - Rainfall storage tubes by sewerage administrators

# Allocation in river: 1,860m<sup>3</sup>/s

 Controlled by rivers	1,500m³/s
 Storage in flood control facilities and in retarding basins	360m³/s

Under the future land use, runoff is estimated at Sueyoshibashi point based on the largest rainfall after 1945.

River related projects in Tsurumi River Basin inundation control plan

8. Adaptation measures in Tsurumi River



#### Sewerage projects in Tsurumi River Basin inundation control plan

8. Adaptation measures in Tsurumi River



# **Development of facilities for target rainfall**

Planned discharge in pump drainage areas

Planned storage of major facilities

Citv	Discharge	Planned	Citv
<i>,</i>	area	discharge	
	aroa	albertarge	
Yokohama	Tsuzuki	17m³/s	Yokohama
	Kouhoku	142m <sup>3</sup> /s	
	Hokubu	189m <sup>3</sup> /s	Kawasaki
Kawasaki	Kase	55m³/s	
Total		402m <sup>3</sup> /s	







# Storage, infiltration and forest conservation

Development of rainwater storage and infiltration facilities, conservation of forested areas (Total effect by municipalities : 0.3 million m<sup>3</sup>)



Purchase and conservation of forest in developing area

# Operation rule of pumping station

Preparation of basic operation rules, communication, command and control, information sharing and public announcement

#### Basic rules of restricted pump operation

-River and sewerage administrators make basic rules of restricted pump operation to effectively decrease urban flood and inundation caused by heavy rainfall that exceeds the current project design target.

#### **Communication and information sharing**

- -Related organizations jointly establish communication system for effective and efficient pump operation.
- -The administrators provide hazard information beforehand and ask for cooperation from residents. When pump operation is restricted, the administrators supply necessary information for residents' smooth evacuation.



Although surface water damage along river is mitigated by pump drainage, river water flood may occur at the bottle neck of water way in the downstream



Surface water damage may occur around the drainage pump due to drainage restrictions

# Public awareness to mitigate damages

8. Adaptation measures in Tsurumi River

(Public awareness and education on disaster preparedness)

#### To organize local meetings and raise public awareness on preparedness on disaster

Education for pupils



Annual educational course for pupils on disaster preparedness at the Center Disaster preparedness caravan



To visit local meetings and explain to residents

**Tsurumi River Administration Center** 

# Public awareness on flood damages

8. Adaptation measures in Tsurumi River

(Advance dissemination of flood and inundation prone information)

By simulating urban flood and inundation, municipalities prepare "Hazard Maps"



# Other measures (follow-up the plan)

Implementation, monitoring, evaluation and modification of the plan

# Progress of major projects

Implementation of river and sewage project

#### Installation of rainwater storage and infiltration facilities

- Installation of rainwater storage and infiltration facilities
- Countermeasures against blocking rainwater infiltration
- Progress of rainwater storage and infiltration facilities constructed for development based on regulations and guidelines

# Changes of river basin

· Re-evaluation of latest development (area, location, type etc.)

# Modification of the plan