Role of IWRM in building a society adapted to climate change

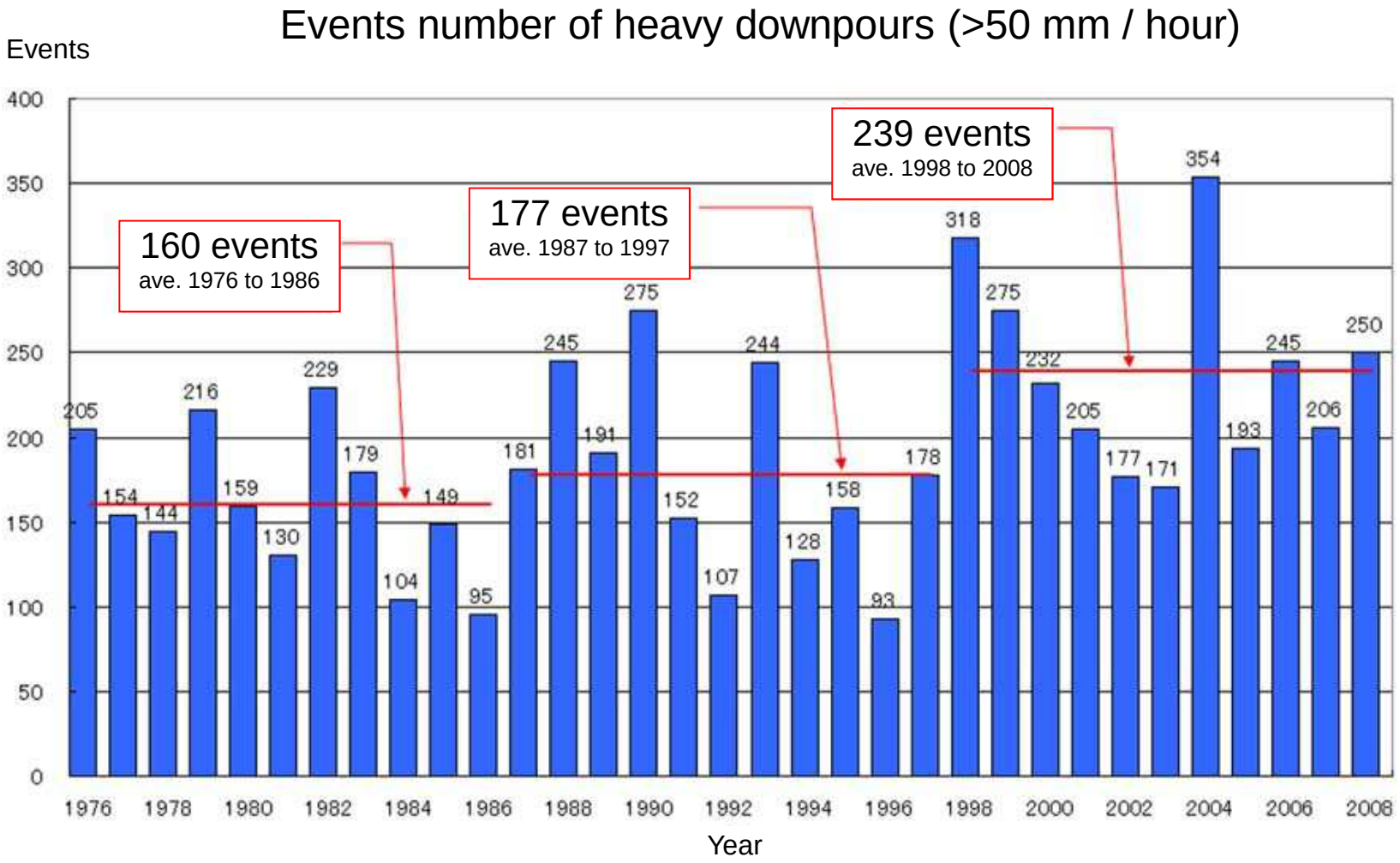
Kenzo HIROKI

Principal, UNESCO-ICHARM

(Vice Chair, Steering Committee, GWP)

Climate change is felt through water now and in the future

Increasing heavy rain in Japan

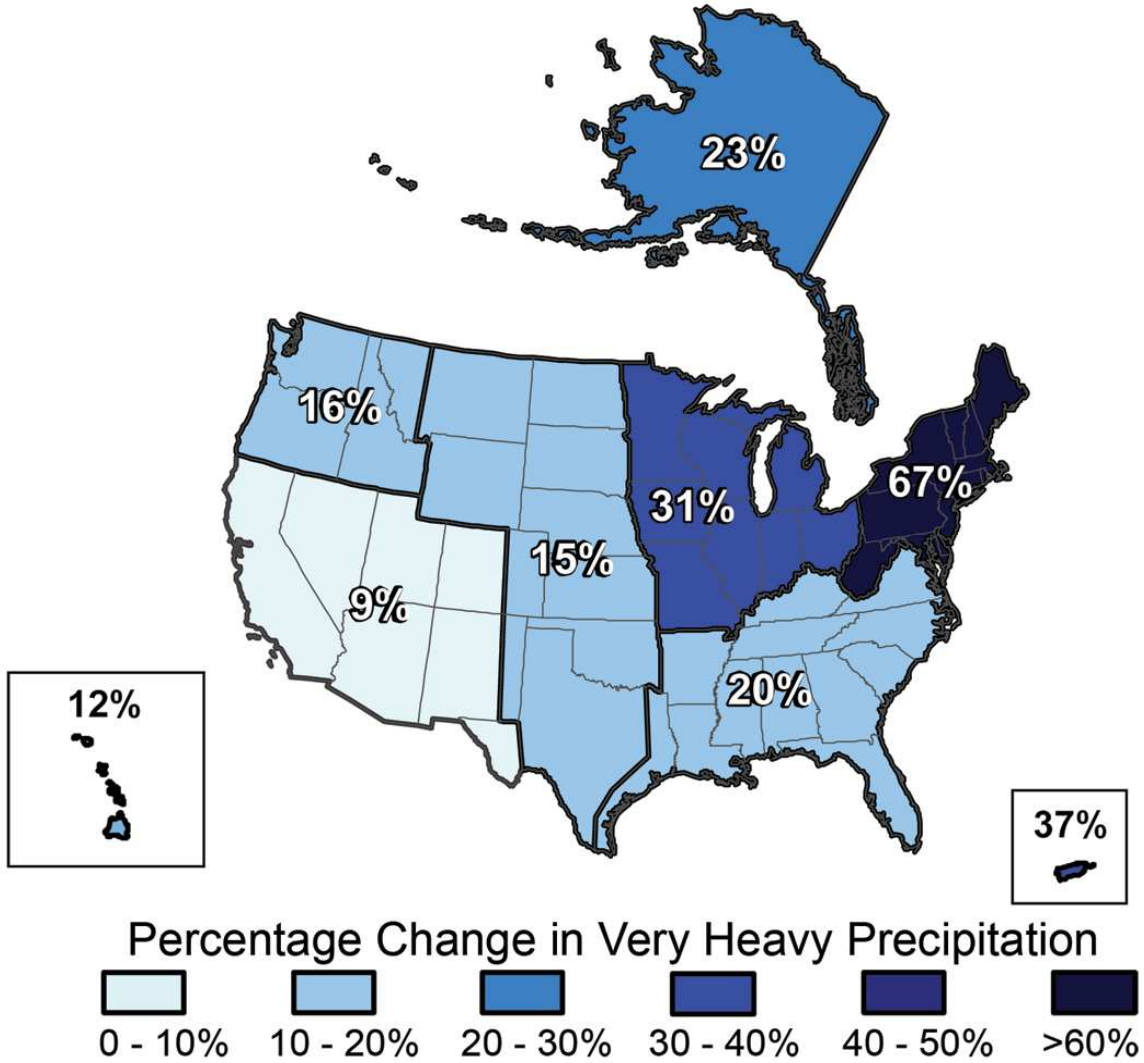


Source: report of Japan Meteorological Agency

Heavy rains have increased across US

Observed Increases in Very Heavy Precipitation (1958 to 2007)

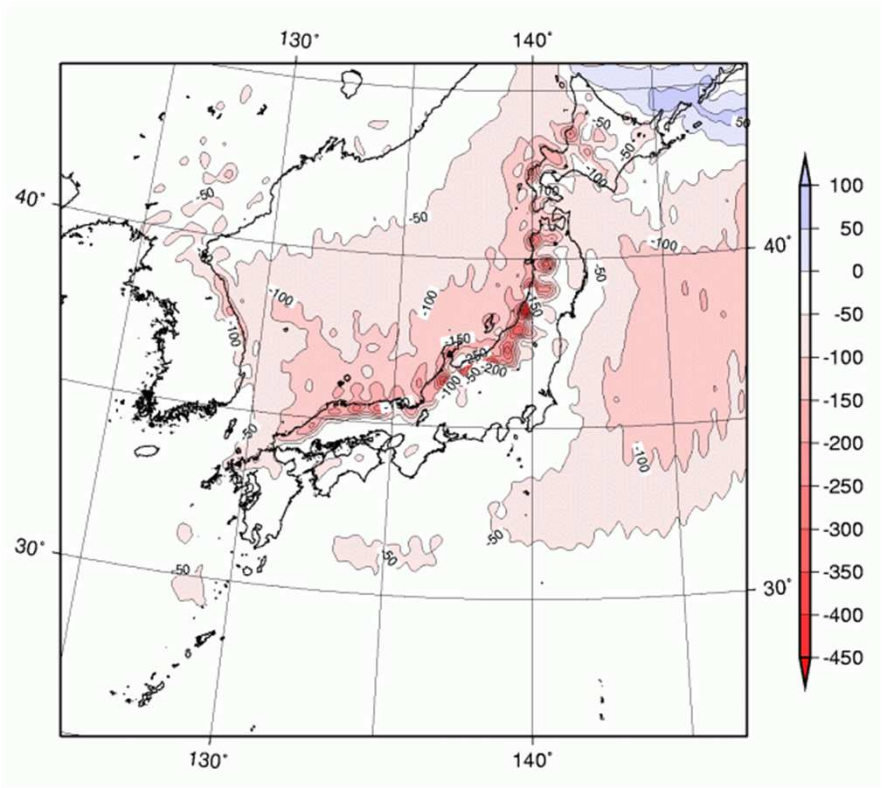
Source: Report by US Global Change Research Program (June, 2009)



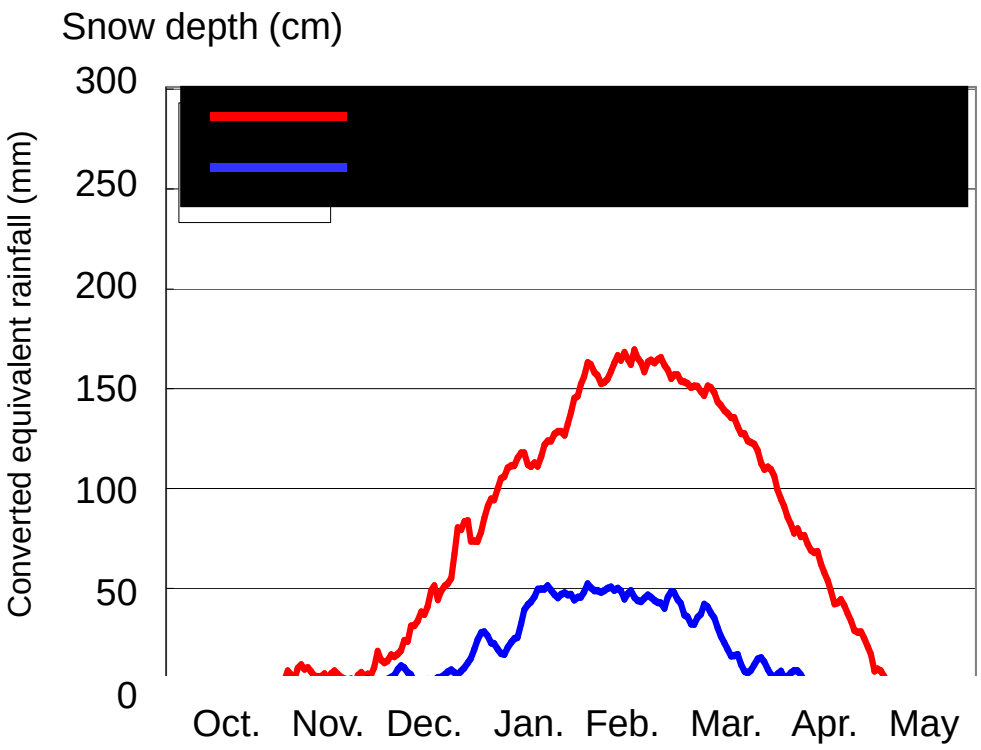
No snowman

Snowfall will dramatically decrease in the northern regions.

In a 100 years' time, the upstream catchments of the Tone River will have considerably less snow depth.



Changes in annual snowfall
(avg. of 2081–2100) – (avg. of 1981–2000)



Snow depth changes
expected 100 years hence (Fujiwara)

Source: Global warming projection vol. 6 (JMA)

Prolonged droughts are expected due to climate change

River Basin	Dam	Irrigation period pattern	Drought periods at present state (days/10yrs)	Drought periods at around 2050 (days/10yrs)
Ishikari	Taisetsu	Advanced by 0-10 days	About 60 days	About 30-70 days
	Chubetsu	Advanced by 0-10 days	About 30 days	About 130-180 days
Tone	8 dams	Advanced by 0-40 days	About 30 days	About 100-110 days
		Deferred by 0-60 days	About 30 days	About 90-120 days
Chikugo	Matsubara/ Shimouke	Advanced by 0-5 days	About 50 days	About 70 days
		Deferred by 0-30 days	About 50 days	About 70-80 days

Droughts mitigated

Droughts exacerbated

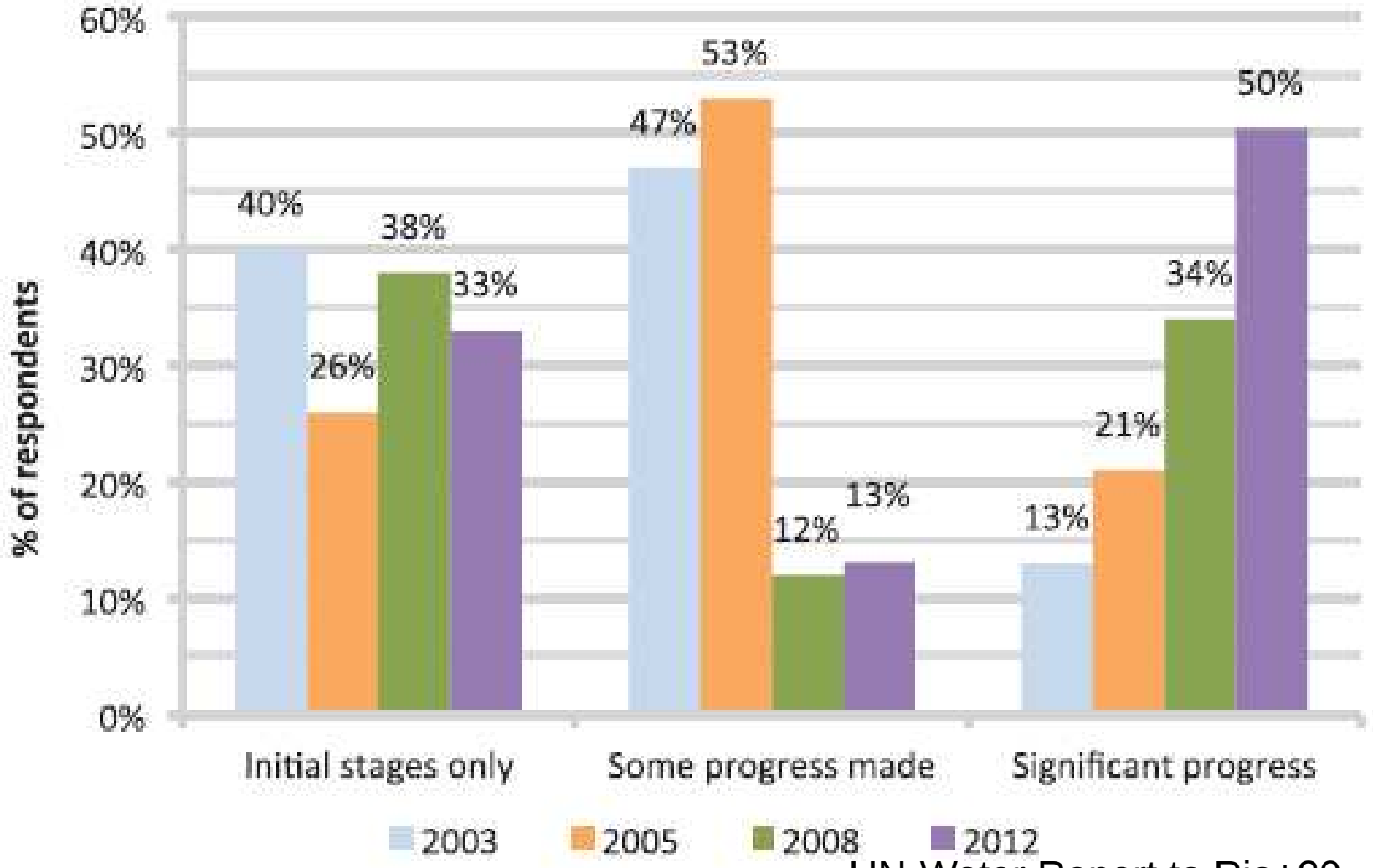
Current status of progress in IWRM

- IWRM can do a lot to address climate change adaptation, but… -

Projected impacts by climate change by sector

Phenomenon and direction of trend	**Agriculture, forestry and ecosystems**	**Water resources**	**Human health**	**Industry, settlements and society**
Warmer and more frequent hot days & nights (Certain)	Decreased yields in warmer environments	Effects on water resources relying on snow melt	Reduced human mortality	Declining air quality
Warm spells / heat waves (Very likely)	Reduced yields in warmer regions	Increased water demand; water quality problems	Increased risk of heat-related mortality	Reduction in quality of life; impacts on elderly, very young & poor
Heavy precipitation events (Very likely)	Damage to crops; soil erosion	Contamination of water supply	Infectious respiratory & skin disease	Disruption of societies due to flooding
Area affected by drought increases (Likely)	Land degradation, lower yields	More widespread water stress	Increased risk of water-borne diseases	Water shortages; reduced hydropower
Intense tropical cyclone activity increases (Likely)	Damage to crops	Disruption of public water supply	Increased risk of water-borne diseases	Disruption by flood; potential for migrations
Increased incidence of extreme high sea level (Likely)	Salinisation of irrigation	Decreased freshwater availability	Increased risk of water-borne diseases	Costs coastal protection

Progress of National IWRM Plans - Survey result on 171 countries -



UN-Water Report to Rio+20

Climate change adaptation is gaining more importance

Figure 7.10 **The importance of climate change adaptation:** The current status in responding countries by HDI Groups *(Question 7.3.5b)*

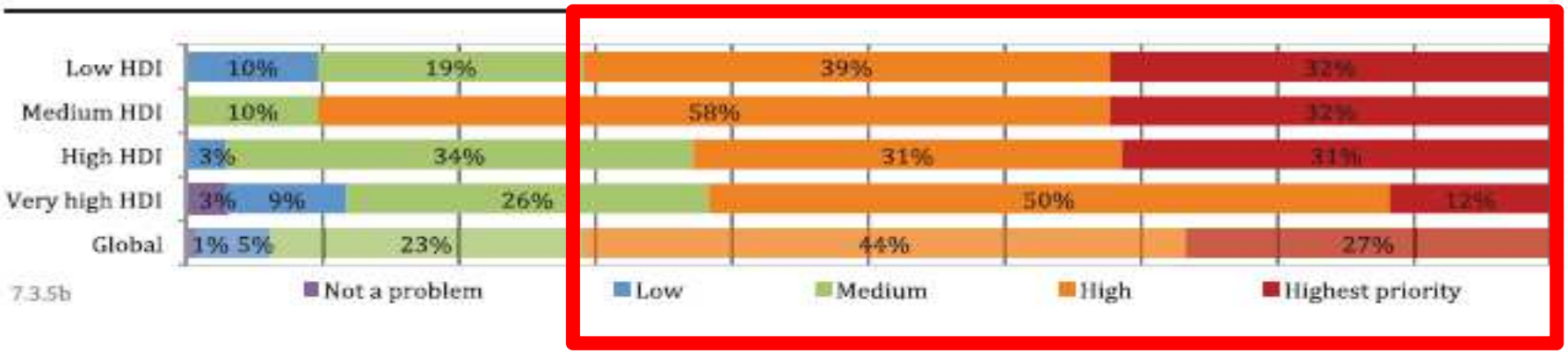
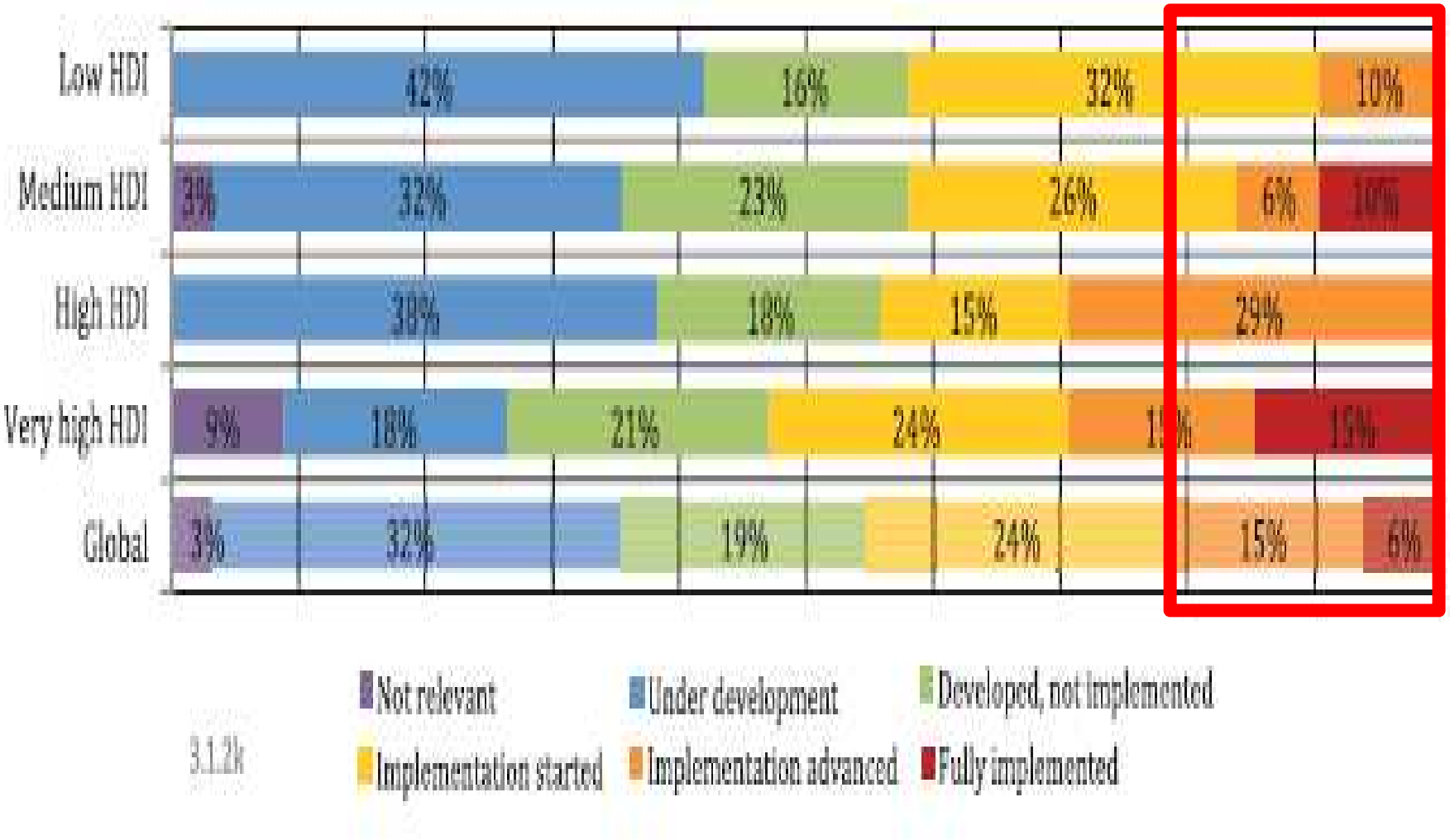


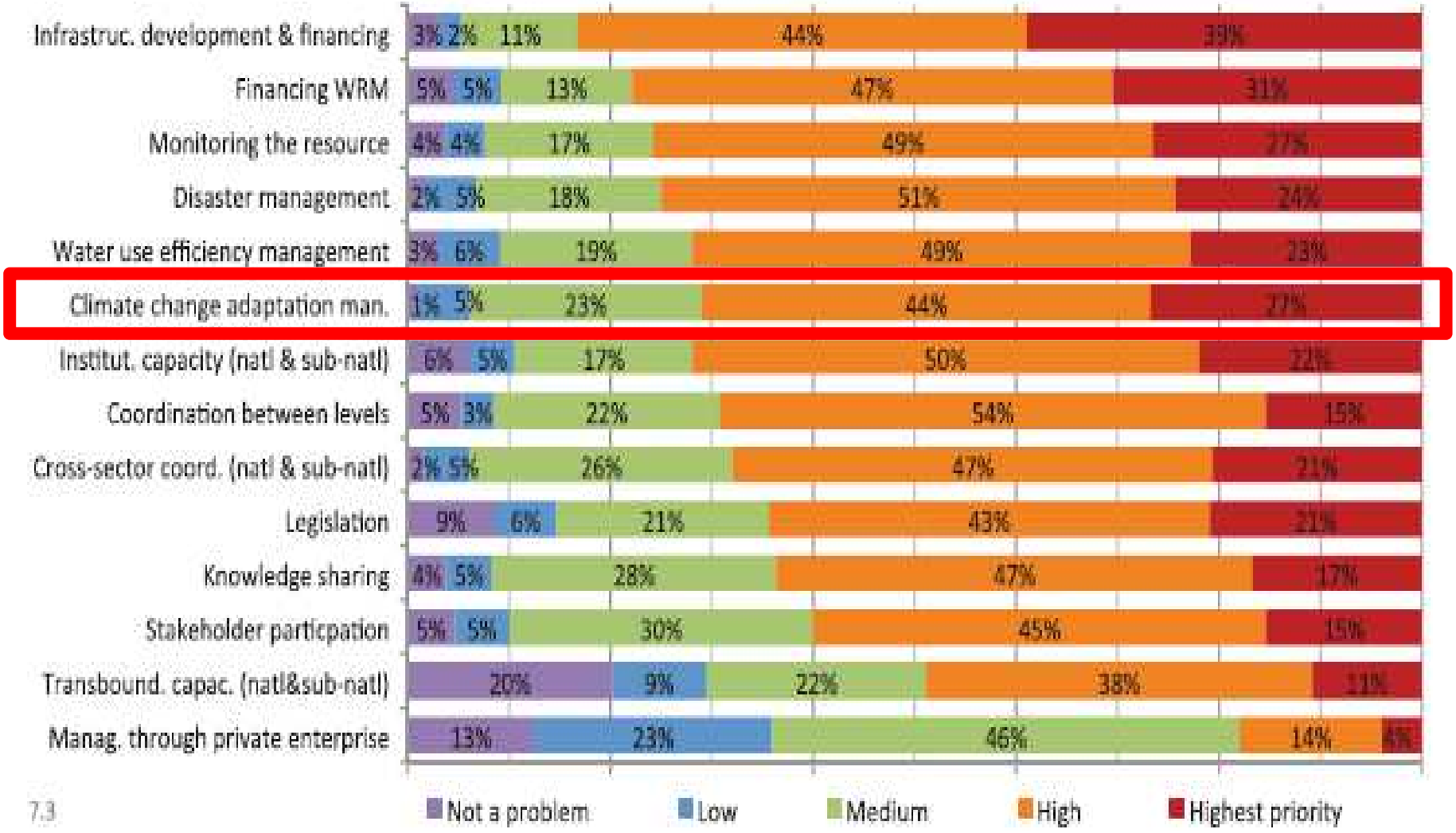
Figure 7.11 **Perceived change over the past 20 years in the importance of climate change adaptation:** The current status in responding countries by HDI Groups *(Question 7.4.5b)*

Climate change adaptation programs through water have not made fast-enough progress



Too many things to worry in WRM?

- Climate change adaptation is important, but not the top priority issue -

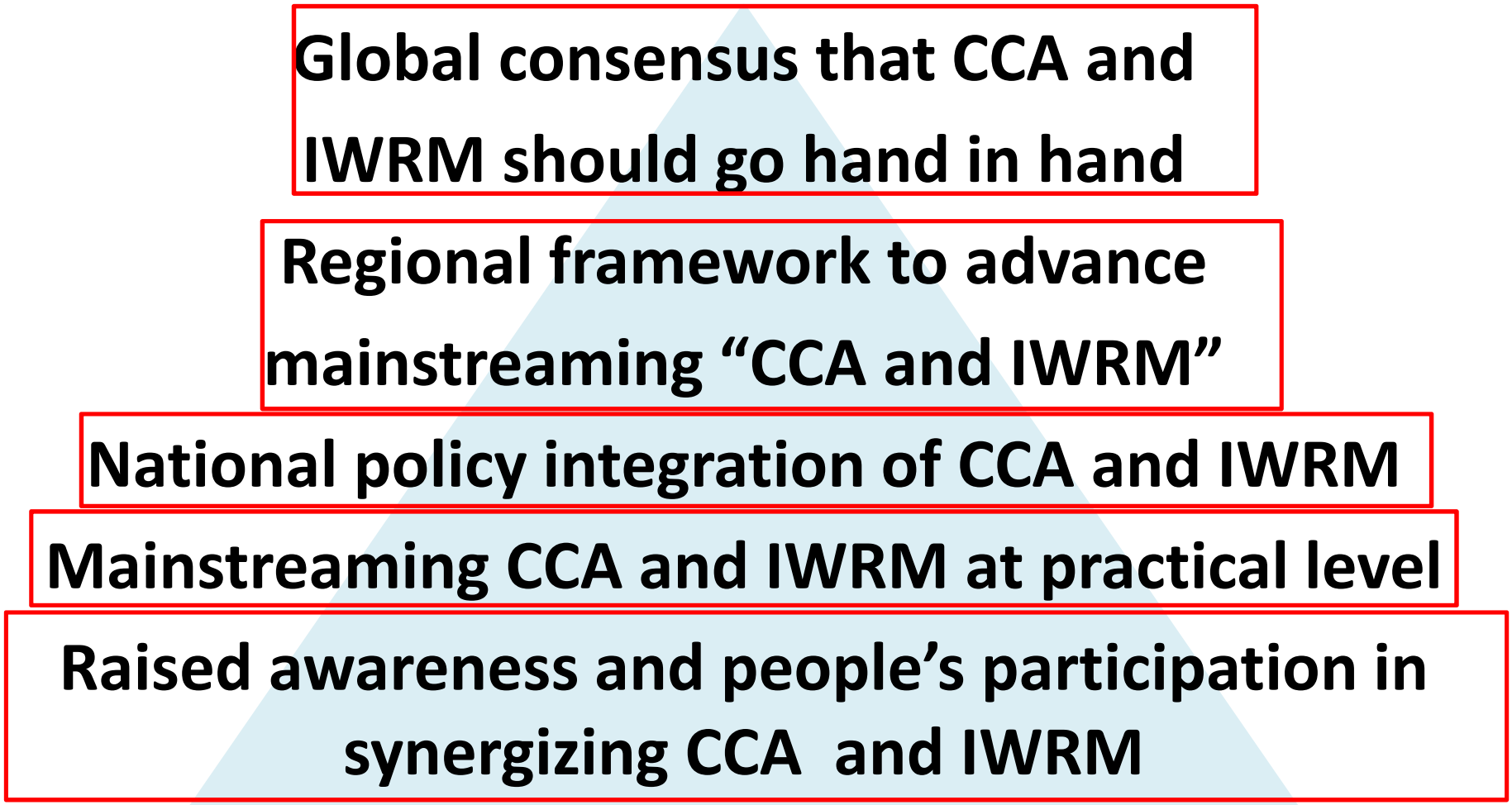


Current status of IWRM and climate change adaptation

- **IWRM plans made substantial progress nationally and globally**
- **Increased awareness on the need to address climate change adaptation particularly through water resources management**
- **Climate change adaptation has yet to be fully addressed in water resources management & v.v.**

Mainstreaming climate change adaptation is needed in IWRM and vice versa

Integration pyramid of IWRM and climate change adaptation



Policy integration, where should they happen?

Goal	Venue
◆Global consensus that CCA and IWRM should go hand in hand	UN General Assembly, FCCC
◆Regional framework to advance mainstreaming “CCA and IWRM”	Regional body (AU, WACDEP, APWF, ESCAP, ECLAC, etc.)
◆National policy integration of CCA and IWRM	National governments
◆Mainstreaming and synergizing CCA and IWRM at practical level	Joint Workshops & dialogue on CCA & WRM (HERE!)
◆Raised awareness & people’s participation on CCA and IWRM	Your neighbourhood Everywhere

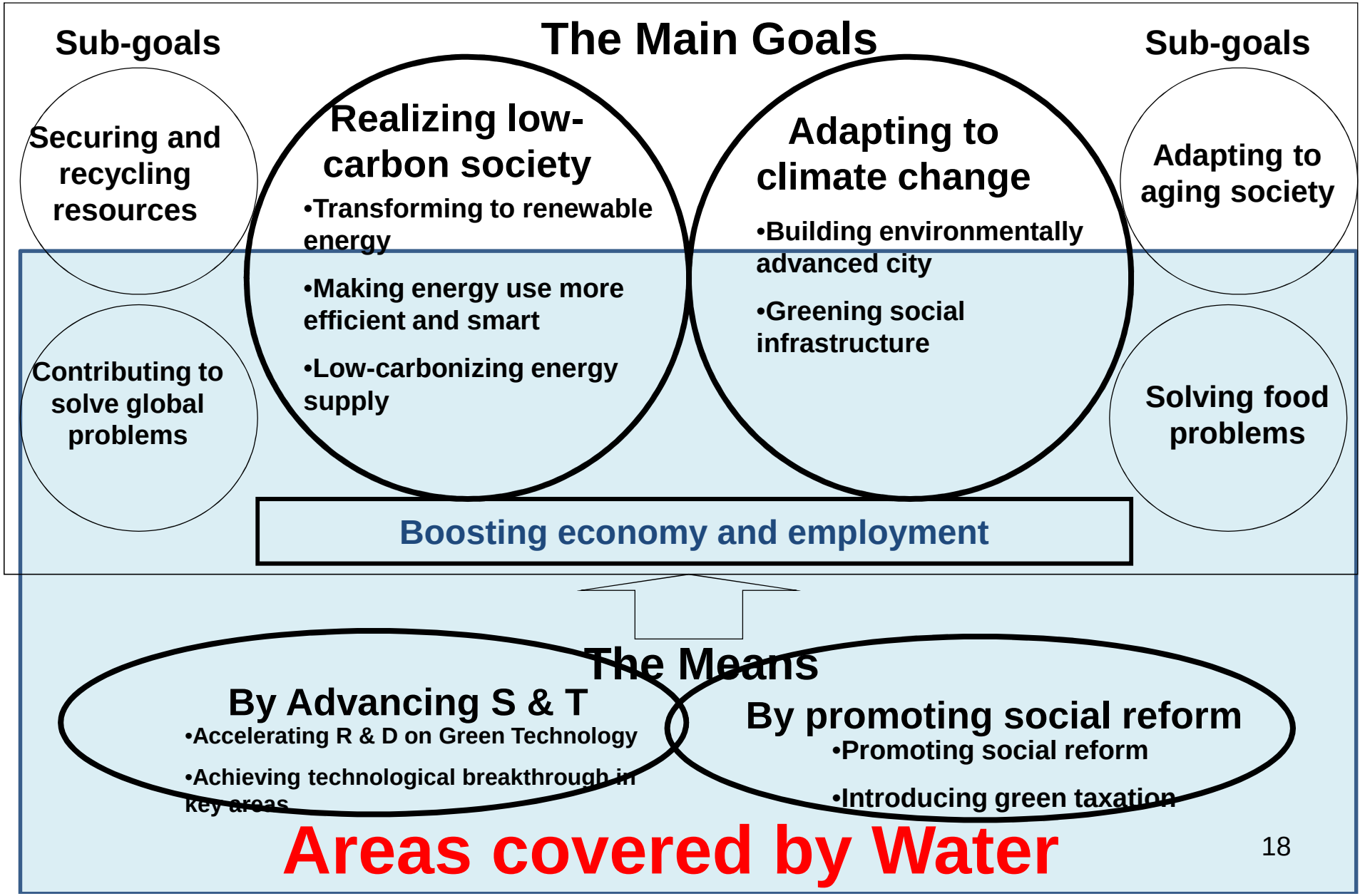
Integrating water and CCA at national policy

- A case for science & technology policy in Japan -

Going beyond water
- a process of integrating CCA and WRM in S & T Policy -

- Think what climate and other changes will bring to our society
- Dream a society we want to build despite the difficulties
- Identify key changes needed to realize the dream
- Find what water (and/or IWRM) can do to help realizing the key changes towards the dream

Addressing climate change in National Science and Technology Policy (Green Innovation)



Target 1 in addressing adaptation

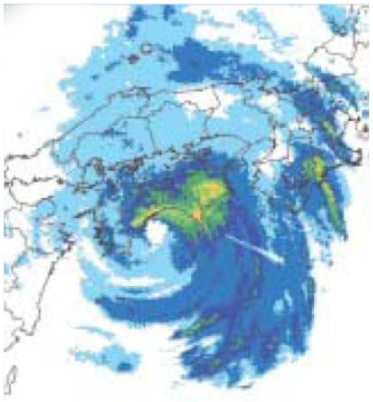
Safeguarding land, cities and nature

To change land use, city structure and social system in order to protect land from disasters, mitigate heat-island and other effects to cities and conserve forests and ecosystems

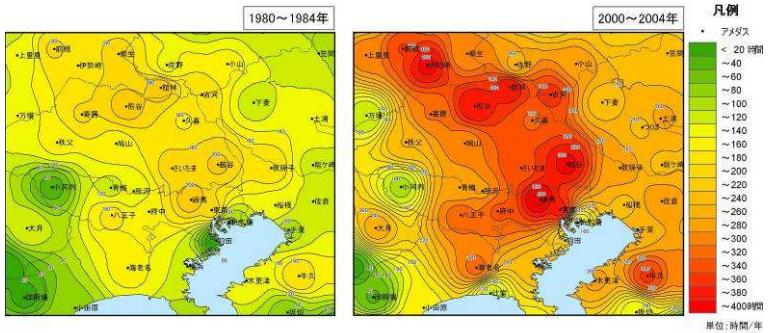
Ways to make it happen

- ✓**Creating land adaptive to climate change by combining structural and non-structural measures**
- ✓**Redesigning cities to embed mitigation and adaptation in society**
- ✓**Conserving forests and ecosystems as social assets**

10th Typhoon, 2004



Source: Japan Meteorological Agency



Heat-island phenomena in Kanto-area

Source: Ministry of the Environment, Japan

Forests and ecosystem

Target 2 in addressing adaptation

Enhancing people's health and livelihoods

To transform economy, health and social security systems into adaptive ones in order to protect people, esp. vulnerable, from health threats and enhance livelihoods by galvanizing agriculture, improving public transportation, etc.

Ways to make it happen

- ✓**Presenting blue prints of low carbon communities suitable to individual local conditions**
- ✓**Creating sustainable local industry and economy**
- ✓**Protecting people from infectious disease, etc**
- ✓**Providing houses and buildings adapted to climate change**

Green factory

Source: Transfer Association of Green Factory

Insulating glass

Source: Japan Construction Material & Housing Equipment Industries Federation

Advanced transportation system

Source: Mayor Suzuki, Toyota city

Target 3 in addressing adaptation

Creating solidarity for adaptation

①To build solidarity network to facilitate collaboration for adaptation among communities, cities and nations.

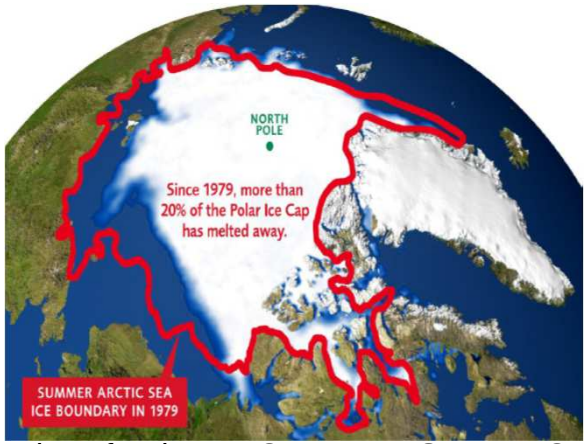
②To create enabling environment for people's participation through, e.g., education, awareness raising, and community approach.

Ways to make it happen

✓Building systems to share the knowledge and information related to effects of climate change and adaptation to it

✓Promoting people's actions by providing with educational programs, information tools, training programs for community leaders, etc.

Source：University Corporation for Atmospheric Research



Reduction of Polar Ice Cap area　Source：ICIA, 2004

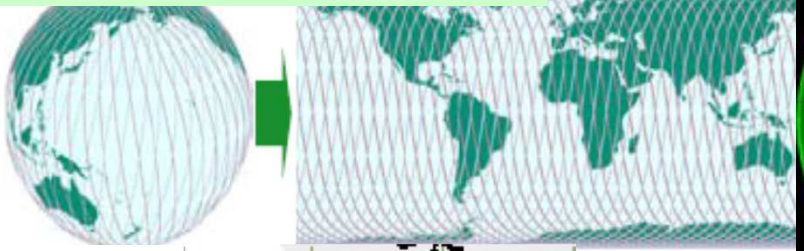
Source： JICA (2001) Annual Evaluation Report

Water in the Science and Technology Policy to help achieving breakthrough for climate change adaptation

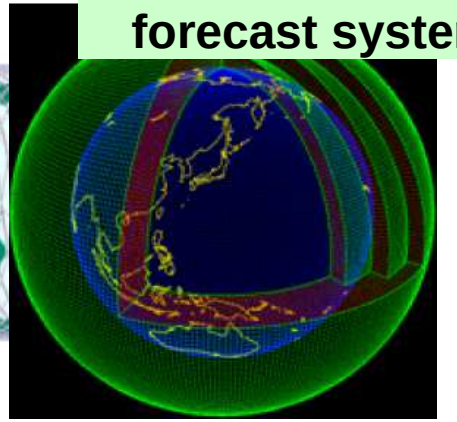
- What water can do to help creating adapted society -

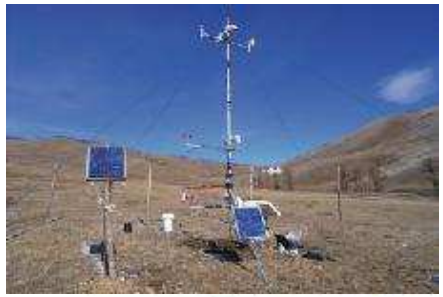
Integrating global monitoring system/models with local experiences/actions

Observation Satellites

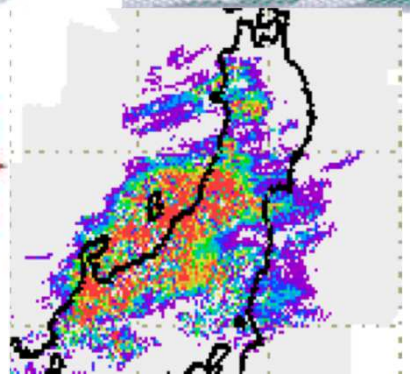


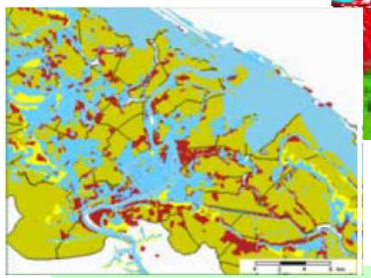
Link to simulation & forecast system





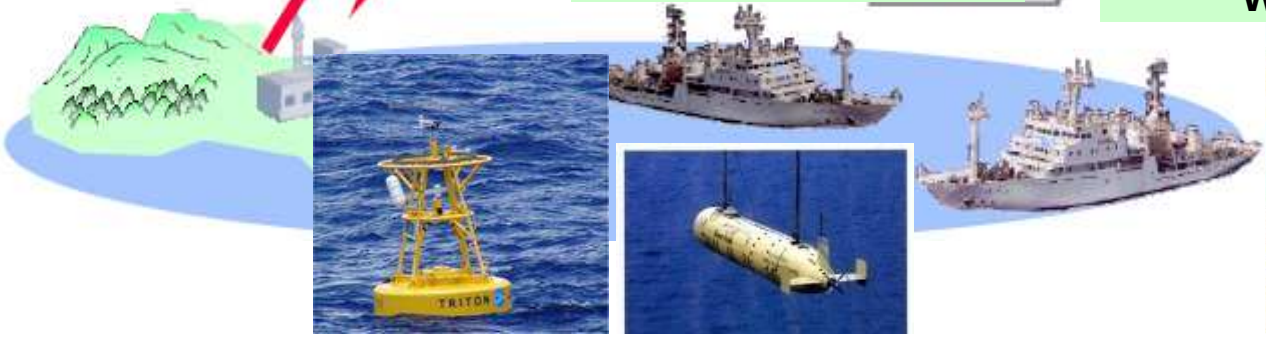
Ground & surface sensors





Ocean and seabed observation

Integration of database on water, air and land

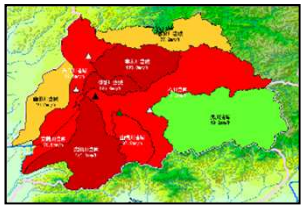


IT-based risk management of mega-disaster

Monitoring

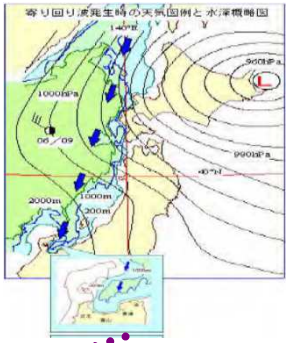
CCTV Camera

Real-time risk assessment

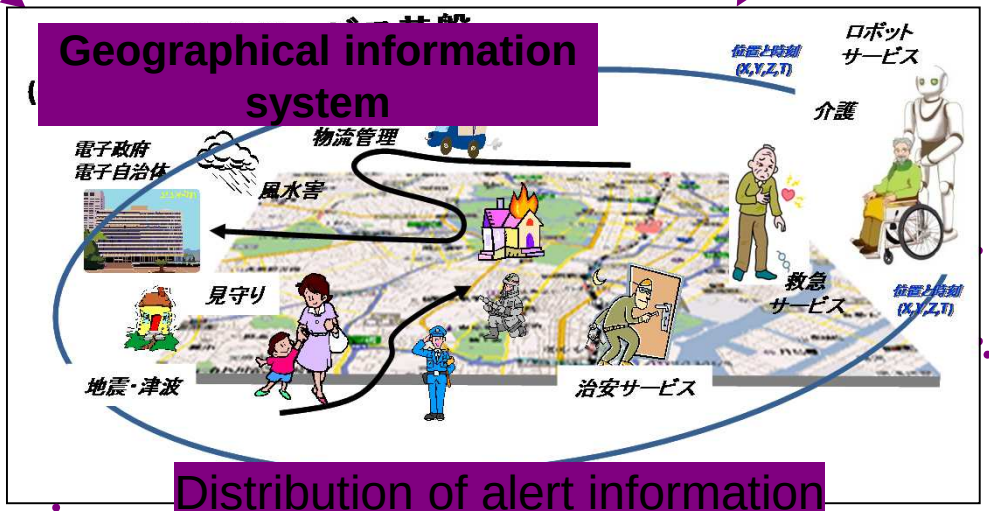


MP Radar Observation system

Weather forecasting

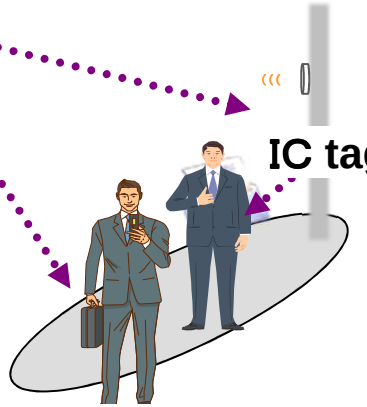


Geographical information system



Warning system

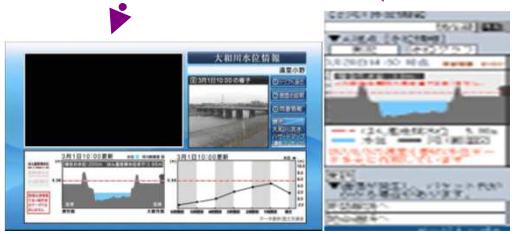
IC tag



Alarm e-mails on mobile phones

Distribution of alert information

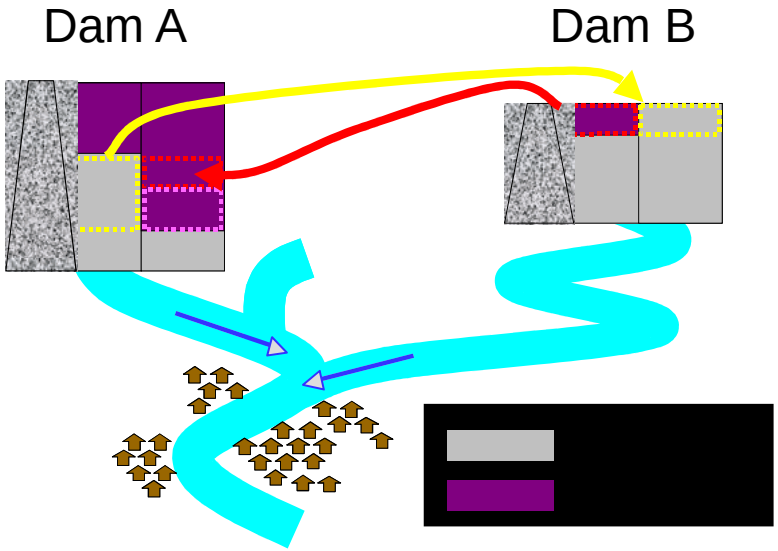
Automatic water gate operation



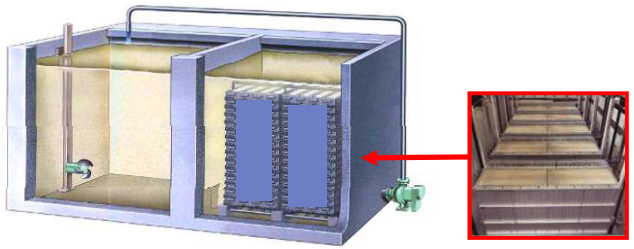
Disaster news on digital wave TV

Water Supply Management

- Basin-wide integrated reservoir operation
- Linking reservoirs by structures (tunnels, etc.)
- Developing/Redeveloping water infrastructure
- Sewage recycling system
- Water risk management
- New technology



Reorganization of Dams


Sewage Recycling System


Mobile desalination unit

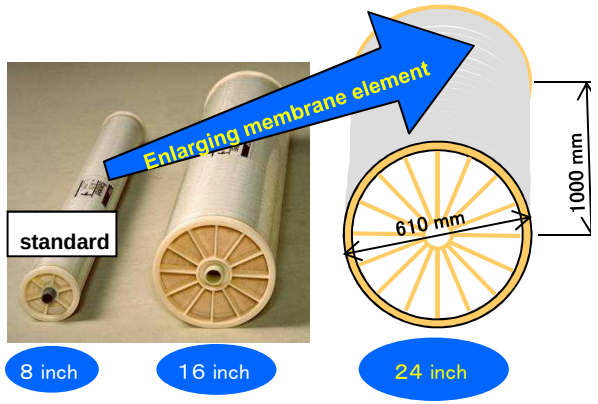
Mega-ton Water Production

R & D to innovate water treatment technology

- ✓ Making desalination technology affordable for the poor
- ✓ Creating new demand for water industry
- ✓ Reducing energy to produce fresh water

Target of "Mega-ton water System"

Properties	Conventional		"Mega-ton Water System"
Capacity (ton/day/plant)	100,000	×10	1,000,000
Size of RO Membrane Vessel	8-inch	×3	24-inch
Desalination Cost	1.0	×0.5	0.5

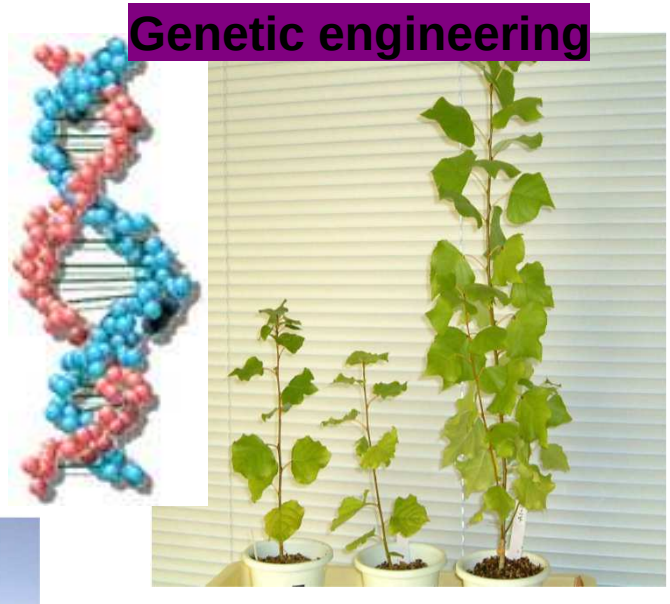


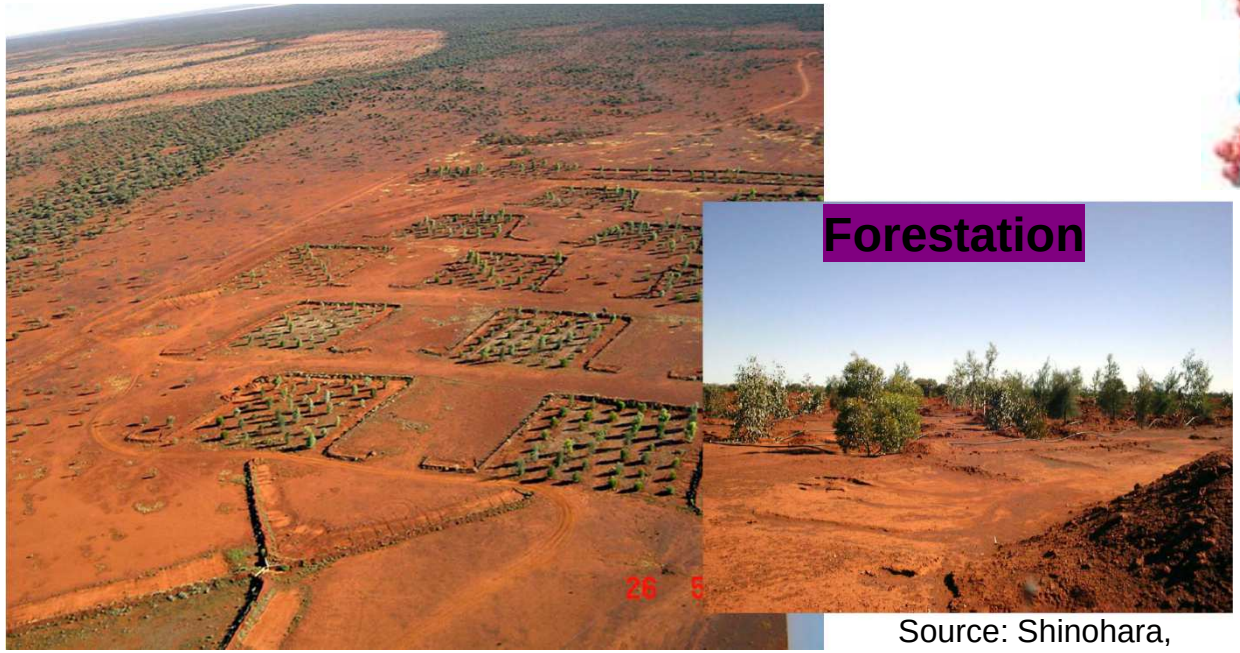
【Project Leader】
Senior Scientific Director
Dr. Masaru KURIHARA
(Fellow, Toray Industries, Inc.)

【Project Member】
Academia : 11(Tokyo Univ. et al.)
Company : 18(Toray, Hitachi, Toshiba et. al.)
Others : 2(Sewage Works Agency et. al.)

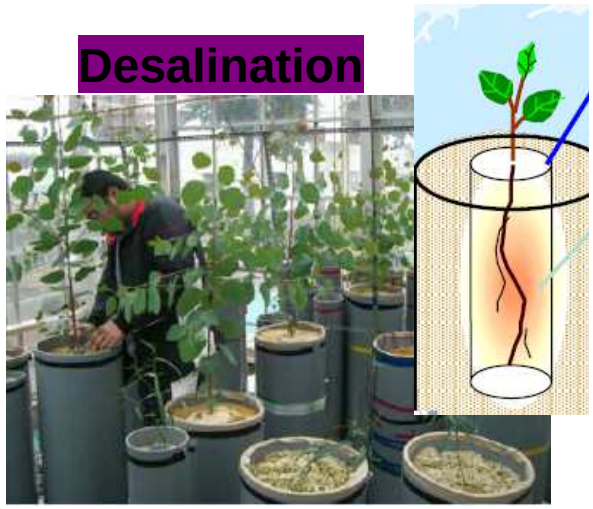
Conserving forests and natural ecosystem

Forest technology to mitigate desertification
(1)Genetic engineering,
(2)Forestation technology, and
(3)Desalination technology





Source: Shinohara,
Forestry and Forest Products
Research Institute, Japan



Conserving water by conserving forests

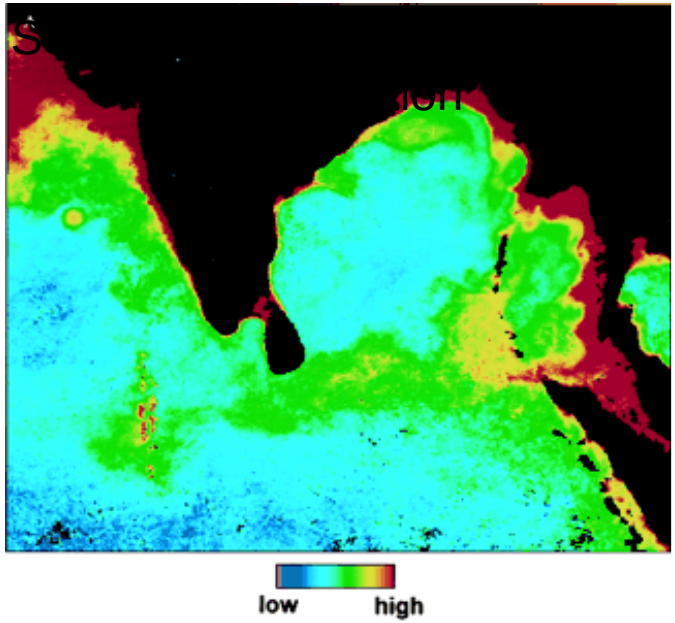
Maximizing carbon absorption by forest/watershed management

Satellite water picture will help detecting cholera outbreak

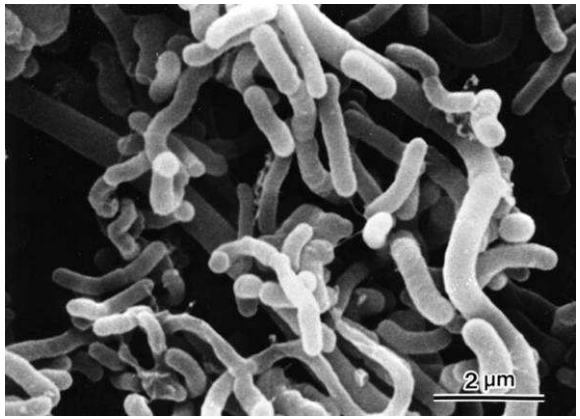
✓Number of cholera cases is significantly correlated with sea water temperature and its intrusion into fresh water as sea planktons are host to the cholera bacteria.

✓Outbreak of cholera can be predicted by monitoring sea water temperature and height from satellites.

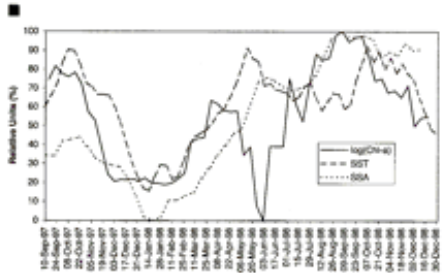
✓More accurate prediction may become possible as remote sensing data of plankton (chlorophyll) are available by launch of SeaWiFS.



Cholera bacillus

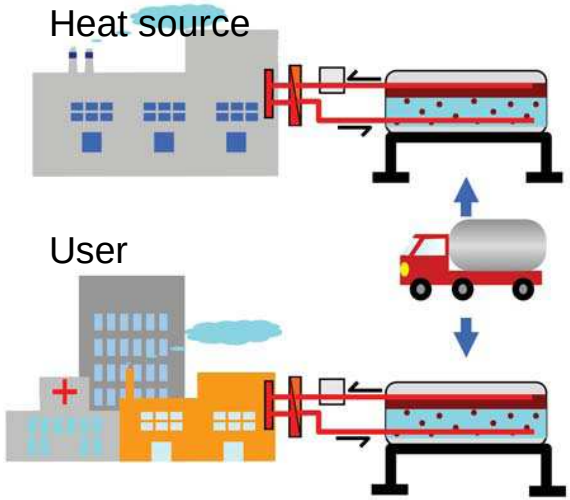


Source: NASA Goddard Space Flight Center

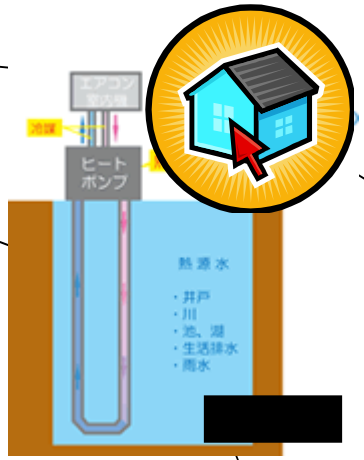


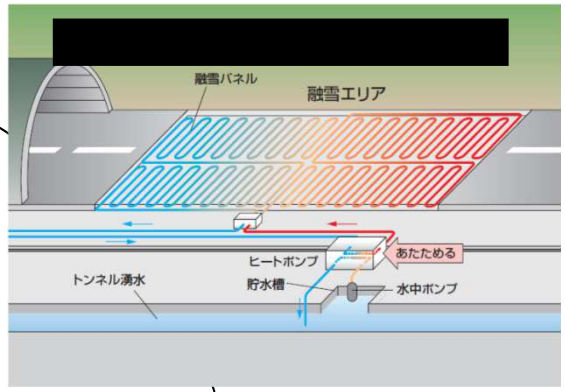
Water contributing to low-carbon energy generation

Energy withdrawal from effluent



Groundwater as source of heat
Power generation by heat pumps





Source: Kowa Co.,Ltd.

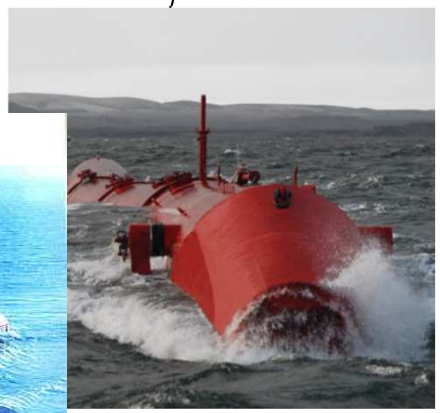
Zero-emission distribution system

Wave & tidal power generation

Source: Ocean Power Delivery Ltd.

Micro-hydropower generation

Source: Kanden Engineering Co.



Source: Ministry of Land, Infrastructure, Transport and Tourism, Japan

Addressing adaptation to climate and social change through IWRM

Addressing climate change

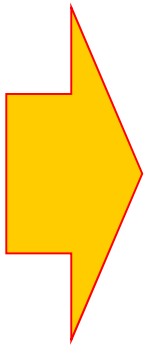
Prepared for more frequent, extreme events

Coping with changed hydrological/ environmental situation

Addressing Social needs

Coordinated use of water resources

Ensuring safe water supply and sanitation



Policy Framework to ensure adaptation to climate change through IWRM

Integrating management of water demand and supply

Integrating water facility planning, designing and operation

Integrating management of surface and ground water

Integrating management of water quantity and quality

Information sharing and stakeholders' participation

A few suggestions for next steps

Priority actions to adapt to climate change through water

- Create global consensus that CCA and WRM should go hand in hand
- Create regional policy framework to discuss adaptation to climate change through water
- Accelerate development of science and technology to achieve breakthrough
- Strengthen global & regional collaboration for monitoring, data-sharing, and joint-research

Thank you