

Basic concept of adaptation strategies

3. Adaptation measures
for climate change

Climate change due to global warming is expected to induce the following phenomena in coastal and low-lying areas.

-More frequent heavy rains and more intense typhoons



Frequent and serious flood and sediment disasters

-Sea level rise and more intense typhoons



Frequent and serious high tides and coastal erosions

-Wider range of variation of rainfall intensity and change of river flow regime



Frequent and serious droughts

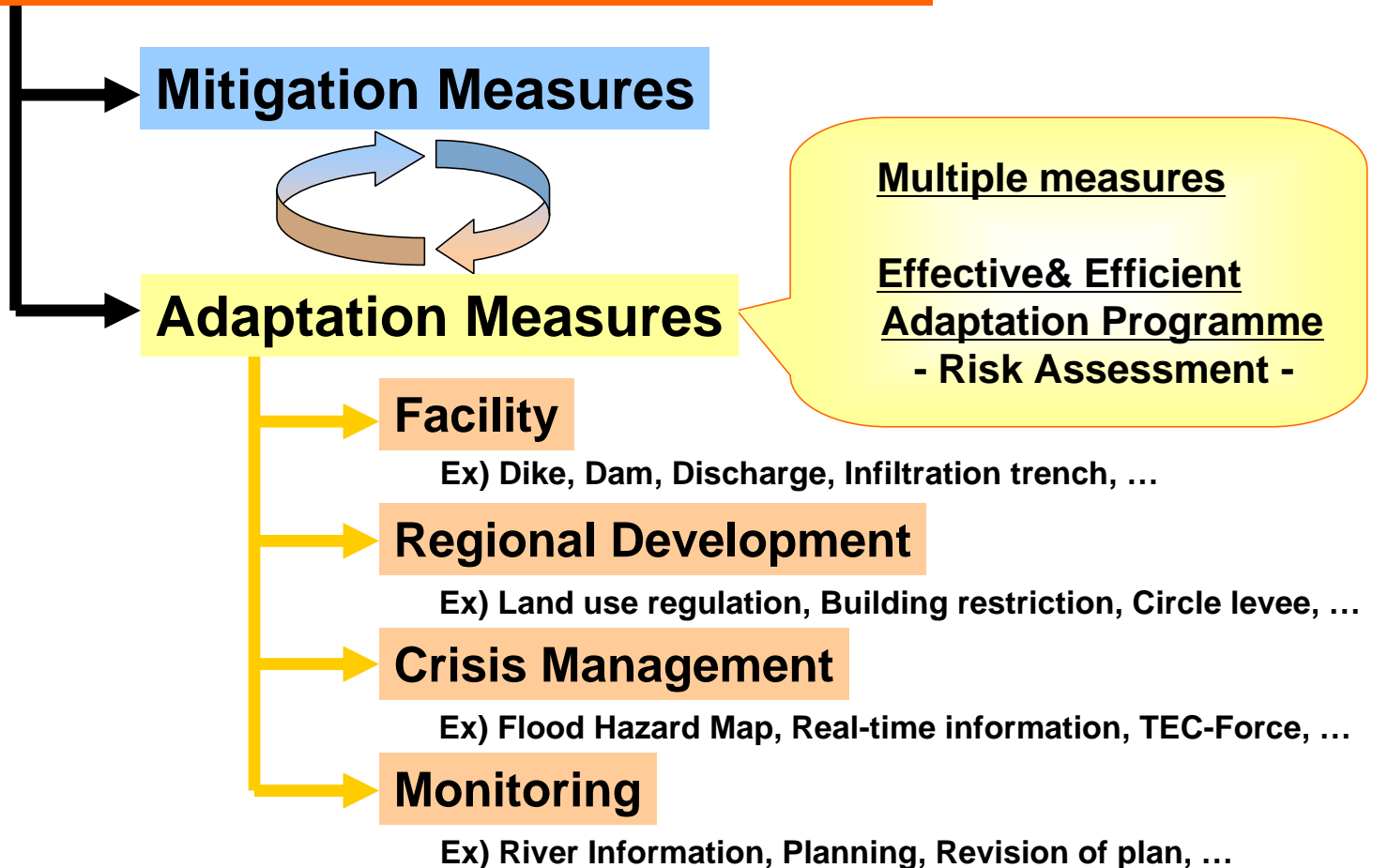
Basic concept for Future ideal society

Combining mitigation and adaptation aiming at "Water -disaster adaptive society"

Basic direction of climate change adaptation strategies

1. Adaptation measures to achieve "Zero casualty" should be considered, because "Zero damage" from disasters is difficult.
2. In a nerve center like the Tokyo metropolitan area, intensive efforts should be made such as preventing from ceasing national function

Counter-Measures for Climate Change



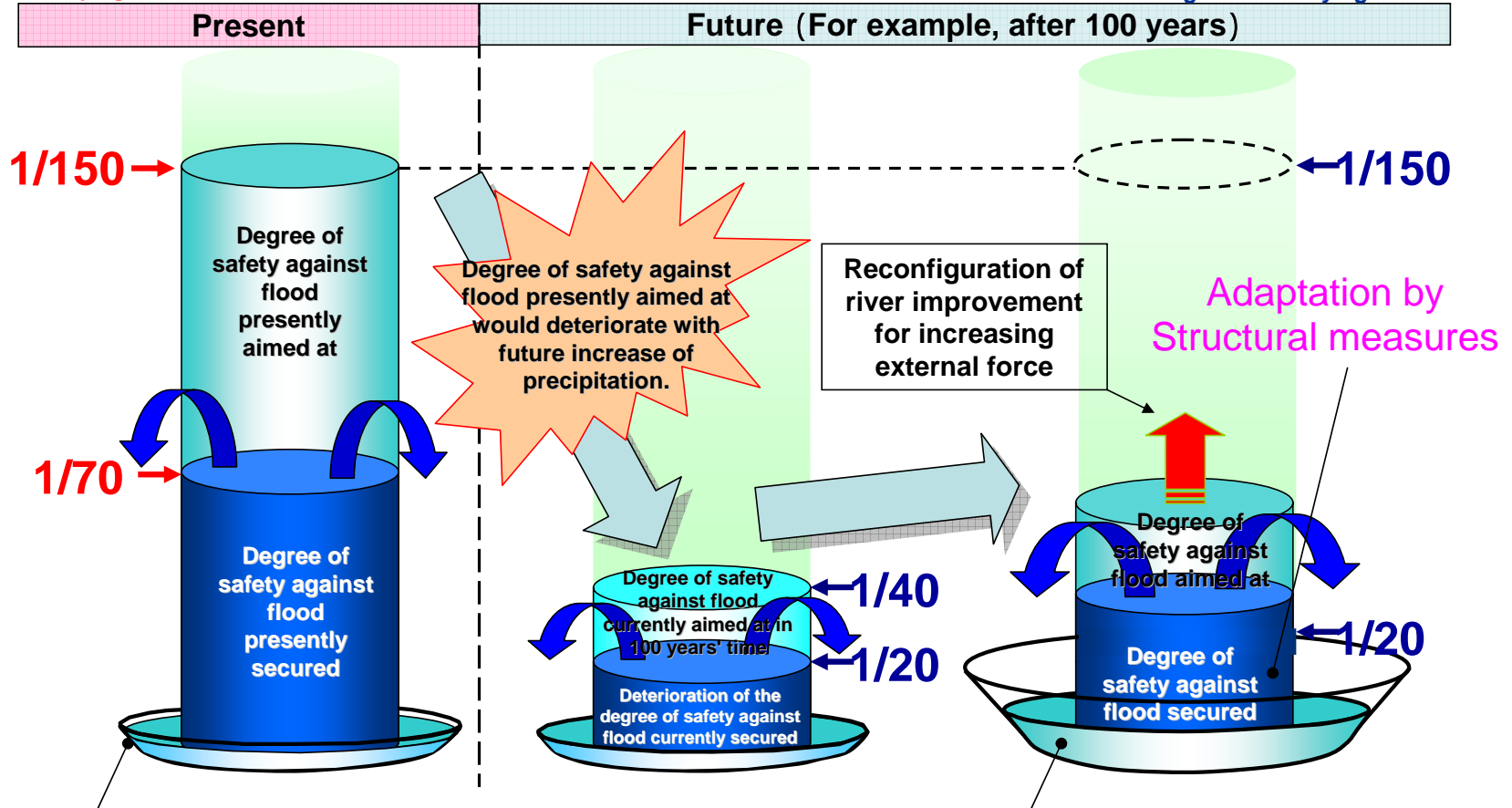
Multiple measures for increasing in risk

3. Adaptation measures for climate change

Red figures indicate present degree of safety against flood.

Image of flood disaster adaptation measures

Blue figures indicate future degree of safety against flood.



Comprehensive flood control measures

Adaptation measures based on regional development through such actions as restrictions on and review of land use

Process of effective and efficient adaptation program

3. Adaptation measures for climate change

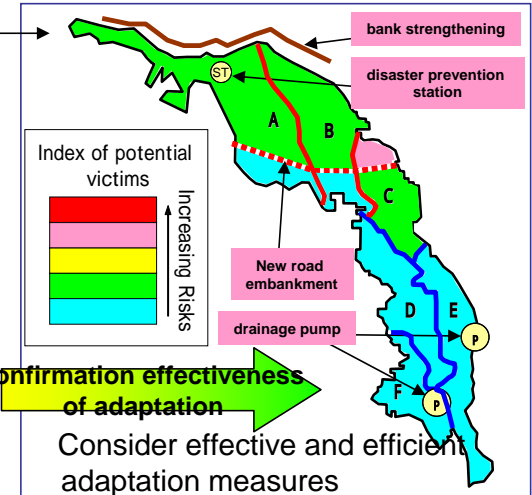
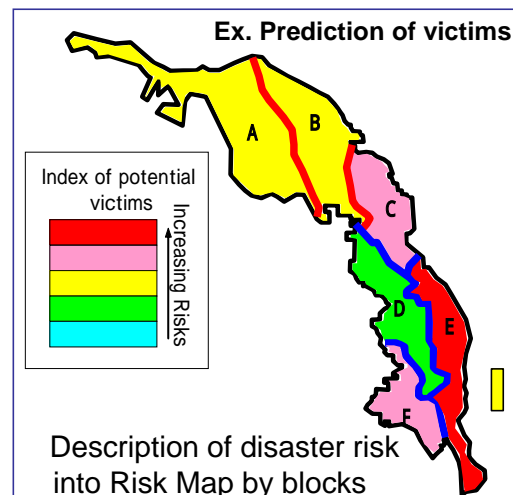
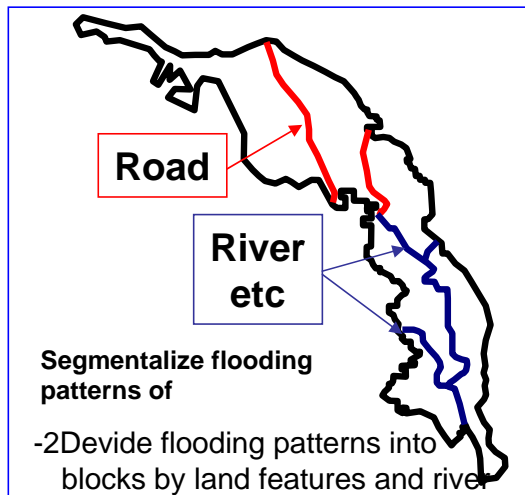
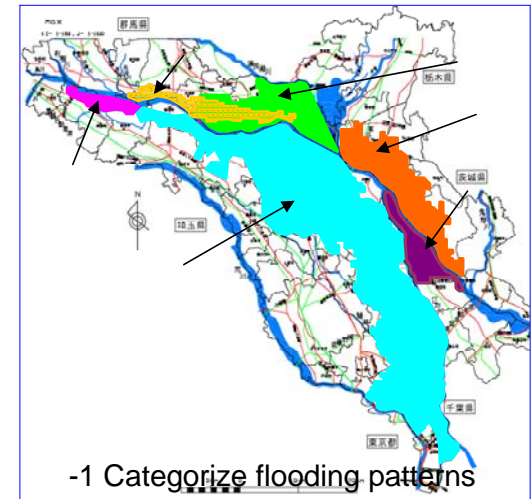
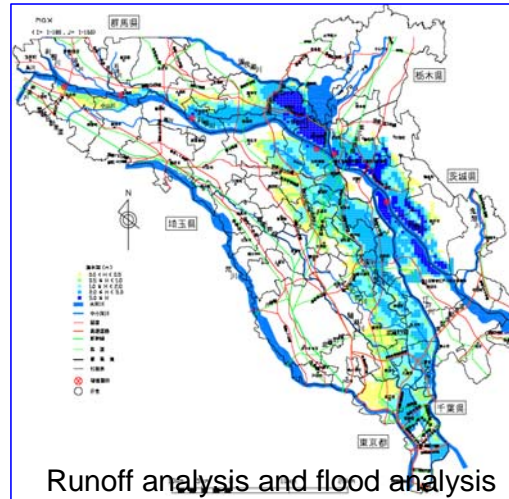
Review of past flood

Runoff analysis and flood analysis

Categorize flooding pattern in each category

Calculate damage and effect

Consider effective and efficient adaptation measures

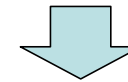
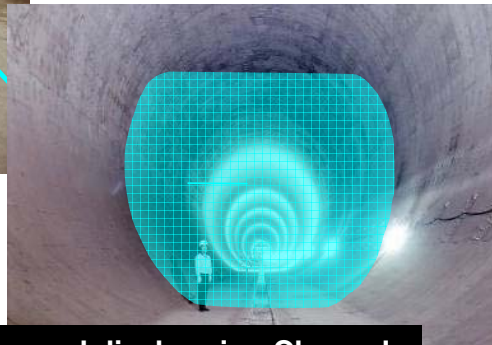
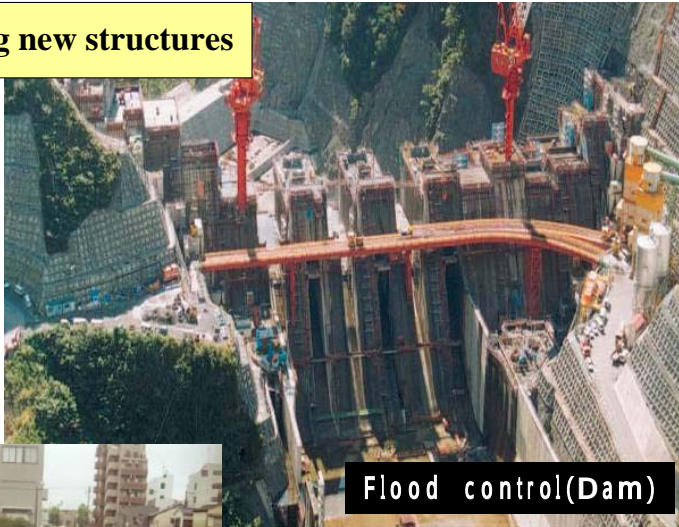


Adaptation by structures

3. Adaptation measures
for climate change

Improvement of the reliability of structures, full and long-life utilization of existing structures

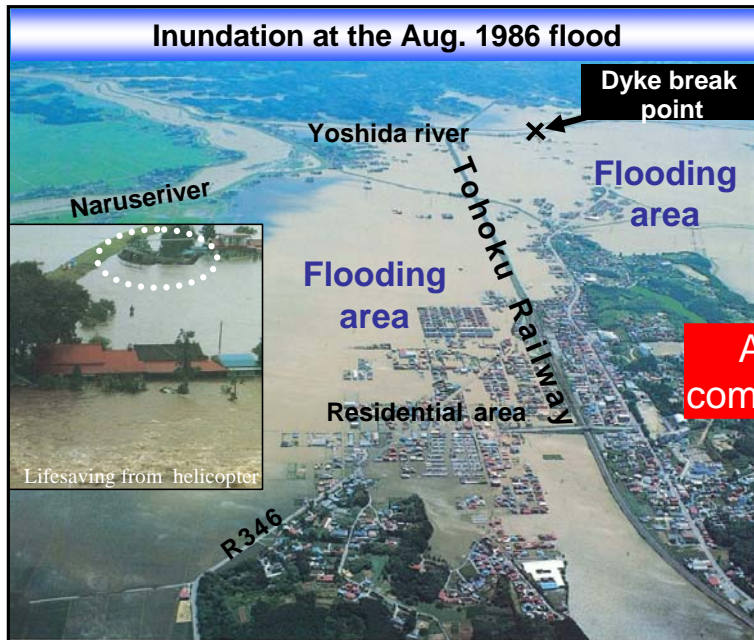
Constructing new structures



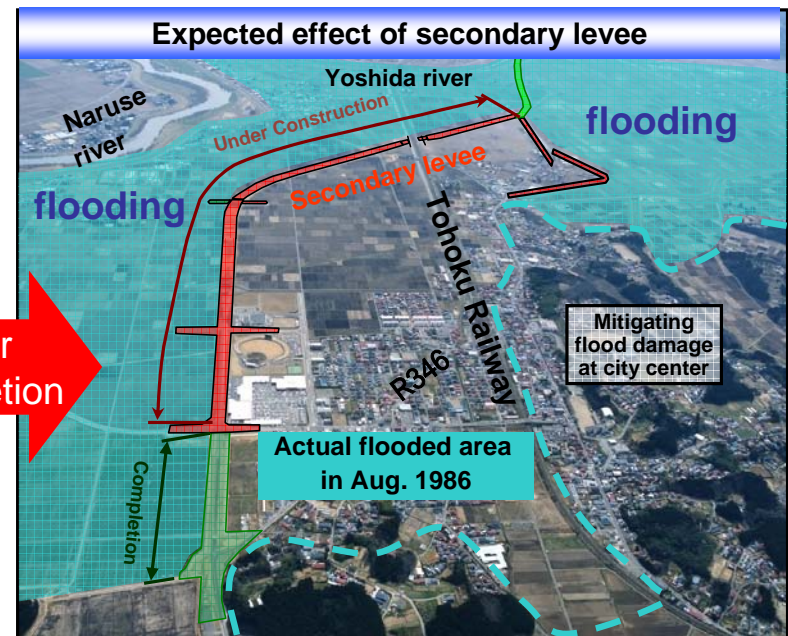
Adaptation by structures

3. Adaptation measures for climate change

Floodwater control with secondary levees in coordination with road construction to prevent expansion of damaged area



At the 1986 flood, 3,060ha was flooded, 1,510 houses were flooded above the floor level, and some parts of the area stayed under water up to 12 days.



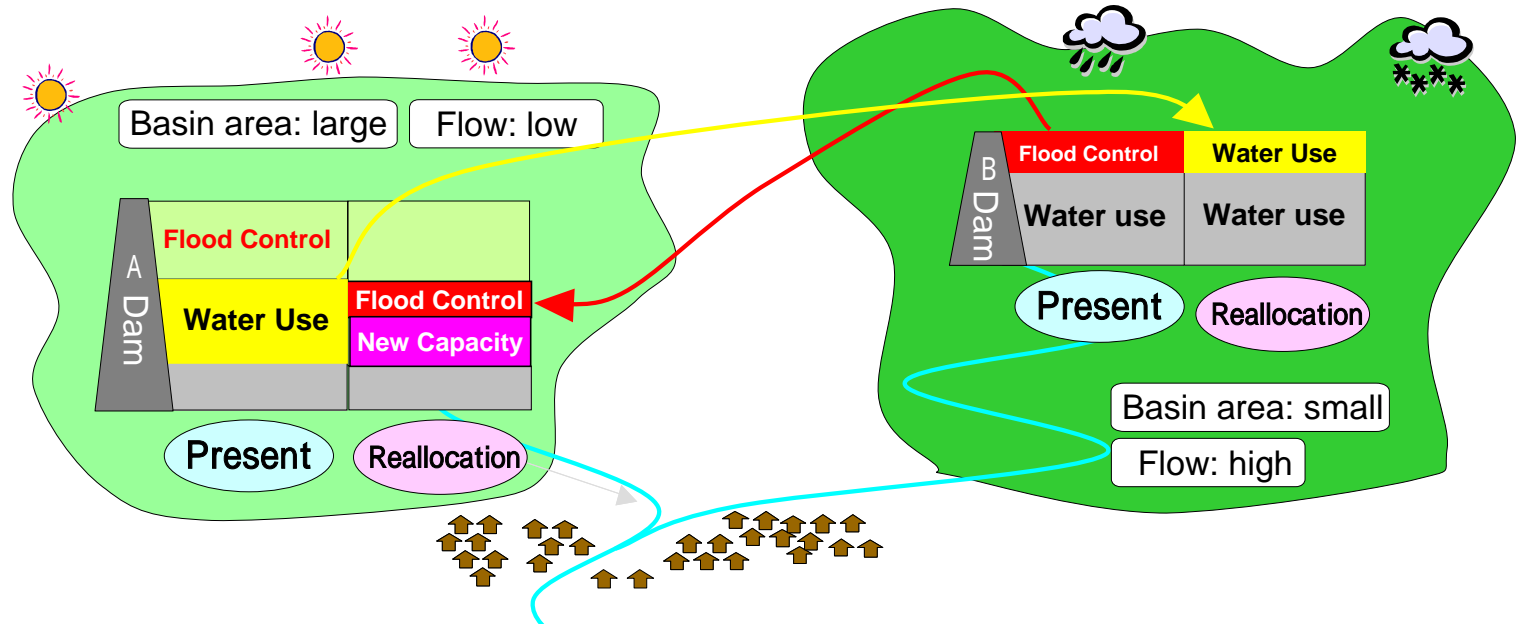
This secondary levee is under construction in coordination with road construction.

Adaptation by structures

- Effective Use of existing structure

3. Adaptation measures for climate change

Based on the deep consideration on characteristics of river basin, re-allocation of Multi-purpose dam's capacity can be more effective in terms of flood-control and water-use



Re-allocation of Multi-purpose dam's capacity

Re-allocation of water use capacity to flood control capacity.

Capacity allocation among existing and newly-planned dams

**Re-allocation will improve
Flood Control, and Water
Resource Use more effectively**

Adaptation in river basin

3. Adaptation measures
for climate change

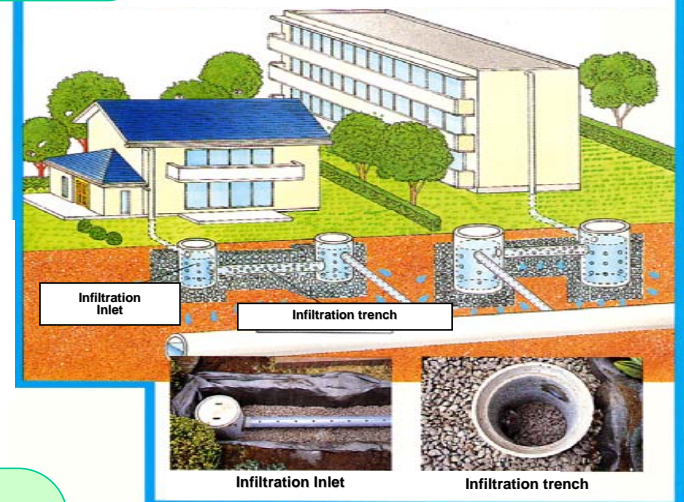
- Storage, infiltration and forest conservation in river basin

Storage

Storage facilities in schools, parks and public houses



Infiltration



Forest Conservation



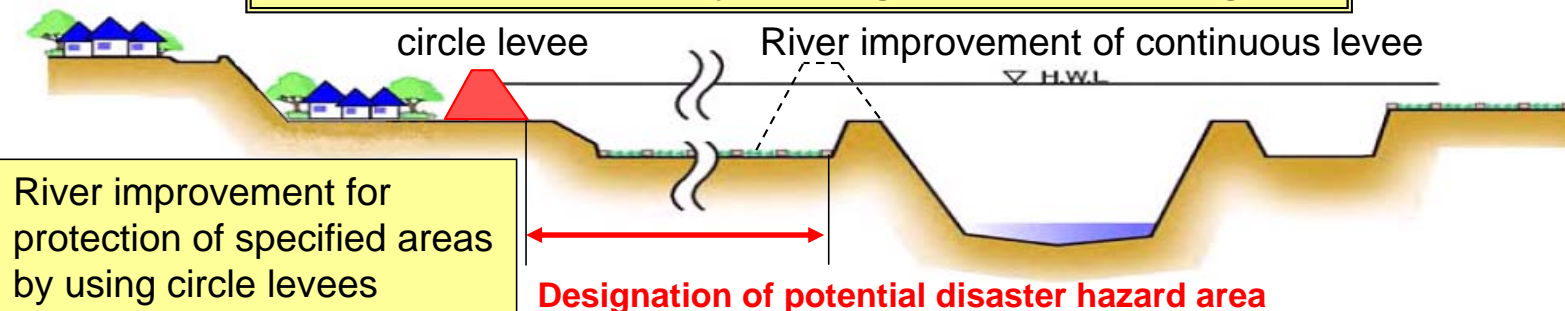
Purchase and conservation of forest in developing area

Adaptation measures in step with local community development

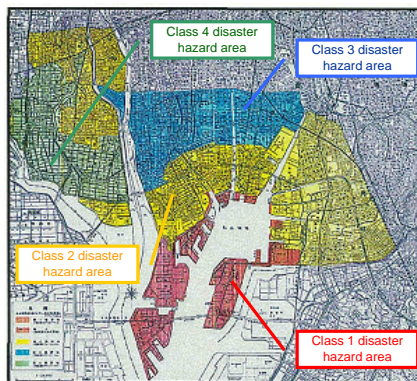
3. Adaptation measures for climate change

Response to floods that cannot be dealt with by facility-based measures, through land use or community development allowing inundation.

Shift to land use or ways of living that minimize damage



Restrictions on land use by designating potential disaster hazard areas



Nagoya city

Building restrictions

	Floor height of the 1st story (m)	Structural restriction	Illustration	
Class 1 zone Uninhabitable area	N-P (+) 4m or more	Wooden structure is prohibited.		"No buildings shall be constructed." Scope -- Areas designated by the mayor the distance from which to any shore line or riverbank line is not longer than 50 meters. Restriction -- Any building having any habitable room or more: hospital, welfare facility for children, and the like shall not be constructed. Any building of non-wooden construction may be constructed, provided that the height of the floor of any habitable room, etc. is not less than H.P. (+) 3.5m or more.
Class 2 zone Uninhabitable area	N-P (+) 1m or more	Any habitable room shall be located on the second story or higher. For a building with a total floor area no more than 100sqm, the above-mentioned restriction may be replaced with the provision of an evacuation route and evacuation equipment.		"Restriction on public buildings (Classes 2 to 4 zones)" Scope -- Schools, hospitals, assembly halls, public offices, welfare facilities for children, and other public buildings similar thereto. Restriction -- The floor height of the 1st story shall be H.P. (+) 2m and any habitable room shall be located at a height of H.P. (+) 3.5m or higher.
Class 3 zone Uninhabitable area	N-P (+) 1m or more	Any habitable room shall be located on the second story or higher.		
Class 4 zone Uninhabitable area	N-P (+) 1m or more	Any habitable room shall be located on the second story or higher.		

Community planning to inundation



Piloti-type building to avoid damage during a flood

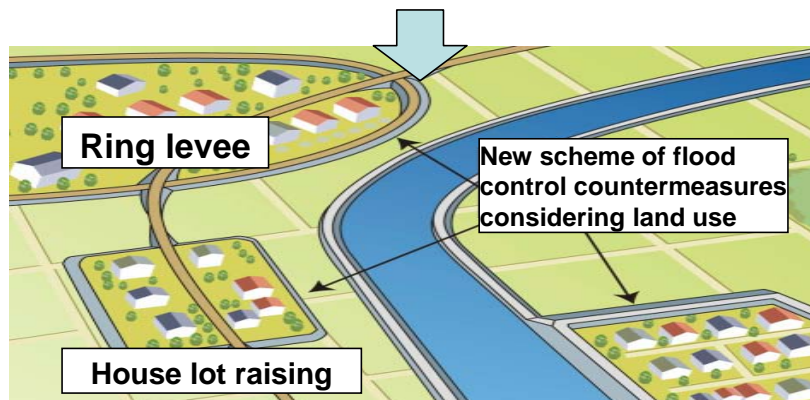
Adaptation measures in step with local community development

3. Adaptation measures
for climate change

More local governments established ordinances including the designation of disaster hazard areas (DHA) for cost and time-effectiveness

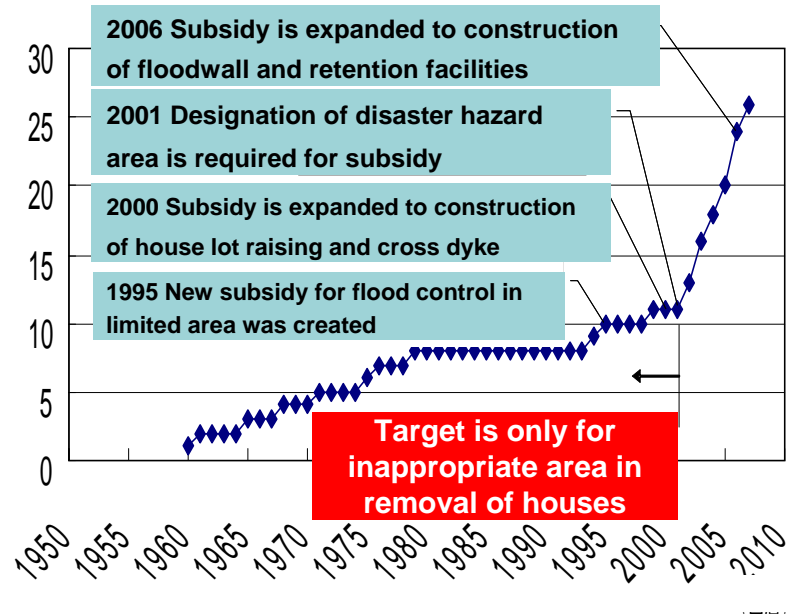


Substantial cost and time are necessary to complete



New counter-measures linked with land-use can be implemented faster (e.g. ring levee, house lot raising)

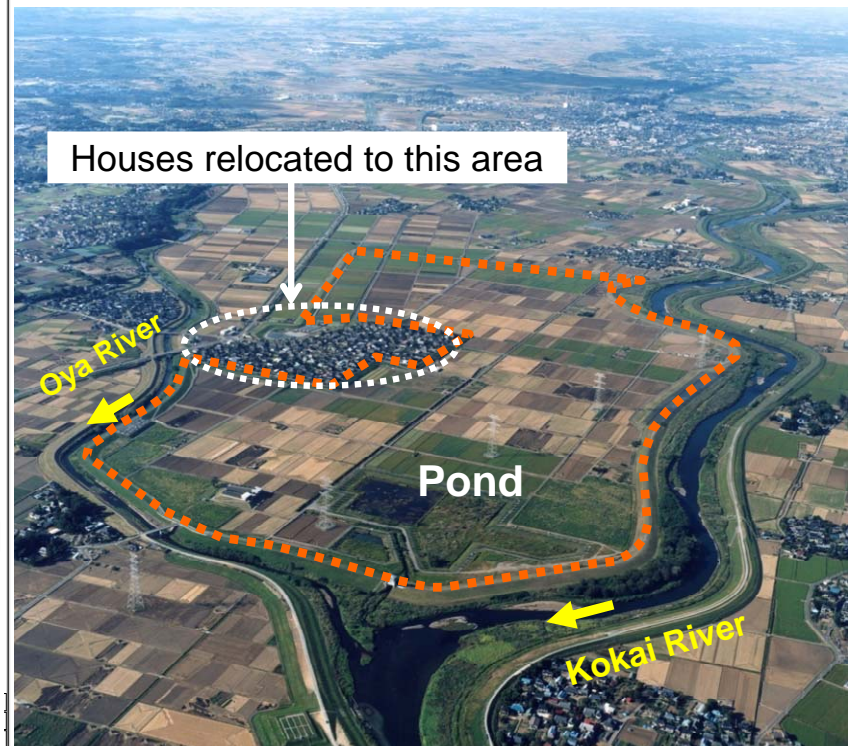
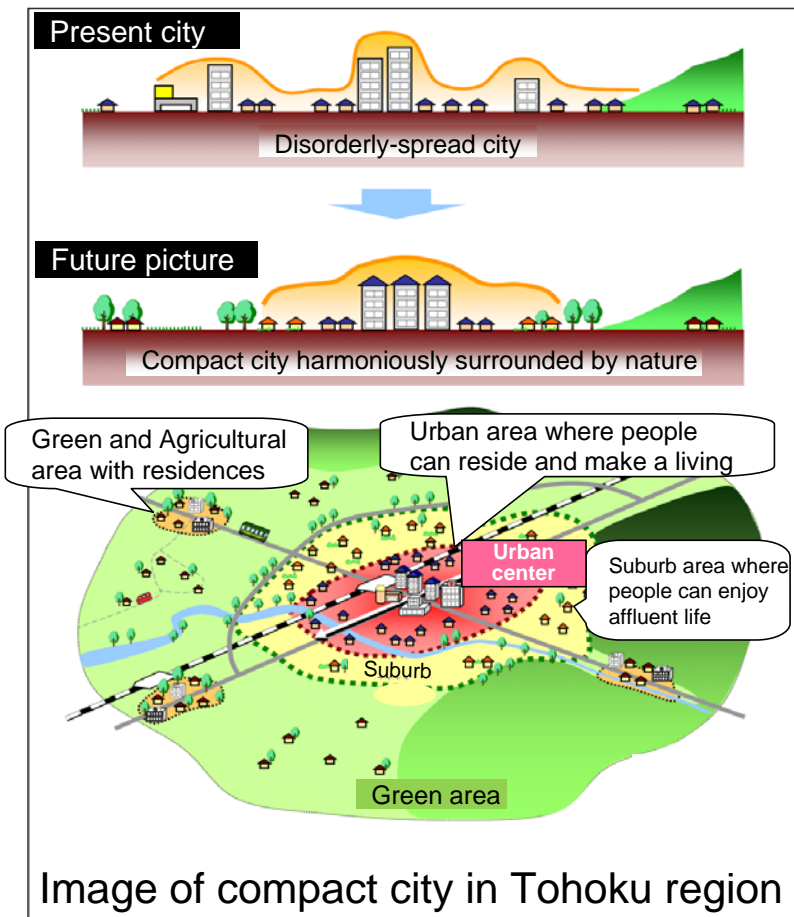
The total number of DHA-designation ordinances by local government



A new concept for urban development :
Compact community easier to implement flood control measures

3. Adaptation measures
for climate change

Compactly-built residences provide better energy efficiency and easier environment for flood control projects



Hakojima retarding basin
(constructed in 1990)

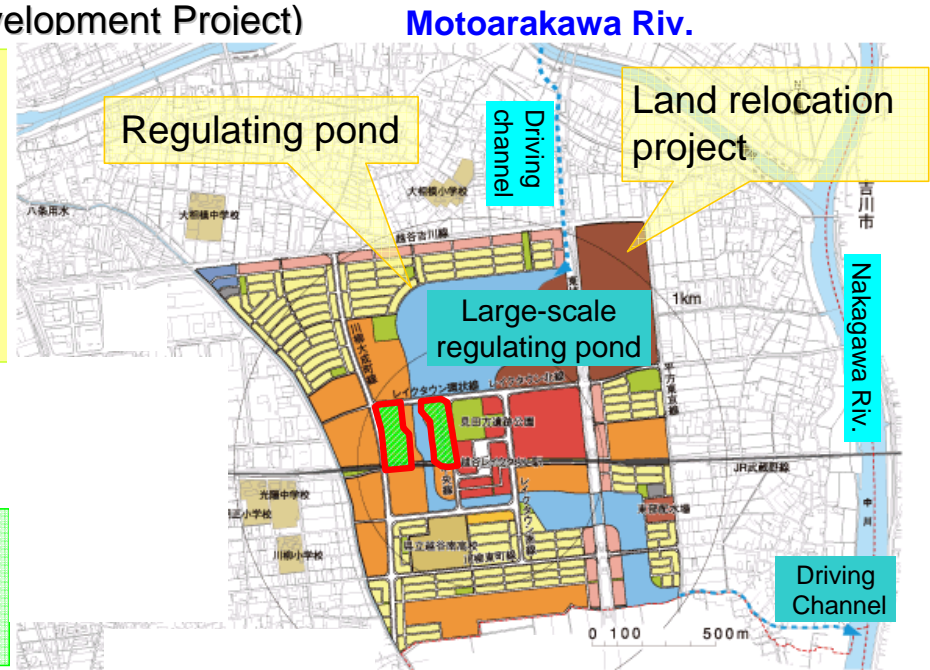
3. Adaptation measures for climate change

Integrated project (Lake Town Development Project)

+

Plus adaptation

Urban renovation with both mitigation and adaptation



3. Adaptation measures for climate change

Water levels in built-up areas in the past floods are indicated on the hazard map.



Toyooka City, Hyogo Prefecture
Shelter (building)



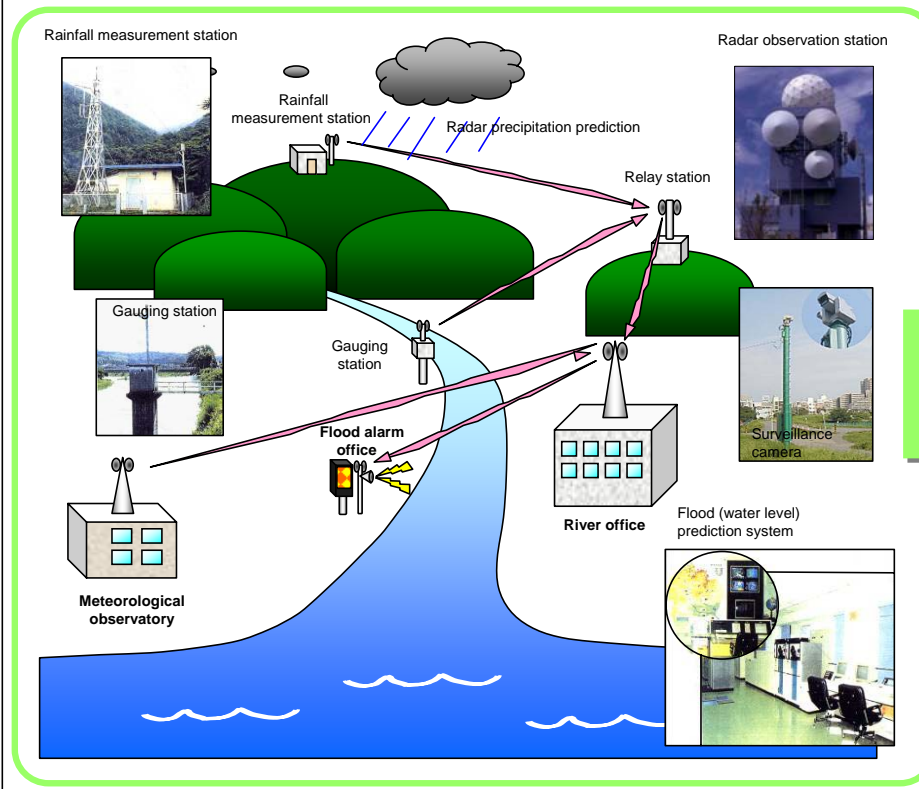
Easily recognizable signs

Adaptation measures with emphasis on crisis management

3. Adaptation measures for climate change

Share real-time information

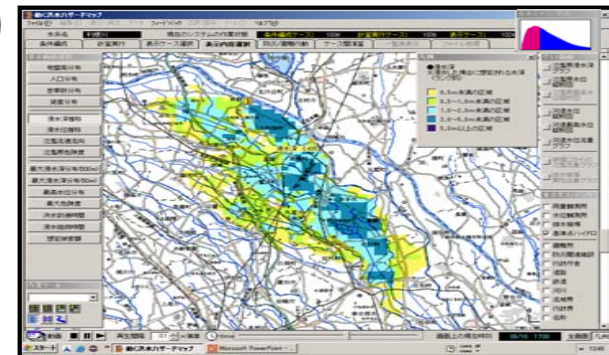
- Provision of rainfall amounts and water levels real-time via cellular phone, the Internet or local disaster prevention radio
- Flood forecasting through real-time simulation



Information provision via
cellular phone or personal
computer



Delivery of an image to a
TV screen



Floodwater prediction through real-time simulation

Adaptation measures

with emphasis on Capacity Building & Public Awareness

3. Adaptation measures for climate change

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



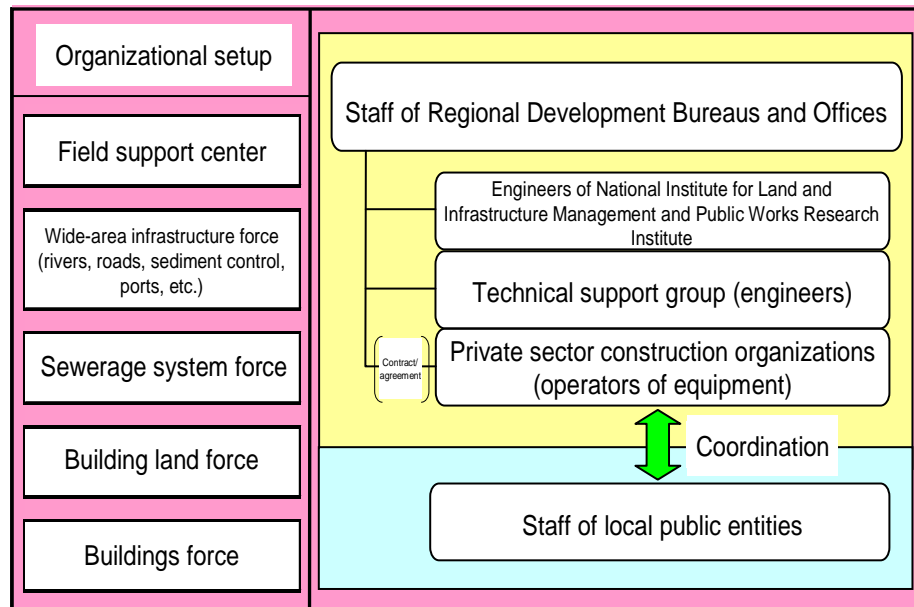
Tsurumi River Administration Center

Adaptation measures with emphasis on crisis management

3. Adaptation measures
for climate change

Reinforcement of actions in the initial stages of a disaster for minimizing damage and restoring infrastructure early, and enhancement of an organizational setup to achieve the goal

TEC-FORCE started in 2008 (Technical Emergency Control Force)



Activities

- Investigation of damage
- Quick repairing
- Prediction of degree of damage risk
- Planning of control measures
- High-level technical guidance
- Assistance in reconstruction

Conclusion

Prioritized investment to disaster prevention

- ✓ Investment prioritize areas related to disaster prevention for limitation of available capacity

Clarification of priority and Planning of road map

- ✓ Drawing up short-term, middle-term, long-term policy by [selection and concentration] as meaning of clarification of prioritized measures.
- ✓ Planning the road map by assessment of disaster risk in multiple measures (e.g. structure, land-use, preparedness)

Adoption adaptive approach

- ✓ Adopting adaptive approach of revising road map in response to future observation and cumulative knowledge

New technical development and contribution to the world

- ✓ Contributing to the world by transferring of new technology and Japanese expertise, policy, technology

Participatory approach

- ✓ Participatory approach is necessity. Informing to be understood easily to citizens.

