



Current State of Water-related Disasters in Asia-Pacific Region

Junichi Yoshitani

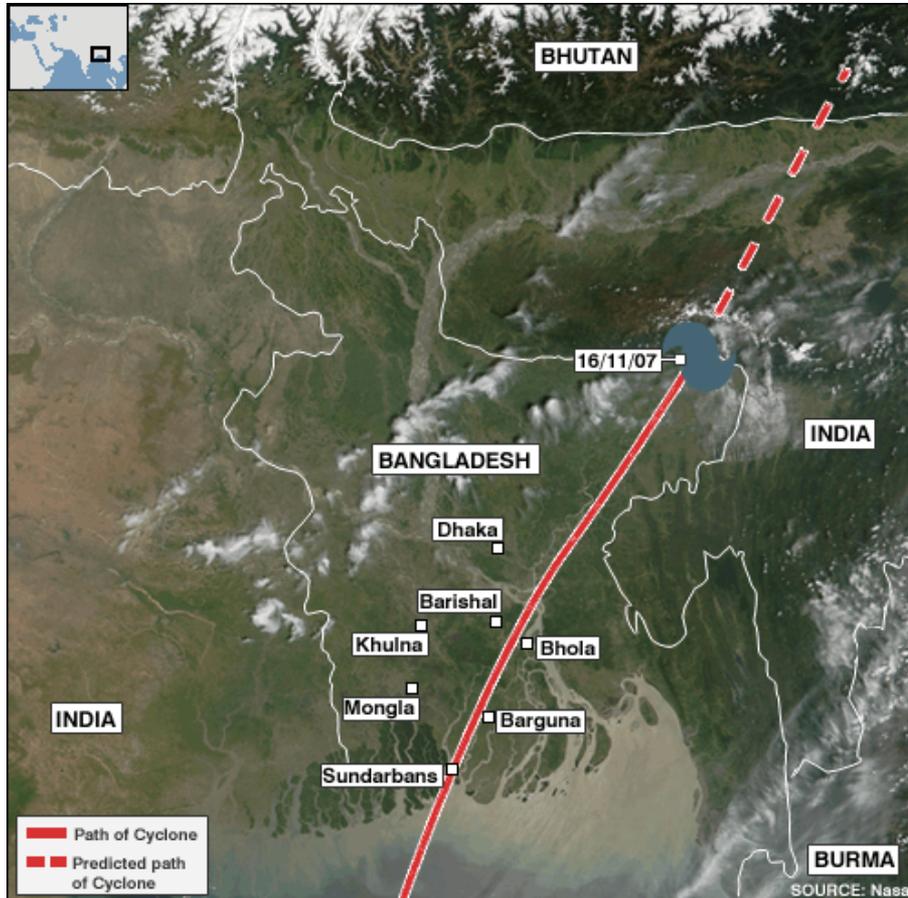
ICHARM

International Center for Water Hazard and Risk Management

under the auspices of UNESCO

hosted by PWRI, Tsukuba

Severe Cyclone Sidr in Bangladesh, November 2007



Recent Floods in Pakistan, July 2007



Flood victims seek shelter as they wait for relief Pakistan July 2007



Pakistanis wade through flooded streets Pakistan



Monsoon season has brought misery to millions in South Asia, Pakistan



Thousands of Families have lost their homes

Flood and Waterlogging Disasters in Cities in China



July, 2007
Chongqing

On July 16 to 17, a heavy storm with a maximum rainfall of 408 mm hit Chongqing. The heavy rain caused 6.43 million people affected, 56 people death, 30 thousand room collapsed.



July, 2007
Chongqing

Courtesy of Kuang Shangfu,
IWHR

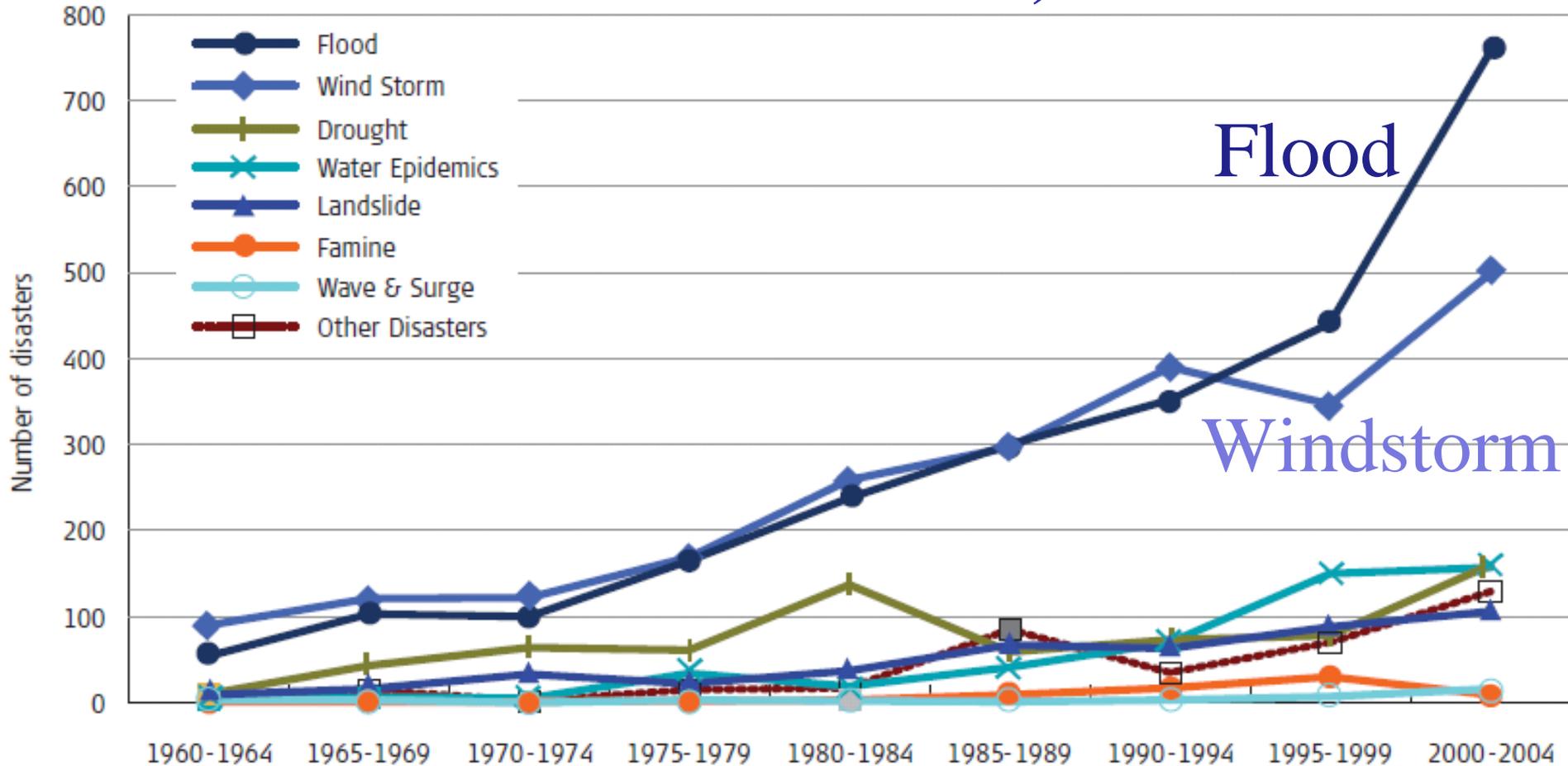


July, 2007
Chongqing



July, 2007,
Chongqing

Global Trends of Number of Water-related Disasters, 1960-2004



Source: Data from the Center for Epidemiology of Disasters (OFDA-CRED) in Louvain (Belgium). Analysis by PWRI, 2005.4

Urbanization

Development of the Tsurumi River Basin

(Kawasaki City, Kanagawa Prefecture): 1960s –

The Tsurumi River basin has been rapidly urbanized since 1960s, when flood control measures began to lag behind urbanization.

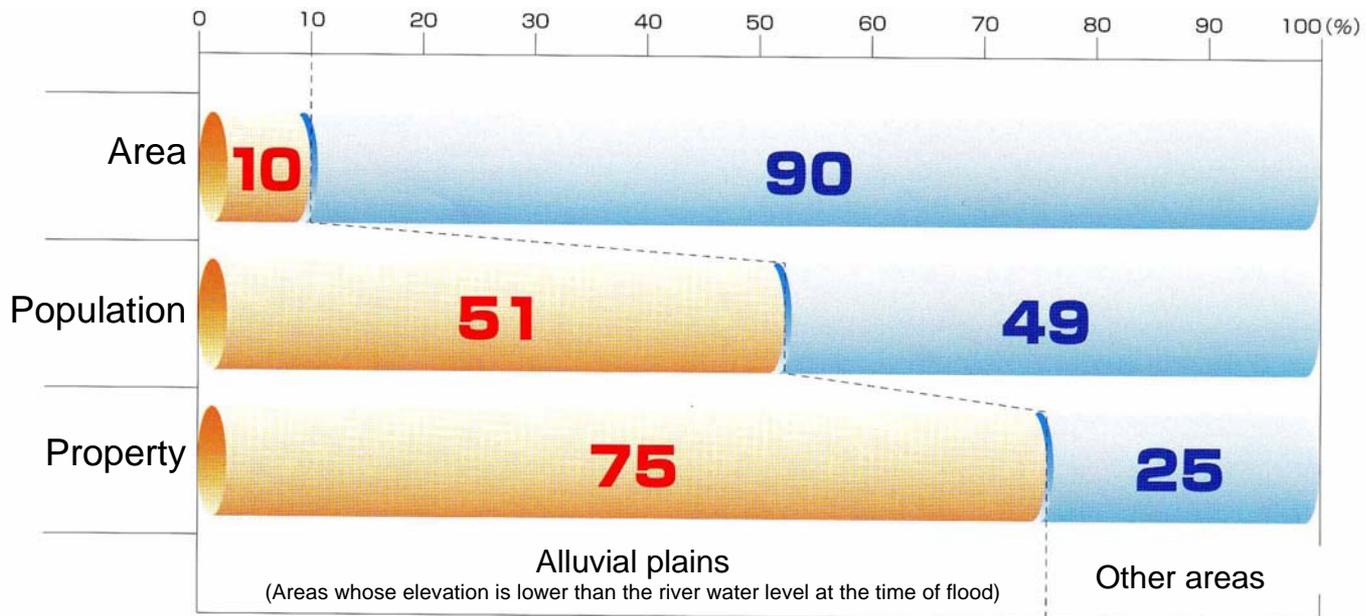


The Tsurumi River (Kanagawa Prefecture)

Property on Plains

Japan has many mountain ranges, and thus plains account for only about 10% of its total land area.

About 50% of the total population and 75% of property concentrate on the plains.

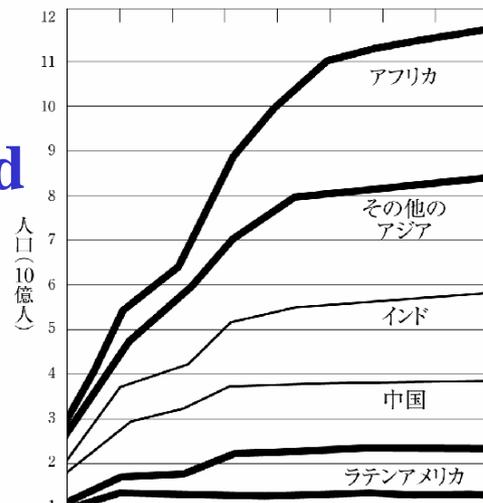


Japan has many mountain ranges, and about 50% of the total population and 75% of property concentrate on the plains that account for only about 10% of its total land area. Damages caused by floods, therefore, could be much more serious than those in other countries.

Population Growth

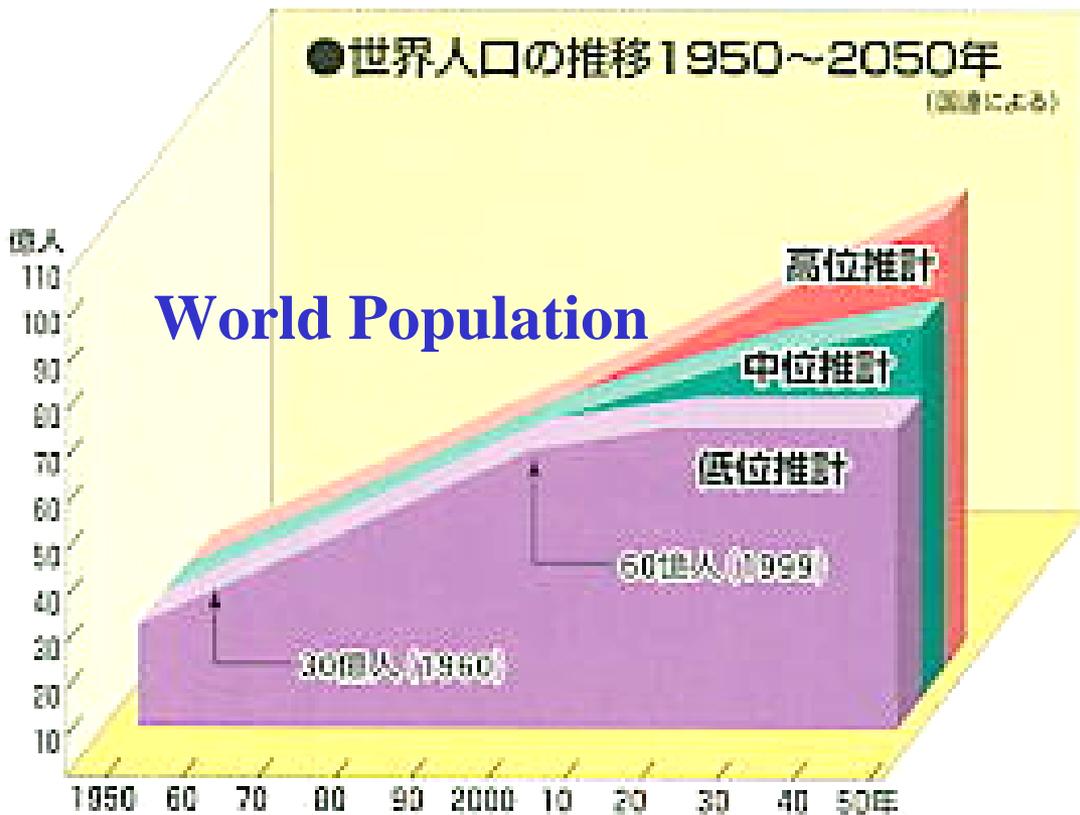
9 billion by 2050
(medium projection)

World

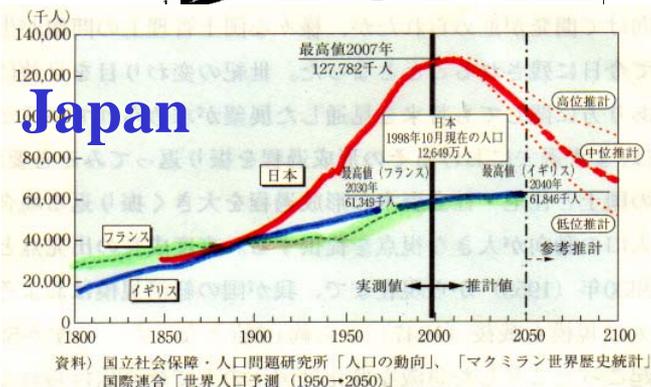


●世界人口の推移1950~2050年
(国連による)

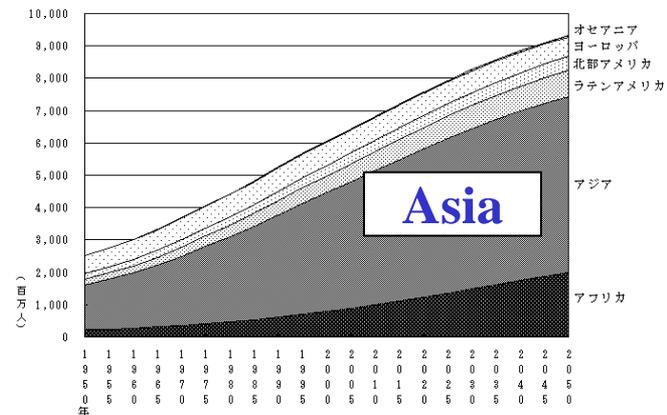
World Population



Japan



Asia



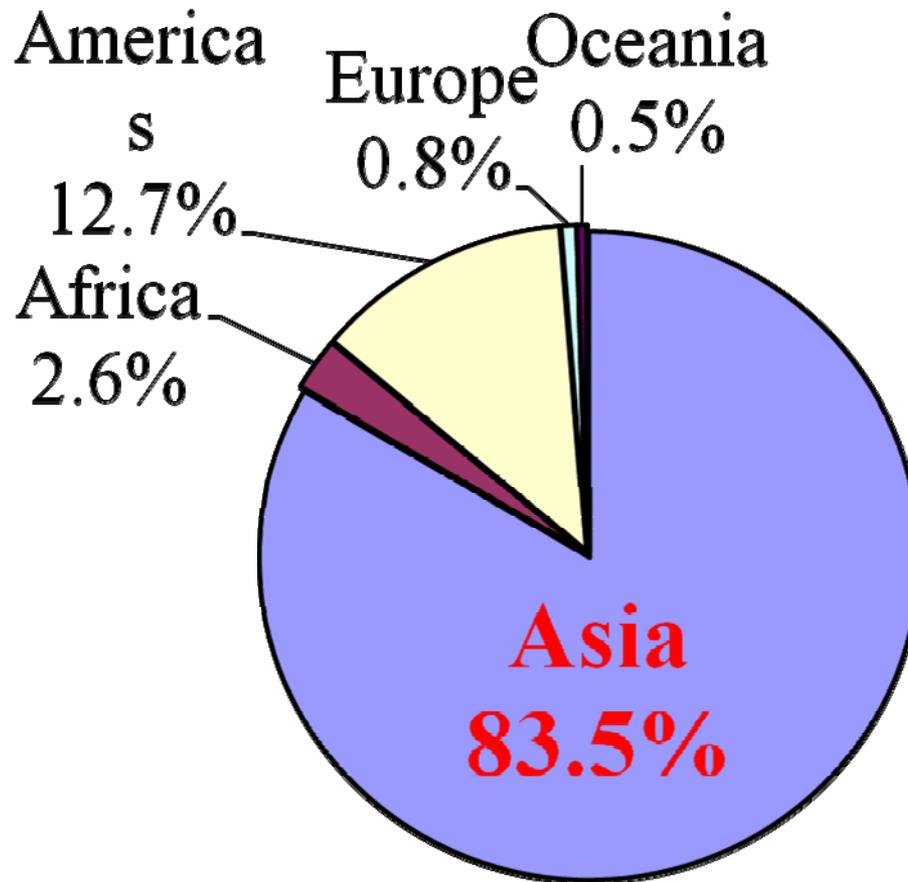
<http://biz.nifty.ne.jp/nikkenkyo/4joho/738sokoniarukiki/jinkou.htm>

資料: United Nations, World Population Prospects 2000 年版による。

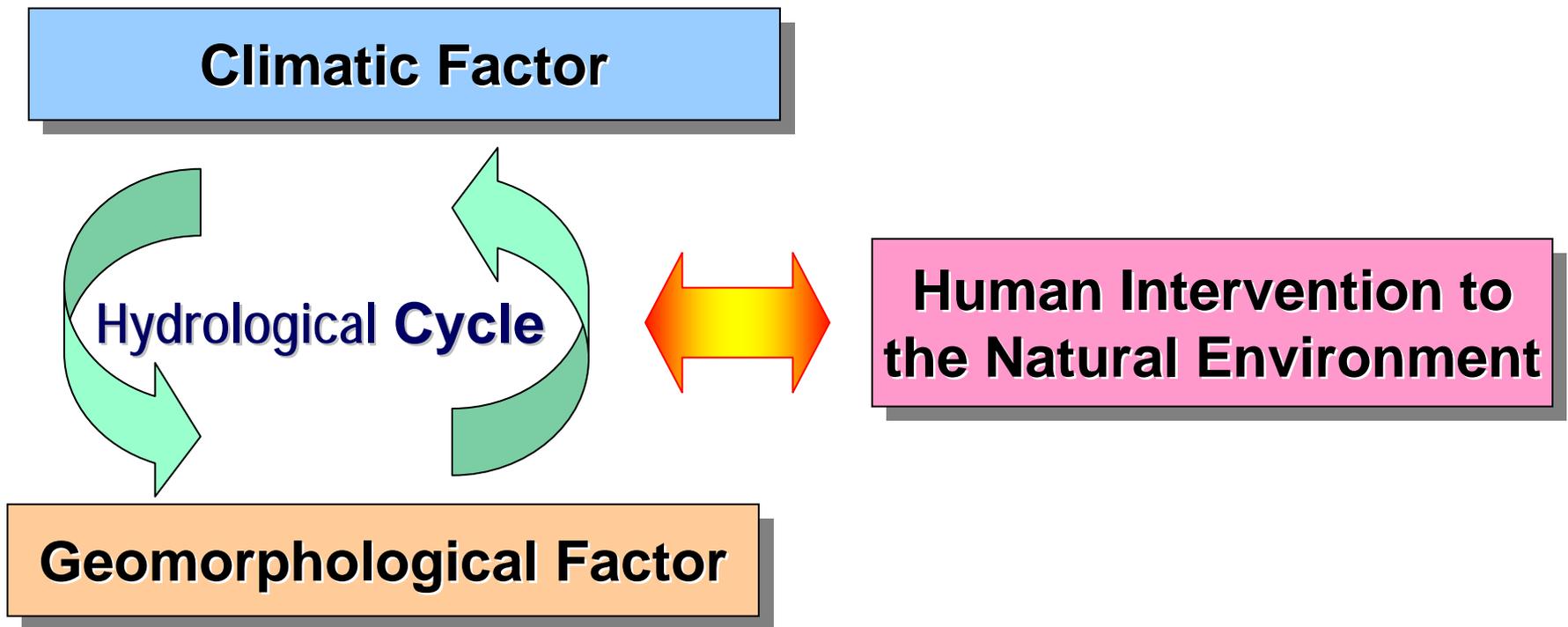
<http://www.stat.go.jp/data/kokusei/2000/topics/topics08.htm>

Regional Distribution of Fatalities

**Total Global Fatalities of Flood, Slides,
Windstorm and Wave/surge 1980-2006**



Three Major Factors Governing Regional Characterization in Hydrology-Water Resources System

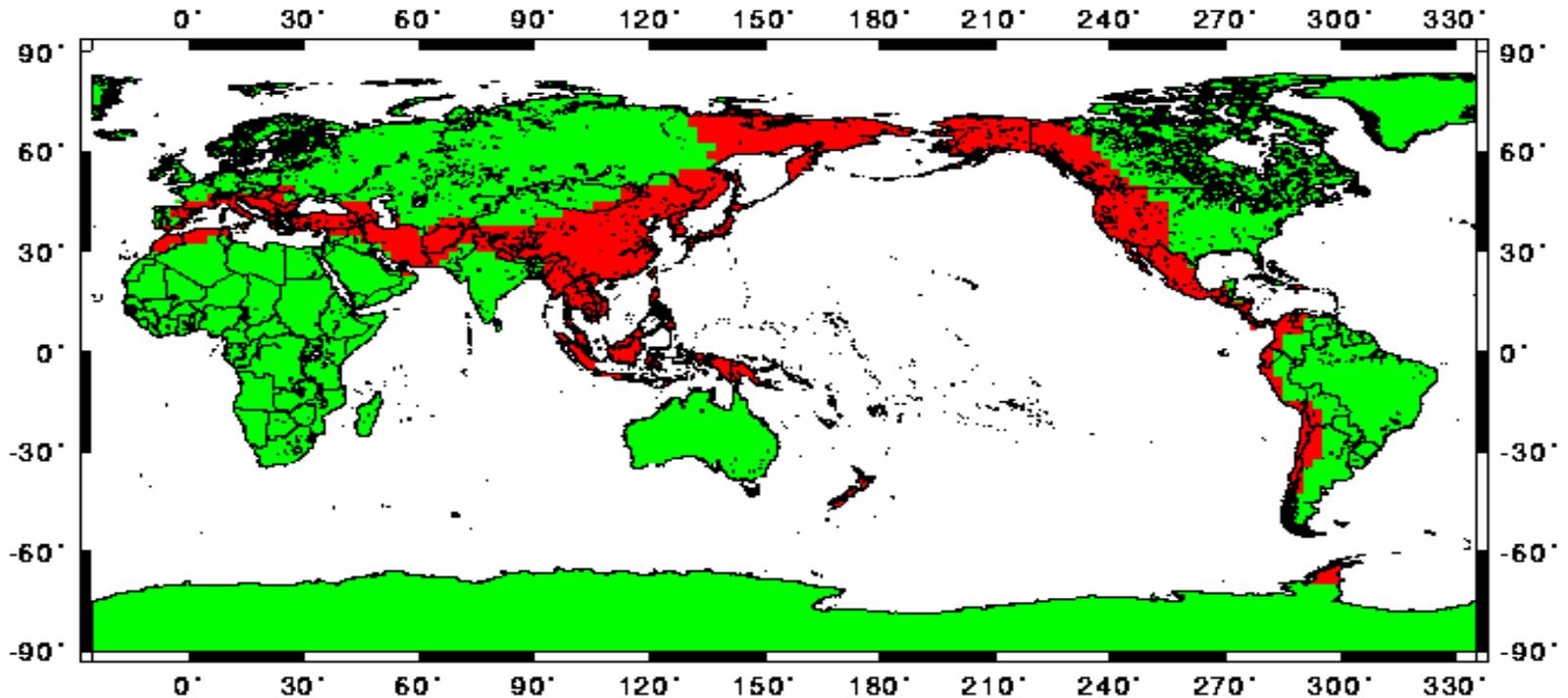


- **Hydrology-water resources system** in the river basins should be considered in a **dynamic interaction** among these three factors

Tectonic Zones

-Alpine-Himalayan Zone : Alps -- Mediterranean Coast -- Middle and Near East -- Himalaya
-- Sumatra – Java

-Circum-Pacific Zone : New Zealand – New Guinea – Philippines – South-western fringe of Asian continent
-Japan Archipelago– Aleutian Islands – West Coasts of both North and South America



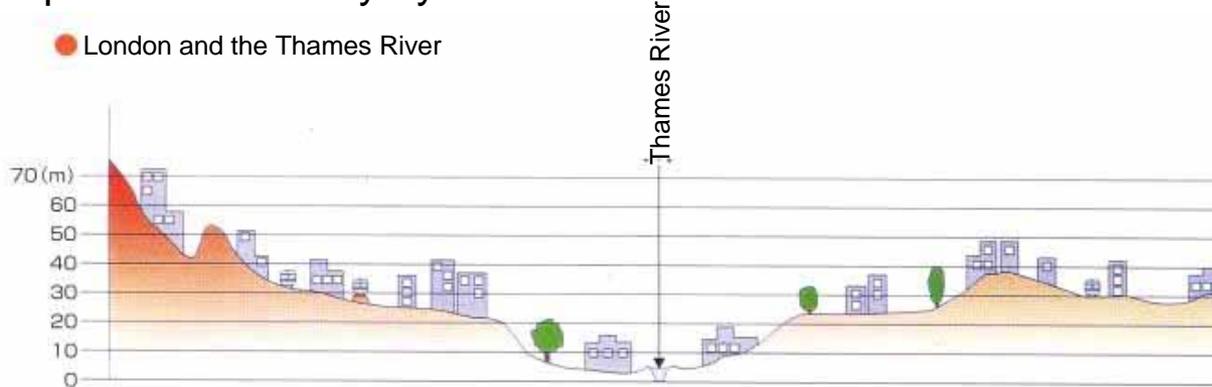
TECTONIC ZONES

Courtesy of Prof. Musiake

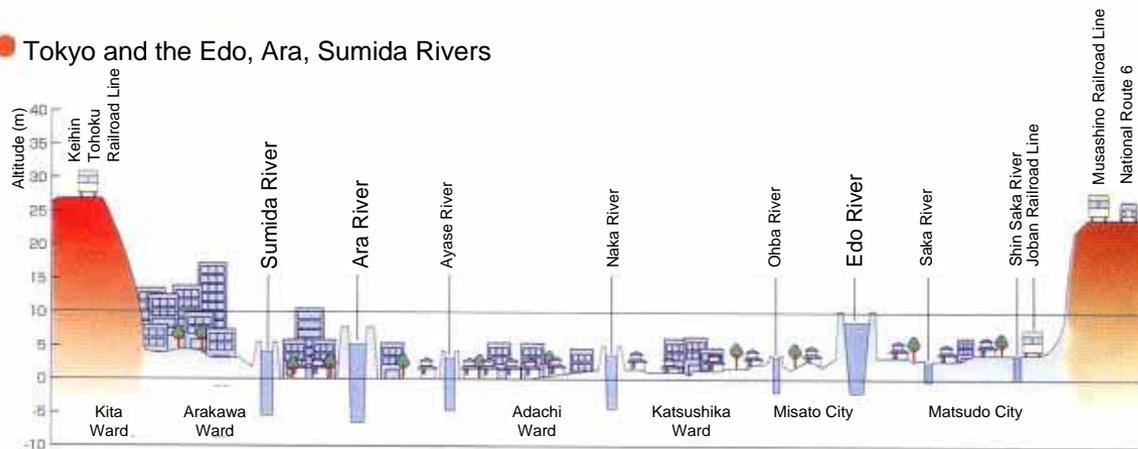
Risk Comparison between Tokyo and London

There are many raised bed rivers in Japan because of much sediment discharge caused by slope collapse in the upper mountainous areas. This causes sever damages in case of levee breach. Historically, therefore, flood control have been Implemented mainly by embankment.

● London and the Thames River

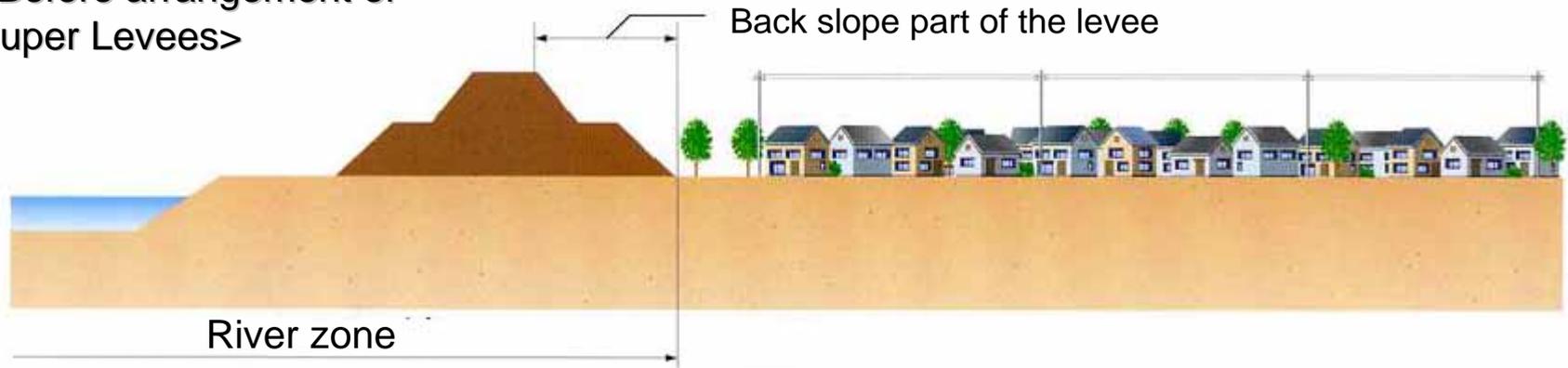


● Tokyo and the Edo, Ara, Sumida Rivers

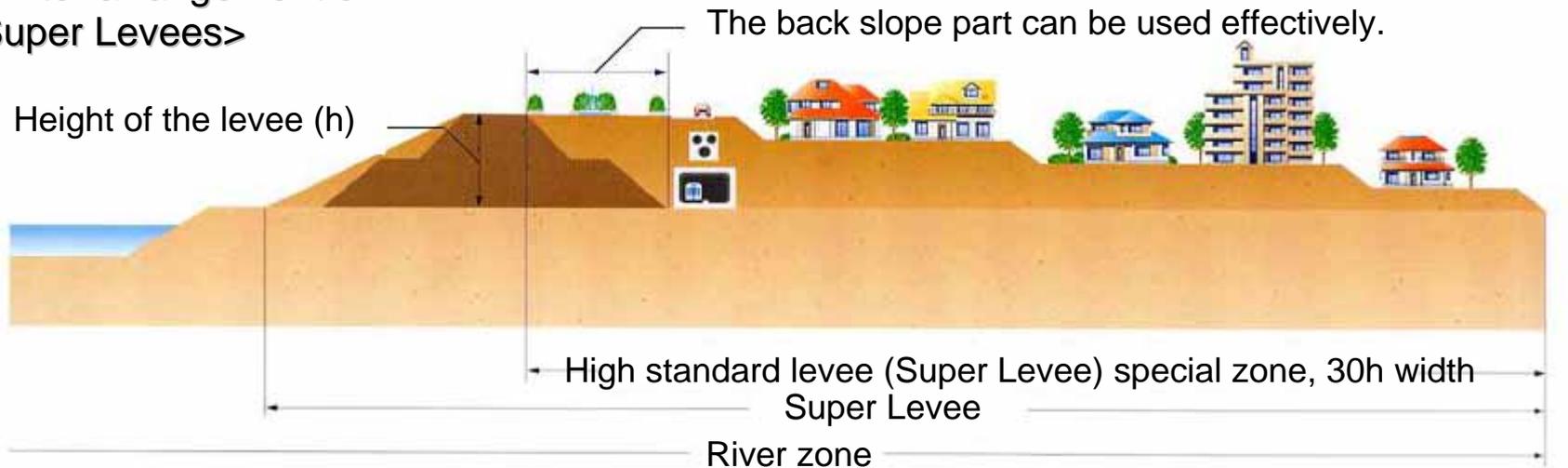


Super Levee

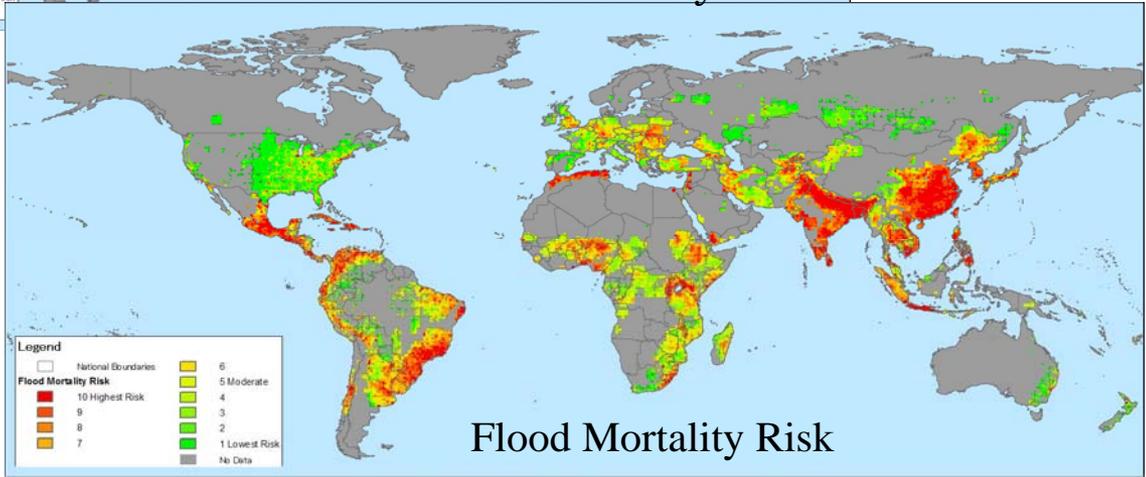
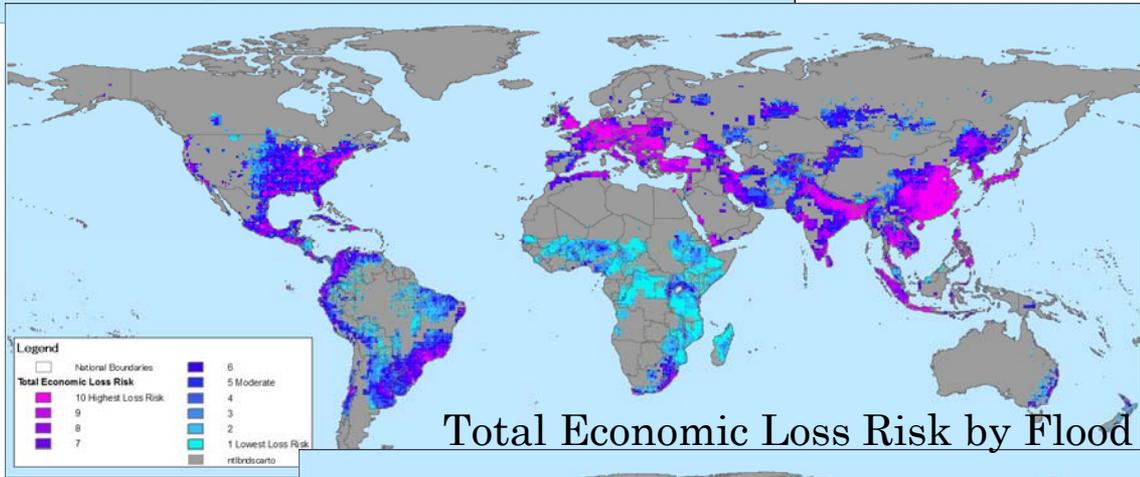
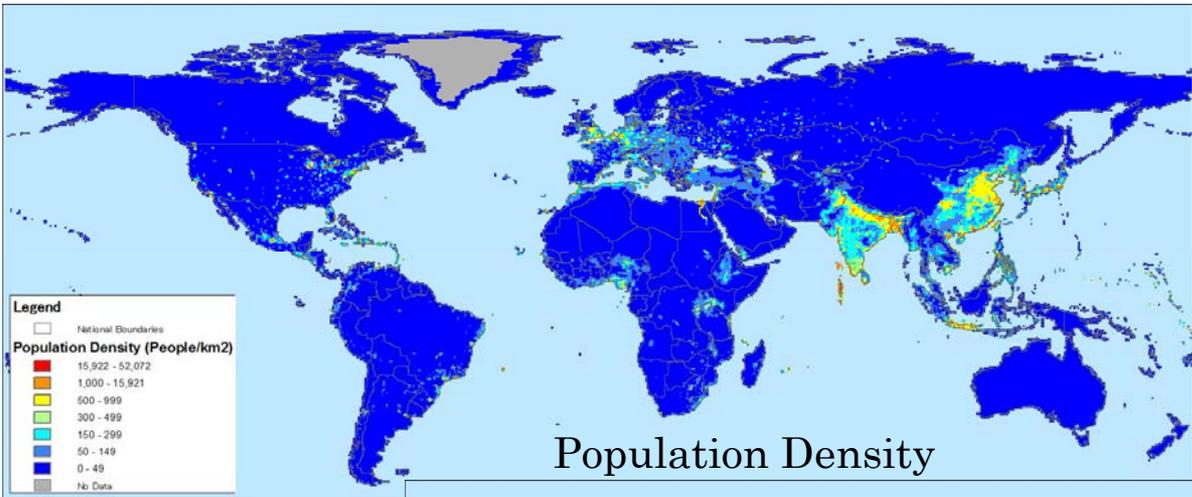
<Before arrangement of Super Levees>



<After arrangement of Super Levees>

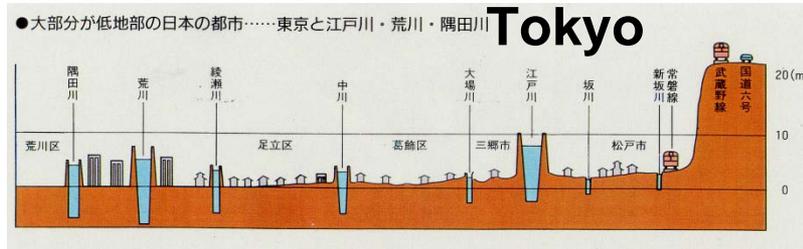


High Flood Risk in Asia and Pacific Region

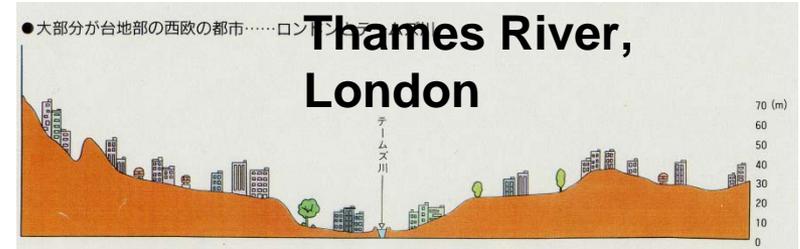


Data source: The core data sets of Natural Disaster Hotspots - A Global Risk Analysis, Center for Hazards & Risk Research, Columbia University

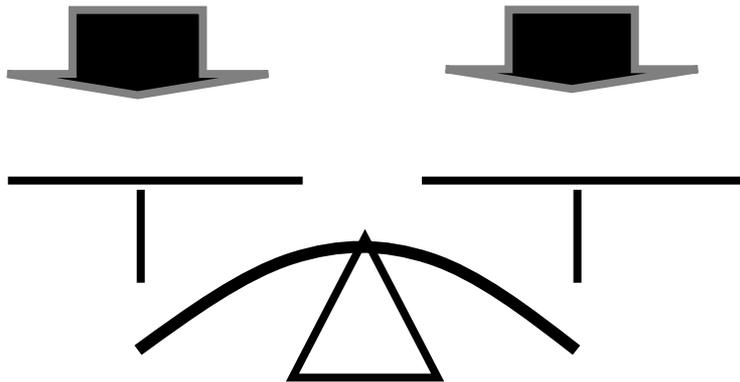
Vulnerability vs Coping Capacity



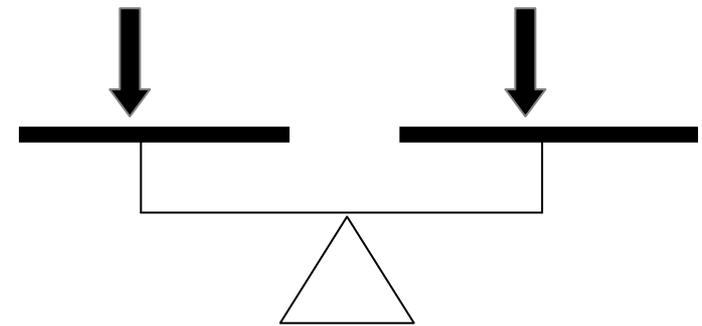
氾濫源の資産を構造物で守る治水事業が必要
普段は安全だが、超過洪水には非常に脆弱



氾濫源の土地利用規制が容易
ソフト対策が有効に機能



大きなリスク・脆弱性と
大きな対策でバランス

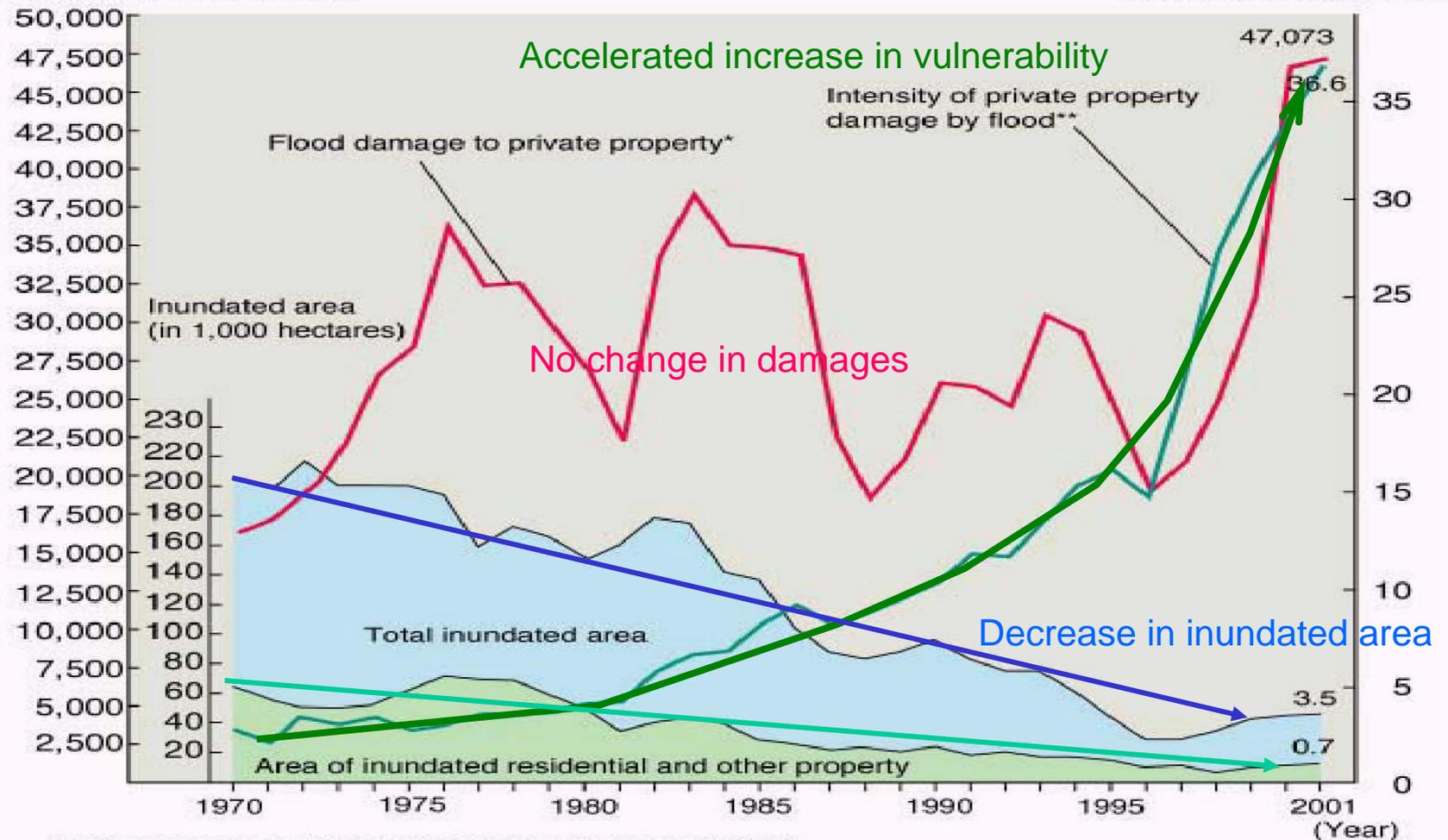


小さなリスク・脆弱性と
小さな対策でバランス

Accelerated Increase in Vulnerability

Flood damage density: damage cost / hectare
(in ¥ 1,000; at 1990 prices)

Total damage (in ¥ billion)



- * Private property damage by flood is the sum of direct damage plus loss due to interruption of business.
- ** Density of private property damage by flood is calculated by dividing the private property damage by the area of inundated residential area.

Gombak River



Photo by Hideshi Sasahara

長江の治水政策の変遷とその社会科学的分析

1. 長江流域の概要

流域面積180万km²、延長6300km²



20世紀以降の大洪水被害

洪水発生年月	被災面積 (km ²)	死者数(人)	経済損失 (当時金額)
1931年6-8月	37,730	145,400	13.8億銀元
1954年5-7月	31,700	33,169	100億元以上
1998年7-8月	65,200	2,292	1,345億元

出展: 国家防办, 南京水文所, 《中国大洪水》及び 李宪文等, 《1998年洪水100问》



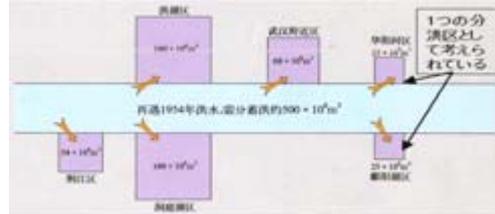
2. 長江の治水計画

1954年洪水を基準に、ダム、堤防、三峡ダム、遊水地などを整備

流量計画



長江分洪区(遊水地)計画(全容量500億m³)



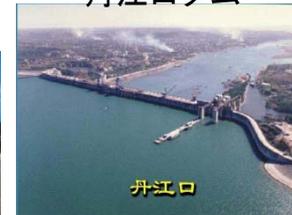
堤防強化・嵩上げ



三峡ダム



丹江口ダム



治水対策の変遷

1920年以前 輪中堤中心

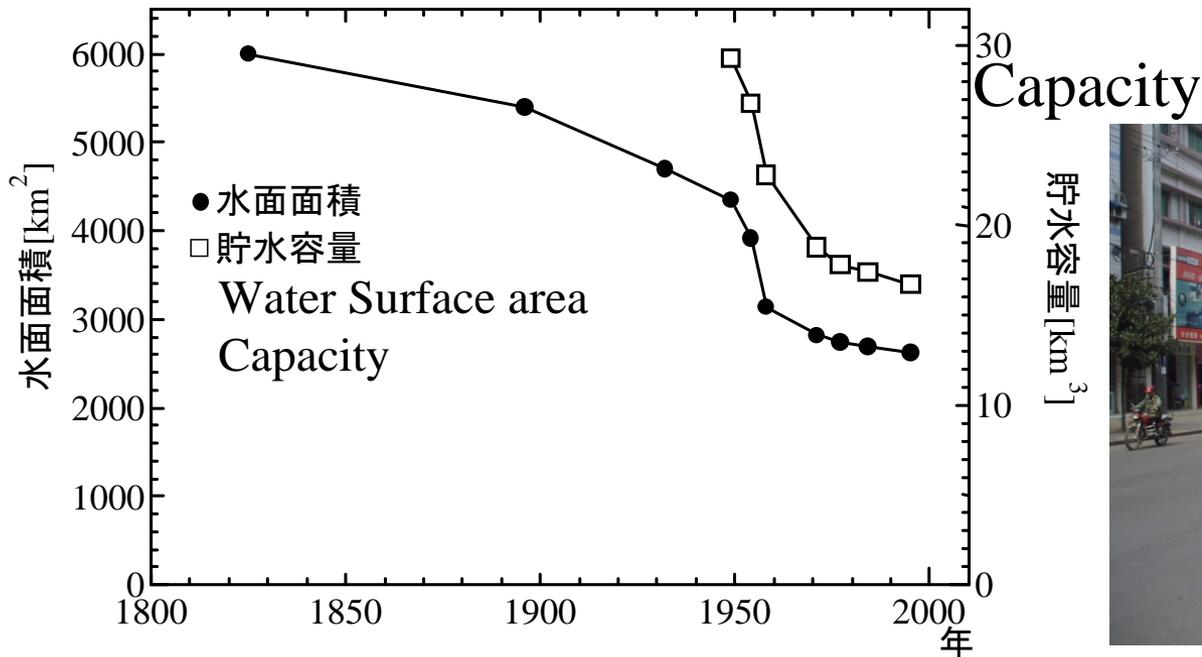
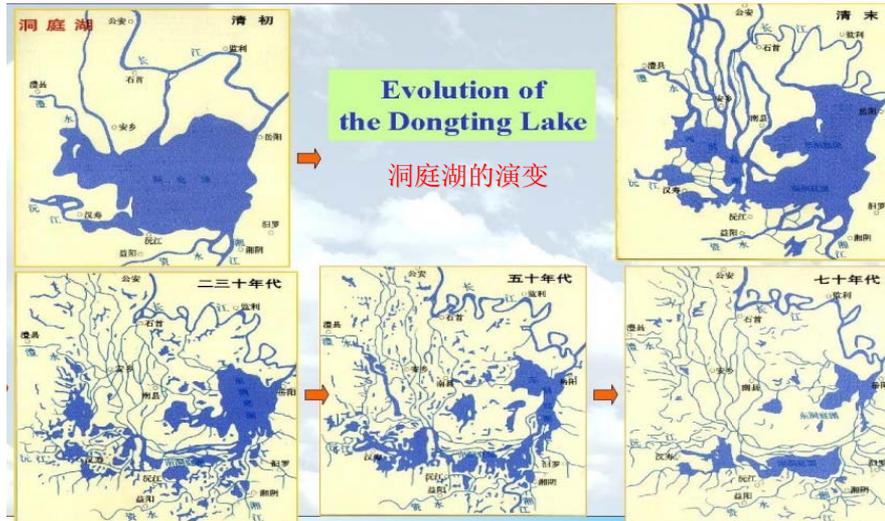
～1949年 部分的に治水計画の導入、蓄洪壅殖方針により輪中堤建設が促進される

1954年洪水まで 本格的治水計画の下で分洪区が建設、堤防嵩上げ・補強

1998年洪水まで 長江水利委員会設立、三峡ダムなど構造物対策の推進

1998年以降 非構造物対策との組合せ重視、計画高水位を高くしない方針

Floodwater Retarding Basin



Voluntary Retardation of Floodwaters

■ *The Nation*

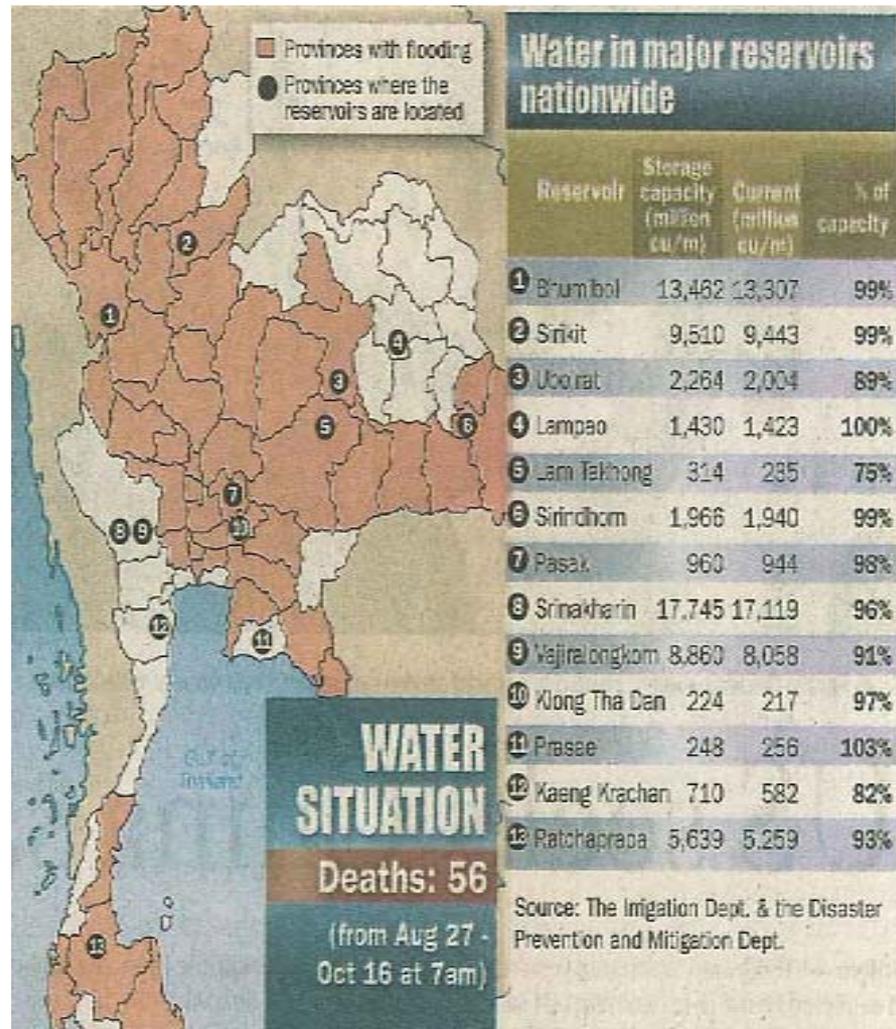
HIS MAJESTY the King has asked the Royal Irrigation Department (RID) to keep him updated on the flood situation and also granted permission for the RID to divert floodwater into his properties at Pathum Thani and Saraburi.

The Rama 9 Pond located between Klongs 4 and 5 in Pathum Thani has already absorbed water from the Rangsit area, while the RID is planning how to use Ban Mor Lake in Saraburi as soon as possible, said RID director-general Smart Chokanapitak yesterday.

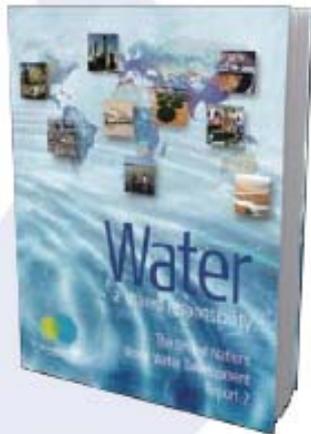


“King does more to help cause flood crisis,” *The Nation*, Friday October 13, 2006

Water storage in major reservoirs in Thailand, October 16, 2006



(Source: Expert urges formal compensation plan, Bangkok Post, October 17, 2006)



UN WWDR II (2006)

- **Flood risk** analyses in diverse localities in developing countries
- Development of **flood warning systems** that use satellite observations and other advanced technology
- Development of **flood hazard** mapping procedures able to meet various environmental and social conditions
- Development of community water hazards risk aversion systems with advanced flood warning and flood hazard maps as available means
- Promotion of basic research on **hydrological measurement, analysis, and forecast** to support ICHARM activities
- Participation in international research programs such as **World Water Assessment Programme, International Flood Initiative, Group of Earth Observations and Predictions in Ungaged Basins**

Research

Data

Results

Curriculum

Participation

Information networking

Knowledge

Network

- Creation of a **worldwide and inter-disciplinary network** of practitioners, researchers and course graduates in the field of integrated water risk management
- **Collection, analysis and dissemination** of information and experiences regarding water-related disasters worldwide
- Timely organization of investigation teams when catastrophic water hazards occur
- Organizing and sponsoring **workshops and symposia**



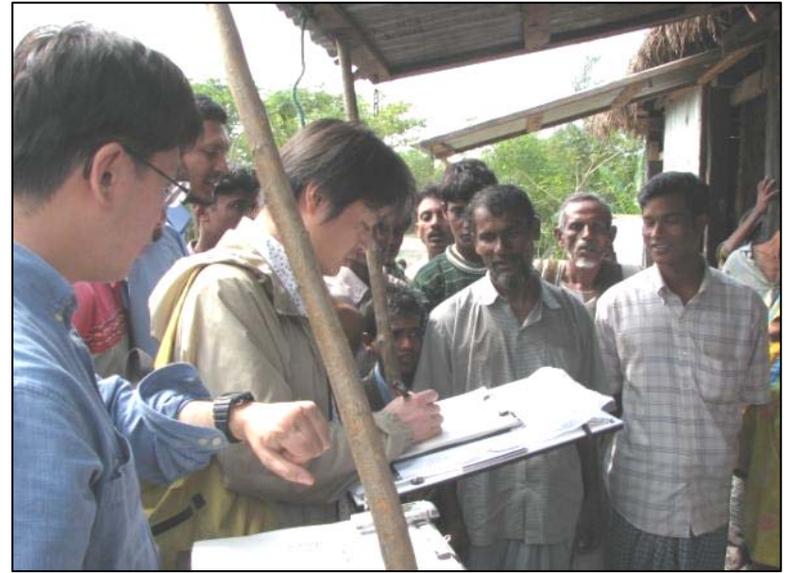
Flood Hazard Mapping Training

Training

- Training courses on **practical risk reduction systems** incorporating existing social diversities, for public officers and decision makers
- Human resources development for integrated flood risk management **in cooperation with universities and related institutes worldwide**
- Training courses of **flood hazard mapping and river and dam engineering** for researchers and engineers
- Providing follow-up activities for course graduates in their home countries

Research: Capacity Assessment of Bangladesh

Hearing Investigation from resident in south coastal area



Training: Master Course on Water-related Risk Management and Others

Master Course (10 students in 2007)

- Full fledged **one-year academic master degree** to be jointly awarded by GRIPS (National Graduate Institute for Policy Studies) and PWRI
- The master thesis will be **a project proposal to be submitted to donor agencies** for local flood risk management.

Flood Hazard Mapping Course (5 weeks, 20 trainees in 2007)

Many More Short-term Courses



Information Networking

- Collaboration with Respective Organization and Programs

IFI, WWAP, IHP centers, UNESCO, WMO, ISDR, MRC, UCD, USGS, USBR, KICT, K-water, ADRC, Typhoon Committee, IWHR, NARBO, JWF, UNU, ADB, JICA, FCSEC, and many more

- Collection of local site-specific information
a number of seminars, workshops, research surveys

- Analyses of global data sets collected elsewhere

provide policy effective information (publication of World's Large Flood Reports)