Asia-Pacific
Economic Cooperation

APEC Workshop on
Facing Abnormal Flood Disaster:
New Vision for APEC Member Economies
(Da Nang, Viet Nam, July 28-29, 2011)
Summary Report

APEC Emergency Preparedness Working Group

September 2011

APEC Project No. EPWG 01/2011A

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INTRODUCTION

On July 28-29, 2911, the ***APEC Workshop on Facing Abnormal Flood Disaster: New vision for APEC member economies***, co-sponsored by Australia, Canada, Chinese Taipei and Viet Nam was held in Da Nang, Viet Nam. Participants to the Workshop were representatives from APEC member economies, representatives of International organizations and relevant agencies, including the United Nations Development Programme (UNDP), the Asian Disaster Reduction Center (ADRC), the Asian Disaster Preparedness Center (ADPC), CARE International in Viet Nam, the Pacific Disaster Center (PDC), the APEC Climate Center, the Institute of Geosciences and Mineral Recourses of Viet Nam and the Institute for Water Resources Planning of Viet Nam. H.E. Ambassador Muhamad Noor Yacob, Executive Director of the APEC Secretariat was also attended at the Workshop and delivered a keynote speech.

The Workshop was opened by H.E. Dr. Dao Xuan Hoc, Vice Minister, Ministry of Agriculture and Rural Development of Viet Nam.

The objectives of the Workshop were to share information on the current situation of the natural disasters and abnormal floods in the Asia-Pacific region, promote further exchange of good practices and lessons learned in the area of abnormal floods preparedness and response, identify the needs and the existing gaps in members' flood management capability, establish a network of flood management experts in the region, and provide recommendations to the Emergency Preparedness Working Group on how to further strengthen the APEC collaboration in addressing natural disasters, particularly the floods.

BACKGROUND

APEC is among the most affected regions by flood disaster with over 48 million people in the Asia Pacific being affected by flooding every year. In recent years, there has also been an increase in abnormal floods with higher magnitude and lower predictability that causes more devastating damage to economies in the region.

Given the severity of natural disasters facing the region, for many years, APEC Leaders and Ministers have placed high priority to emergency preparedness and response. This is one of the core stones of the APEC's work on enhancing human security. In 2005, APEC decided to establish for the first time the Task Force for Emergency Preparedness which was mandated to coordinate and facilitate emergency and disaster preparedness cooperation within APEC. In 2006 Leaders' meeting in Ha Noi, APEC Leaders committed to further intensify cooperation to maximize the use of regional available resources in order to better prepare the region for disasters. The *APEC-wide Strategy for Disaster Risk Reduction and Emergency Preparedness and Response in the Asia Pacific Region in 2009 - 2015* has provided framework and guidelines for APEC's work in this area. The APEC Emergency Preparedness Working Group established in 2010 has become a permanent entity in APEC dealing with this issue. Since 2007, APEC has funded 21 capacity building projects with the amount of more than 2.1 million US dollars for member economies in emergency preparedness.

In 2011, APEC member economies continue to give high priority to emergency preparedness and response towards a secured, stable and prosperous region.

KEY ISSUES DISCUSSED

The two-day workshop was divided into three sessions and included a working visit to

Da Nang and Hoi An.

Session I on Abnormal flood disasters in Asia – Pacific region and experience of APEC economies was chaired by Mr. Steve Opper of Australia. Participants had a productive discussion on such issues as climate change and its impact on abnormal floods, rising sea levels, high tides and the possible impact of the increasing abnormal flood to economies in the region. Participants shared the views that, the region was entering into a more insecure era with more frequent, more devastating and unpredictable natural catastrophes and indentified the following needs and gaps for flood risk management (FRM) among member economies:

- The understanding of flood hazard assessment;
- Improving existing early warning systems and the monitoring of floods;
- The understanding of the influence of climate change on flood hazard and other risks;
- Enhancing emergency preparedness and undertaking simulation exercises;
- Capacity building of government officials in flood risk management, flood risk education within schools and awareness raising of the general public;
- Improving evacuation management and having comprehensive evacuation plans;
- Utilizing a combination of structural and non-structural measures to prevent, mitigate, prepare for and reduce the risks from floods;
- Ensuring that historical lessons learnt from past flood experiences are recorded and acted upon.

Session II on Best practices on emergency preparedness and response to abnormal flood disasters was chaired by Dr. Kenichiro Kobayashi of Japan. Member economies shared useful and effective experiences and best practices on flood management. Representatives of the international organizations pointed out that fully comprehensive FRM, not just focusing on mitigation or response was necessary; non-government sectors had an important role in FRM and disaster risk management (DRM) generally, particularly in capacity building of sub-economy government staff in raising awareness about flood, promoting the integration of FRM into local development planning, supporting transboundary co-operation in FRM. Member economies noted the more frequent abnormal flood in the Mekong River delta, especially in the lower Mekong basin countries, and stressed the need for further cooperation in flood management and mitigation. Participants also exchanged information and experiences on flood hazard mapping, flood early warning system (FEWS), sophisticated flood monitoring and FEWS and software (VinA WARE) as well as new technologies, including scientific prediction, real-time monitoring (e.g. use of Doppler Radar) and regularly updating FRM plans/mapping/modeling. Economy risk assessments and the identification of local “hot spots” considering a range of social factors and overlaying with hazard maps were useful means to assess priority areas. Flood hazard and risk assessment (combining assessment of both hazard and vulnerabilities) were important in urban areas and should include historical data analysis as well as community involvement.

Participants shared some of the good practices in FRM as follows:

1. Flood risk assessment

- Flood hazard risk assessment mapping undertaken by local government and non-government agencies in APEC economies should ensure high level of engagement of local people.

- Evacuation route assessment needs to be determined for different flood water levels including historical peaks.

- The importance of examining the impact of floods on critical flood on irrigation dykes, etc. and drainage systems within the urban context.

2. Risk mitigation

Both structural and non-structural measures should be undertaken in combination until recently within many APEC economies. There has been strong reliance on structural measures, dykes and seawalls, etc. compared with “soft measures” (awareness raising, education, cooperation, etc.)

3. Flood preparedness and response planning (FPRP)

- FPRP should be taken on annual basis and lessons learnt recent flood experiences incorporated into the revised plans.

- Land-use planning is of critical importance and areas historically affected by flooding should not be built upon particularly for critical infrastructure.

- Early warning and flood warning system need to ensure an “end to end” approach, remote sensing information need to reach people most likely to be affected by floods and other hazards in a timely manner and in an understandable form.

- It is important to include development of Standard Operating Procedures for early warning systems and to train disaster managers in the use of the procedures as well as the use of tools; disaster management exercises that help to develop specific skills in the application of EWS are very important as well.

- Comprehensive evacuation management systems was necessary for urban and rural areas to minimize loss of life and needed to be updated regularly.

- Enhance linkages between economy flood forecasting centers and local levels for early warning dissemination, thereby particularly focusing on the strengthening of capacities at local levels.

- Local level stock piling of essential food and non food items is important part of flood preparedness.

- Primary and high school education on FRM and DRM is of great importance.

4. Recovery and rehabilitation

Improved assessment, monitoring and modeling technologies, methods and tools utilized in the recovery should be scaled up and sustained.

Session III on New vision for APEC members in abnormal flood management was chaired by Dr. Nguyen Huu Phuc of Viet Nam. Representatives of international organizations briefly presented the new vision and strategies of the UN agencies and NGOs to respond to floods and other hazards and to climate change. Participants agreed that non-government organizations – INGOs, the Red Cross/Crescent Societies and UN agencies had a vital role to play in community based FRM and DRM; UN agencies also play an important role in institutional development and capacity building at economy and sub-economy levels of governmental DRM structures, the formulation of legislation, policy dialogue and co-ordination and convening among DRM stakeholders.

Recognizing the importance of cooperation in emergency preparedness, member economies reached agreement that APEC should to continue to give high priority to natural disasters. More cooperative actions needed to be taken to provide capacity building for member economies and to ensure that the region was better prepared for disasters. Participants also indentified several main challenges existed amongst APEC

economies which included the diversity of development level, issues of consensus, limited funding, existing organizations and mechanism.

CONCLUSION AND RECOMMENDATIONS

Recommendations for individual APEC member economies

1. It is important for member economies to have an enabling legislative framework for flood and other hazard management. A comprehensive institutional structure at all levels, with clear roles and responsibilities, is essential for effective and efficient flood risk management

2. A regular revision of early warning and flood monitoring system, flood risk assessment, evacuation management and consideration of worst scenarios are required particularly before and after flood events.

3. It is essential to engage local people in decision making about flood risk management and to build community resilience and adaptive capacity to cope floods and other hazards in addition to protective infrastructures.

4. Education of primary and high school children and their teachers in disaster risk management is essential.

5. Global climate change scenarios need to be “downscaled” to economy and provincial/state level in order to be useful for local level flood risk management. Local authorities need to be able to access, understandable information related to climate change scenarios to guide their planning processes. Flood risk management and climate change impacts need to be integrated into economy and sub-economy social economic development plans to ensure disasters/climate proofing of critical infrastructures (government, offices, schools, hospitals and clinics.

6. Greater attention should be paid upon respective roles of women and men in flood risk and more generally, in disaster risk management.

Recommendations for APEC collective actions

1. Identifying medium and long term goals of the APEC cooperation in natural disaster response. The APEC Working Group on Emergency Preparedness should play a leading role in this endeavor.

2. Improving the coordination and enhancing intra- APEC cooperation. There should be more coordination among the EPWG and other APEC Working Groups and fora, such as the Telecommunication Working Group, the Tourism Working Group, the Small and Medium Enterprises Working Group, the Transportation Working Group and Health Working Group.

3. Developing APEC Best Practices on Emergency Preparedness.

4. Setting up an APEC Network for Flood Risk Management.

5. Formalizing the Public-Private Partnership in APEC on emergency preparedness, response and recovery.

6. A support fund for emergency preparedness would be considered by member economies and the APEC Secretariat.

7. Better and closer coordination between APEC and other regional and international institutions.

The Workshop was closed by Dr. Nguyen Huu Phuc, Director, Disaster Management Center, Ministry of Agriculture and Rural Development of Viet Nam.

Annex

WORKSHOP ON FACING ABNORMAL FLOOD DISASTER-NEW VISION FOR APEC ECONOMIES
(LifeStyle Resort, Da Nang, Viet Nam, July 28 – 29, 2011)

Agenda and selected workshop presentations

Asia-Pacific
Economic Cooperation

WORKSHOP ON
FACING ABNORMAL FLOOD DISASTER-
NEW VISION FOR APEC ECONOMIES
(LifeStyle Resort, Da Nang, Viet Nam, July 28 – 29, 2011)

PROGRAM

Wednesday, July 27, 2011

Afternoon — Arrival of delegates

Thursday, July 28, 2011

08:00 – 08:30 — **Registration**

08:30 – 09:00 — **Opening session**

Opening speech

H.E. Mr. Dao Xuan Hoc, Vice Minister, Ministry for Agricultural and Rural Development of Viet Nam

Welcoming remarks

H.E. Mr. Vo Duy Khuong, Standing Vice Chairman, the People's Committee of Da Nang, Viet Nam

Madame Nguyen Nguyet Nga, Director General, Department of Multilateral Economic Cooperation, Ministry of Foreign Affairs of Viet Nam

Keynote speech

H.E. Ambassador Muhamad Noor Yacob, Executive Director of the APEC Secretariat

09:00 – 09:10 — Group photo

09:10 – 09:30 — Coffee break

09:30 – 12:00 — **Session I: Abnormal flood disaster in the Asia – Pacific region/ Experience of APEC member economies**

Moderator: Mr. Steve Opper - Director of the Community Safety Directorate, New South Wales State Emergency Service, Australia

09:30 – 11:30

- **Abnormal flood disaster caused by climate change and their consequences in APEC economies and in the world**

  Ms. Ok-Yeon Kim , APEC Climate Center

- **Earthquake and Tsunami disaster in Japan – Experience and lessons learned for other APEC members**

  Mr. Yasuo Kawawaki, Deputy Director, Hyogo Perfectural Government and Senior Recovery Expert, Asian Disaster Reduction Center, Japan

- **Climate change, rising sea levels, high tides, abnormal flood in the region- Possible Impacts to Viet Nam**

  Mr. Dao Ngoc Tuan, Deputy Director, Institute for Water Resources Planning, Viet Nam

- **Experience in facing abnormal floods in Australia**

  Mr. Steve Opper, Director of the Community Safety Directorate, New South Wales State Emergency Service, Australia

- **Experience in facing abnormal flood in China**

  Ms. Wang Dandan, Research Assistant from Department of Emergency and Disaster Evaluation, National Disaster Reduction Center of China

11:30 – 12:00 Discussion

12:00 – 13:30 Lunch break

Venue: The Senses Restaurant, Lifestyle Resort

14:30 – 18:30 Working and Field trip

- Work with the Committee for Search and Rescue of Da Nang City
- Visit Da Nang's flood prevention works
- Sight-seeing tour in Hoi An Ancient City

18:30 – 20:00 Welcoming dinner hosted by H.E.Mr. Dao Xuan Hoc, Vice Minister, Ministry for Agricultural and Rural Development of Viet Nam

Venue: The Morning Glory Restaurant, Hoi An

20:00- 21:00 Visiting Hoi An Ancient City

<u>Friday, July 29, 2011</u>

09:00 – 12:00 Session II: Best practices on responding to abnormal flood disaster and emergency preparedness

<u>Moderator:</u> Mr. Kenichiro Kobayashi, Associate Professor, Disaster Prevention Research Institute, Kyoto University, Japan

09:00 – 10:20

- **Building Capacity for Mekong Flood: Experiences from Lower Mekong basin countries**

  Mr. Thanongdeth Insisiengmay, Regional Program Manager, Asian Disaster Preparedness Center

- **Best Practices of Flood Hazard Mapping in Japan**

  Mr. Kenichiro Kobayashi, GCOE-ARS, Associate Professor, Disaster Prevention Research Institute, Kyoto University, Japan

- **Local Flood Early Warning Based on Low-Tech Geo-informatics Approaches and Community Involvement - A solution for Rural Areas in the Philippines**

  Mr. Olaf Neussner, Disaster Risk Management in the Eastern Visayas, the Philippines

10:20 – 10:40 Coffee break

10:40 – 12:00

- **Flood Monitoring and Pilot Project of Early Warning Decision Support System in Central Viet Nam**

  Mr. Chris Chiesa, Representative of PDC, University of Hawaii, USA.

- **Application of new technologies for forecasting abnormal flood disasters in Chinese Taipei**

  Mr. Wei Sen Li, Deputy Executive Secretary, National Science and Technology Center, Chinese Taipei

- **Flood hazard and Risk assessment in Yen Bai city: a combination of alluvial - and flash-floods**

  Ms. Nguyen Thi Hai Van, Viet Nam Institute of Geosciences and Mineral Resources

12:00 – 12:30 Discussion

12:30 – 13:30 Lunch break

Venue: The Senses Restaurant, Lifestyle Resort

13:30 – 16:30 Session III: New vision for APEC members in abnormal flood management.

Moderator: Mr. Nguyen Huu Phuc, Director General, Disaster Management Center of Viet Nam

13:30 – 15:10

- **New vision and strategy for NGOs in strengthening the community's response and resilience in facing flood disaster and climate change.**

  Mr. Eric Debert, Disaster Risk Management Program Manager, CARE International in Viet Nam

- **UN new vision in cooperating and capacity building on flood management and adapting to climate change**

  Mr. Ian Wilderspin, National Senior Technical Advisor on Disaster Risk Reduction, UNDP Viet Nam

- **APEC cooperation in natural disaster response – Challenges and Ways Forward.**

Mr. Dede Rifai, Deputy Director of APEC, Ministry of Foreign Affairs, Indonesia

- **Enhancing APEC cooperation in abnormal flood preparedness and response.**

  Ms. Nguyen Nguyet Nga, Director General, Department of Multilateral Economic Cooperation, Ministry of Foreign Affairs of Viet Nam

- **Proposal for International Cooperation on Water-related Disasters**

  Mr. Tomoo Inoue, Director for Water Management Coordnation, Ministry of Land, Infrastructure, Transport and Tourism, Japan

15:10 – 15:25 Coffee break

15:25 – 16:25 Discussion

16: 20 – 16:30 **Closing remarks**

Mr. Nguyen Huu Phuc, Director General, Disaster Management Center of Viet Nam

Saturday, July 30, 2011

Morning Departure of delegates

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : I.1

Abnormal flood disaster caused by climate change and their consequences in APEC economies and in the world

Purpose: Information
Submitted by: APEC Climate Center

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Abnormal flood disaster caused by climate change and their consequences in APEC economies and in the world

APEC Workshop on
"Facing the Abnormal Flood: New vision for APEC member economies"
(Da Nang, Vietnam, 28-29 July 2011)

Ok-Yeon Kim

Climate Research Department
APEC Climate Center

Components of Risk Management

Risk = Hazard

(Natural Events)

X

Vulnerability

(Social Factors)

Has there been a change in extreme events?

Has there been a change in extreme events like heat waves, droughts, floods, and hurricanes?

"Since 1950, the number of heat waves has increased and widespread increases have occurred in the numbers of warm nights. The extent of regions affected by droughts has also increased as precipitation over land has marginally decreased while evaporation has increased due to warmer conditions. ***Generally, numbers of heavy daily precipitation events that lead to flooding have increased, but not everywhere.*** Tropical storm and hurricane frequencies vary considerably from year to year, but evidence suggests substantial increases in intensity and duration since the 1970s. In the extratropics, variations in tracks and intensity of storms reflect variations in major features of the atmospheric circulation, such as the North Atlantic Oscillation."

(IPCC, Climate Change 2007: The Physical Science Basis, Frequently Asked Question 3.3)

Flood Disasters and Human-Caused Climate Change

Are Recent Flood Disasters the Result of Climate Change?

Floods are of great concern in many areas of the world, with the last decade seeing major fluvial events in, for example, Asia, Europe and North America. This has focused attention on whether or not these are a result of a changing climate. Rive flows calculated from outputs from global models often suggest that high river flows will increase in a warmer, future climate. However, the future projections are not necessarily in tune with the records collected so far – the observational evidence is more ambiguous. A recent study of trends in long time series of annual maximum river flows at 195 gauging stations worldwide suggests that the majority of these flow records (70%) do not exhibit any statistically significant trends. Trends in the remaining records are almost evenly split between having a positive and a negative direction.

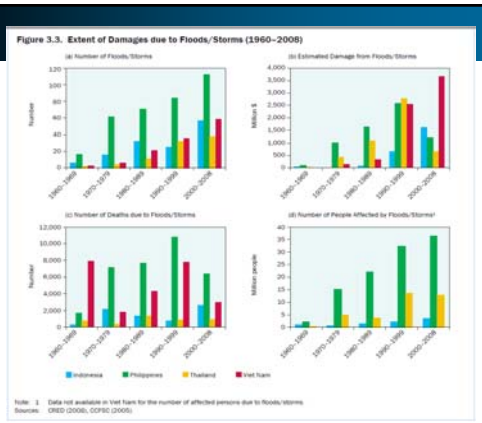
(Frontier in Flood Research (2006): Trends in river floods: why is there no clear signal in observations? By Ceciliv Svensson, Jamie Hannaford, Zbigniew W. Kundzewicz and Terry J. Marsh)

Observed changes in extreme events

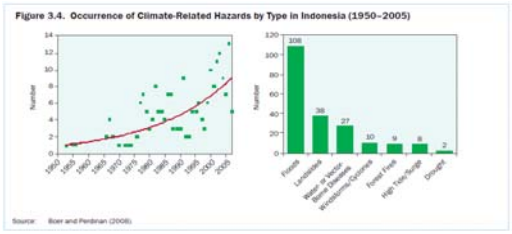
Summary of observed changes in Intense Rains and Floods

Russia	Increase in heavy rains in western Russia and decrease in Siberia; increase in number of days with more than 10 mm rain; 50 to 70% increase in surface runoff in Siberia	Gruza et al., 1999; Izrael and Anokhin, 2001; Ruosteenoja et al., 2003; Gruza and Rankova, 2004
China	Increasing frequency of extreme rains in western and southern parts including Changjiang river, and decrease in northern regions; more floods in Changjiang river in past decade; more frequent floods in North-East China since 1990s; more intense summer rains in East China; severe flood in 1999; seven-fold increase in frequency of floods since 1950s	Zhai et al., 1999; Ding and Pan, 2002; Zhai and Pan, 2003; Zhai, 2004
Japan	Increasing frequency of extreme rains in past 100 years attributed to frontal systems and typhoons; serious flood in 2004 due to heavy rains brought by 10 typhoons; increase in maximum rainfall during 1961 to 2000 based on records from 120 stations	Kawahara and Yamazaki, 1999; Isobe, 2002; Kajiwara et al., 2003; Kanai et al., 2004
South Asia	Serious and recurrent floods in Bangladesh, Nepal and north-east states of India during 2002, 2003 and 2004; a record 944 mm of rainfall in Mumbai, India on 26 to 27 July 2005 led to loss of over 1,000 lives with loss of more than US$250 million; floods in Surat, Barmer and in Srinagar during summer monsoon season of 2006; 17 May 2003 floods in southern province of Sri Lanka were triggered by 730 mm rain	India Meteorological Department, 2002 to 2006; Dartmouth Flood Observatory, 2003.
South-East Asia	**Increased occurrence of extreme rains causing flash floods in Vietnam**; landslides and floods in 1990 and 2004 in the Philippines, and floods in Cambodia in 2000	FAO/WFP, 2000; Environment News Service, 2002; FAO, 2004a; Cruz et al., 2006; Tran et al., 2005

(IPCC, Climate Change 2007: The Physical Science Basis, Chapter. 10)



(Asian Development Bank, The Economics of Climate Change in Southeast Asia: A Regional Review)



(Asian Development Bank, The Economics of Climate Change in Southeast Asia: A Regional Review)

Climate Change & Flood Disasters

Are Recent Flood Disasters the Result of Climate Change?

With huge numbers of his citizens affected by flooding, Bolivian President Evo Morales bitterly complained that the industrial countries' insatiable appetite for fossil-fueled growth, and their lack of climate action, are to blame for the disaster. The floods have been described as the worst in more than 20 years. They have driven tens of thousands of Bolivians from their homes and altogether have affected more than 350,000 people, many of them members of the country's poor indigenous population. Eight of Bolivia's nine departments have been hit with flooding, landslides, drought, hail and freezing weather.

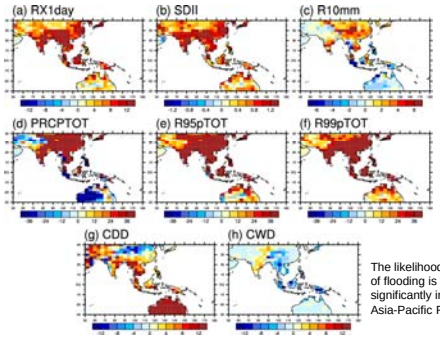
It remains difficult, if not impossible, to pin particular disasters such as floods and storms to the phenomenon of climate change. For all the advances of scientists, such precise causality cannot be established. Climate change or not, "natural" disasters are of course a frequent occurrence. But it is clear that a destabilized climate system, together with other forms of environmental damage, will cause havoc more frequently. Thus, over time, it is becoming more and more likely that a particular disaster was indeed either caused or worsened by climate change—and thus can be traced back to the massive consumption of oil, gas, and coal. Beyond Bolivia, recent weeks have seen a range of devastating floods in Asia and Africa:

…….

(From World Watch Institute)

Projected changes in precipitation

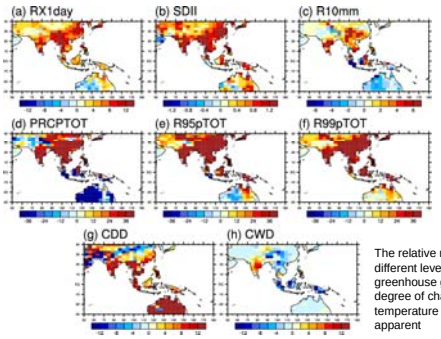
difference between **sresa1b**(2081-2100) and **20c3m**(1981-2000)



The likelihood of occurrence of flooding is expected to significantly increase in the Asia-Pacific Region

Ensemble mean projected changes in temperature

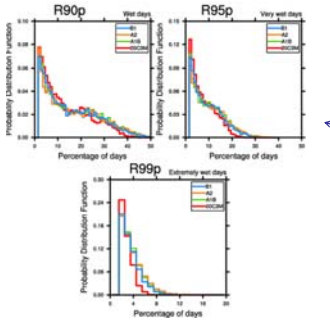
difference between **sresa2**(2081-2100) and **20c3m**(1981-2000)



The relative responses of different levels of greenhouse gases to the degree of changes in temperature extremes are apparent

Projected PDF of the annual frequency of extreme precipitation

for grid points over the APEC terrestrial region for two 20-year periods:
(1) 1981-2000 (20C3M), and (2) 2081-2100 (A1B, A2, B1)



IN THE FUTURE:
with thicker and longer upper tails → increased intensity

Level of Vulnerability to Climate Change

Exposure: Exposure is partially determined by environmental factors, such as whether a society or group resides in a flood-prone area or in a region where drinking water is scarce. Level of exposure also takes into account if large populations or valuable infrastructure are located in these environmentally sensitive areas; the more a country stands to lose from climate-related problems, the greater their exposure.

Adaptive Capacity: A group's adaptive capacity gauges its ability to react to and deal with climate change, which could include building levies to combat flooding or irrigation systems to deal with drought. Adaptive capacity relates closely to a society's "level of wealth, education, institutional strength, and access to technology"; (Burton et al, 2006). A useful, though imperfect, proxy for adaptive capacity is a country's level of development. In general, a more developed nation will be better equipped to deal with the vagaries of climate change than its poorer counterparts.

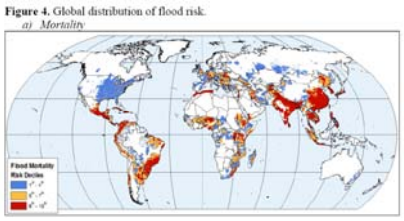
	High Adaptive Capacity	Low Adaptive Capacity
Low Exposure	LOW	MODERATE
High Exposure	MODERATE	HIGH

Source: Earth Trends, 2007.

http://earthtrends.wri.org/updates/node/225

Developing countries are highly vulnerable to Climate Change

The combination of high exposure and low adaptive capacity occurs most commonly in developing countries, making them highly vulnerable to climate change



The figure illustrates the inordinate risks that developing countries face for natural disasters--floods--under current climactic conditions.

Predicting Future Risk

Food Security Index

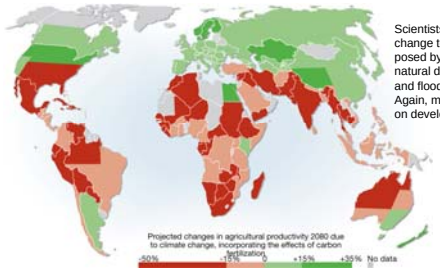
ftp://ftp.fao.org/docrep/fao/011/ai482e/ai482e00.pdf

Food Security Index =

$$\frac{Consumption \times population\ growth\ rate}{(Production \times cc\_impact) - (mean\ stock \times population\ growth\ rate)} \times 100\%$$

Projected changes in agriculture productivity

A 21st Century globally changing climate Will also produce relative winners and losers



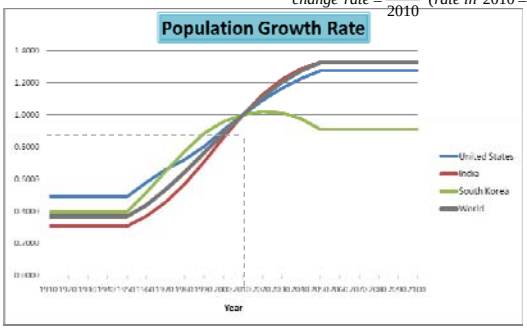
Scientists expect future climate change to increase the risks posed by weather-related natural disasters like droughts and floods.
Again, most of this risk will fall on developing country poor.

This map presents a rough idea of changes in agricultural output from increased temperatures, precipitation differences and also from carbon fertilization for plants. Projecting climate is one thing, but agriculture adds multiple more dimensions of complexity: extreme events, crop rotations, crop selection, breeds, irrigation, erosion, soils and much more. (source: maps.grida.no/library/ files/storage/1800).

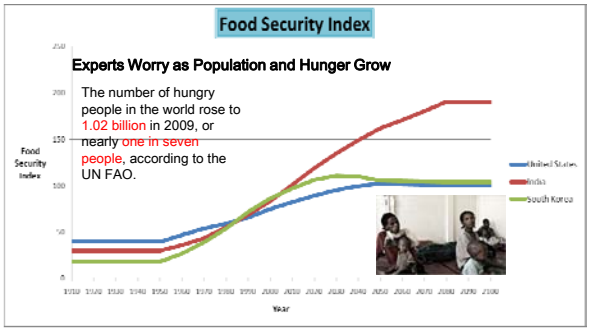
Population Growth Rate

World Population Prospects: The 2008 Revision Population Database) *available at* http://esa.un.org/unpp/

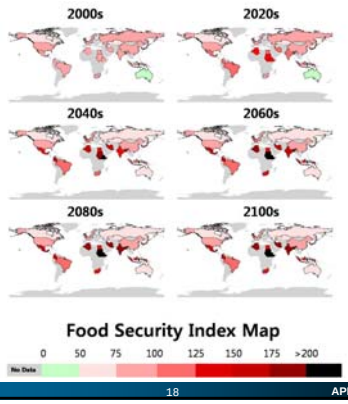
$$change\ rate = \frac{yyyy}{2010}\ (rate\ in\ 2010 = 1)$$



Projected Food Security Index



Projected Food Security Index



Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item: I.2

Earthquake and Tsunami disaster in Japan – Experience and lessons learned for other APEC members

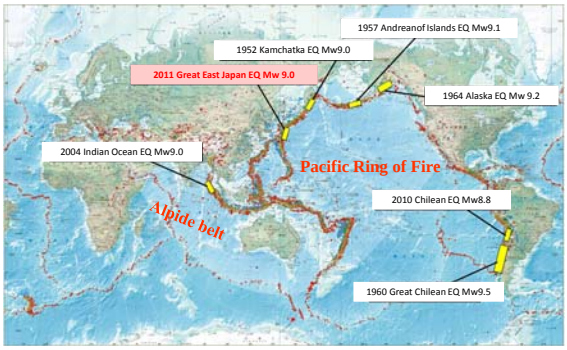
Purpose: Information
Submitted by: Japan

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Earthquake and Tsunami disaster in Japan – Experience and Lessons

Yasuo Kawawaki
International Recovery Platform
Asian Disaster Reduction Center

World's Mega Earthquakes in History



Earthquake Research Institute, University of Tokyo

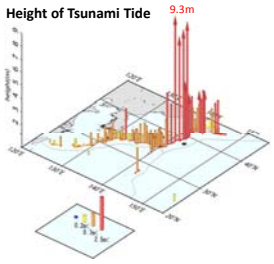
2

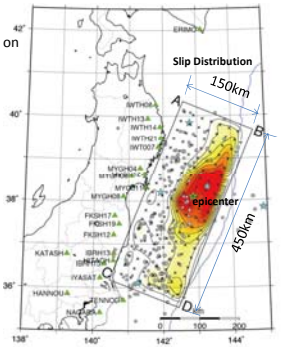
The earthquake and Tsunami

Date and Time:
11 March 2011 at 14:46 JST (5:46 GMT)

Type of earthquake:
Plate-boundary thrust-faulting earthquake on or near the Japan Trench subduction zone

Height of Tsunami Tide 9.3m





※Maximum Run-up height 40.5m

3

The Tsunami Surpassed Dykes

Miyako City, Iwate Prefecture, 11 March 2011

Photo Taken at Miyako City, Miyagi Prefecture
Courtesy of Tarocho Fisheries Cooperative Association

4

Catastrophic Damage to Buildings

Otsuchi Town, Iwate Prefecture , 14 March 2011

5

Widespread Inundation

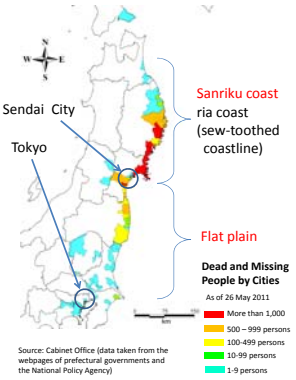
Aerial Photo around Iwate Prefecture, 12 March 2011

6

Casualties and Damages

As of 5 July 2011

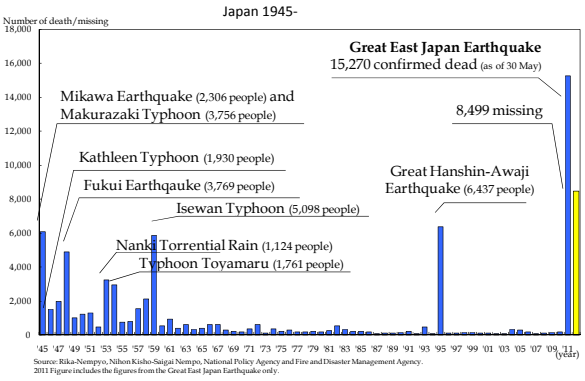
- 15,534 people confirmed dead and 7,092 people missing
- 111,044 buildings completely destructed, approx. 400 thousand buildings half or partially destroyed
- 561 square kilometers inundated
- Damages to stock in 7 prefectures estimated: 17 trillion JPY (211 billion US$)
  - c.f. Hurricane Katrina 125 billion US$
  - Kobe earthquake 100 billion US$



Source: Cabinet Office (data taken from the webpages of prefectural governments and the National Policy Agency)

7

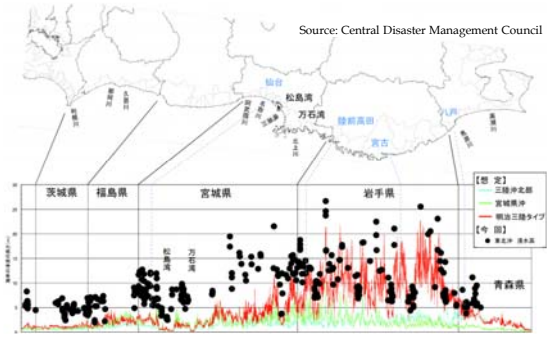
The Death Toll Diminishes Past Disasters



Source: Rika-Nempyo, Nihon Kisho-Saigai Nempo, National Policy Agency and Fire and Disaster Management Agency.
2011 Figure includes the figures from the Great East Japan Earthquake only.

8

Review Damage Projections



Large difference in projected and actual height of tsunami

9

Structural measures
seawall, dyke, breakwater

Hachinohe Port Breakwater

Shiogama Port Breakwater

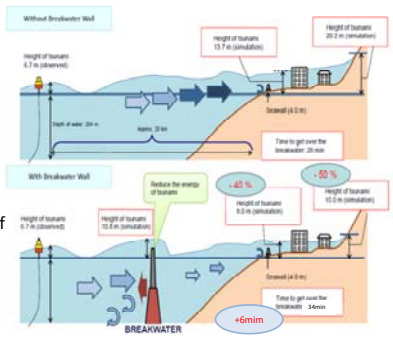
Taneichi Seashore Dyke

Source: Central Disaster Management Council

10

Structural measures
seawall, dyke, breakwater

Breakwater

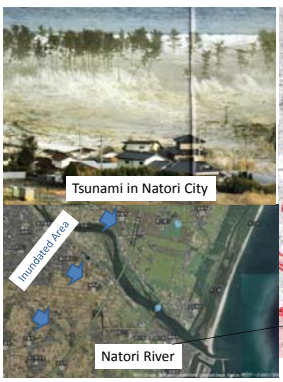


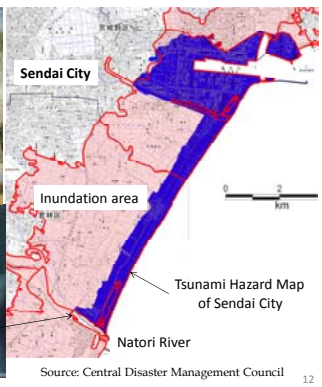
It has been reported that breakwater at the mouth of Kamaishi Bay delayed the arrival of and reduced the forces of tsunami waves greatly.

Source: Central Disaster Management Council

11

Inundation area and hazard map

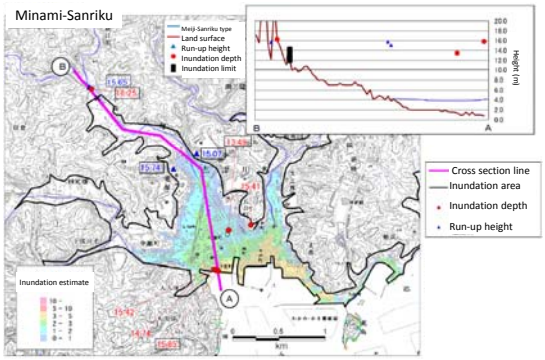




Source: Central Disaster Management Council

12

Inundation area and height of tsunami in Minami-Sanriku Town



Source: Central Disaster Management Council

Implications to tsunami preparedness

The disaster management center of Minami-sanriku town

Apartment building in Minami-sanriku town

Less damage on upland

Relocation

Meiji Sanriku Tsunami(1896)

Showa Sanriku Tsunami(1933)

Source: Central Disaster Management Council

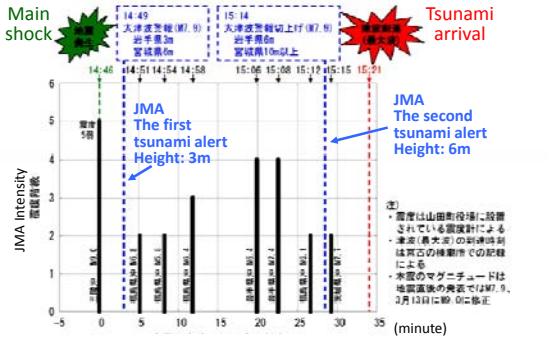
Evacuation

On 11 March 2011, before the strike of the tsunami

Courtesy of Prof.Toshitaka Katada, Gunma University
Photo taken by a local resident in Kamaishi City, Iwate Prefecture

(津波襲来直前に鵜住居地区住民が撮影)

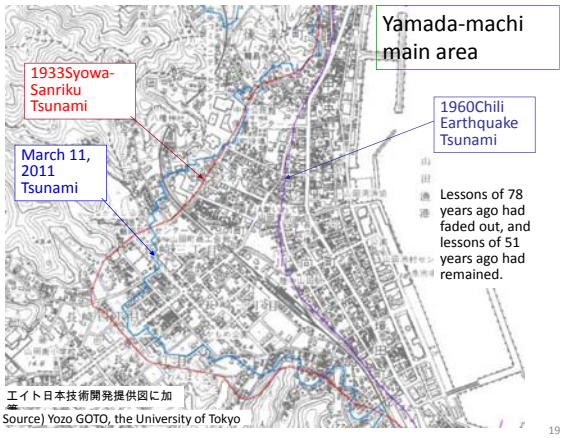
Case study on Yamada-machi, Iwate



Elapsed time after the main shock

エイト日本技術開発提供図に加筆

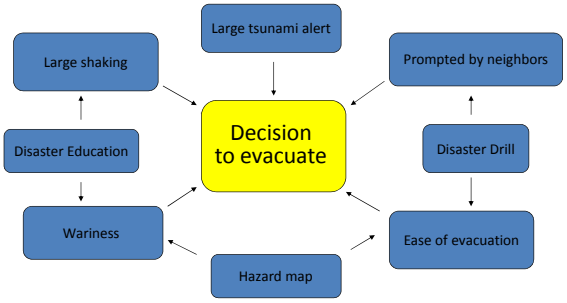
Source) Yozo GOTO, the University of Tokyo



Source) Yozo GOTO, the University of Tokyo

19

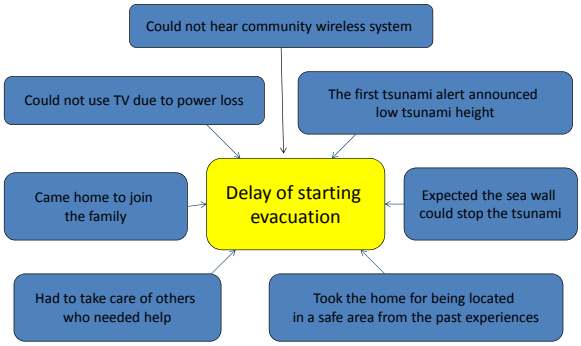
Factors of the decision making of evacuation



Source) Yozo GOTO, the University of Tokyo

20

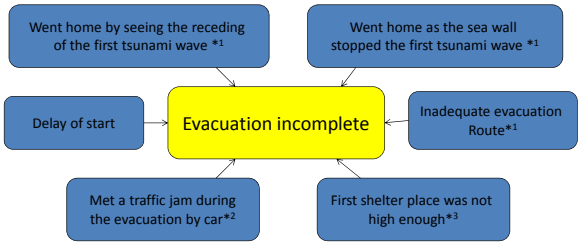
Factors to delay the start of evacuation



Source) Yozo GOTO, the University of Tokyo

21

Factors of evacuation incomplete



*1 From the witnesses in Yamada-machi
*2 63.4% of evacuees took cars for evacuation and 36.6% were trapped by traffic jams.
(Prof. Seki of Toyo Univ. http://www.47news.jp/news/2011/05/post_20110523172902.html)
*3 56% of the first shelter places were washed by the tsunami.
(Higashi Nippon Broadcasting Co.,Ltd. http://www.surece.co.jp/src/press/backnumber/20110428.html)

Source) Yozo GOTO, the University of Tokyo

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Present Discussion
Tsunami disaster mitigation

Level-1
Frequently Occurring Tsunami
- Return period: about 100 yrs (50 – 150?)
- Protect human lives and properties
- Structural measures

Level-2
Massive Tsunami
- Return period: about 1000 yrs (?)
- Much bigger than the Level-1 Tsunami
- Protect human lives at least
- Non-structural measures such as evacuation system, city planning,・・ in addition to structural measures

Source: The interim report,
The technical Investigation Committee of Central Disaster Management Council

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Conclusions of 2011 White Paper on DM

- 1. Review damage projections
- 2. Revise disaster plans
- 3. Prepare for other devastating earthquakes
- 4. Redefine roles of central and local governments
- 5. Strengthen support to disaster victims
- 6. Share lessons with other economies

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Thank you for your attention.

Yasuo Kawawaki
International Recovery Platform (IRP)
Asian Disaster Reduction Center(ADRC)
kawawaki@recoveryplatform.org

25

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : I.3

Climate change, rising sea levels, high tides, abnormal flood in the region- Possible Impacts on Viet Nam

Purpose: Information
Submitted by: Viet Nam

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

CLIMATE CHANGE, RISING SEA LEVEL AND HIGH TIDE

Water Planning Institute

1

1. Changes of climate elements and rising sea level

1.1. Temperature trends

Rising average of temperature (°C) compared to that of the period 1980-1999 in area with average emission B2 and high emission (2nd announcement of Ministry of Resources and Environment)

2

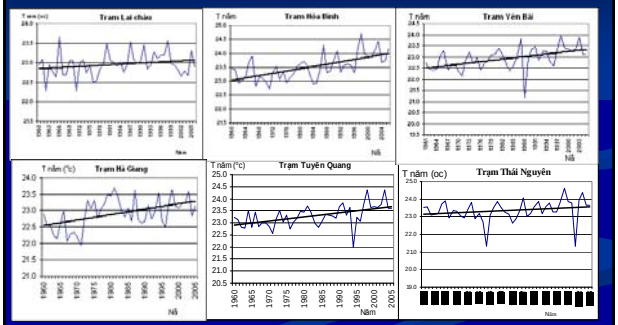
Rising average of temperature (°C) compared to that of the period 1980-1999 in area with average emission B2 and high emission (2nd announcement of Ministry of Resources and Environment)

Area	Period	Scenario **B2**				Scenario A**2**			
		2020	2030	2050	2100	2020	2030	2050	2100
North West	XII-II	0.6	0.8	1.5	3.1	0.6	1.0	1.6	4.1
	III-V	0.6	0.9	1.5	3.0	0.6	0.9	1.6	3.8
	VI-VIII	0.3	0.5	0.8	1.7	0.3	0.5	0.8	2.1
	I X-XI	0.5	0.7	1.2	2.5	0.5	0.8	1.3	3.3
North East	XII-II	0.6	0.9	1.4	3.1	0.7	0.9	1.5	3.8
	III-V	0.5	0.8	1.4	2.8	0.6	0.8	1.5	3.5
	VI-VIII	0.3	0.5	0.8	1.6	0.3	0.5	0.8	2.1
	I X-XI	0.5	0.7	1.3	2.6	0.5	0.7	1.3	3.4
Delta area	XII-II	0.5	0.8	1.3	2.8	0.6	0.8	1.4	3.5
	III-V	0.6	0.9	1.7	3.1	0.7	0.9	1.8	3.9
	VI-VIII	0.3	0.5	0.8	1.7	0.3	0.5	0.8	2.2
	I X-XI	0.4	0.6	1.1	2.2	0.5	0.6	1.1	2.7

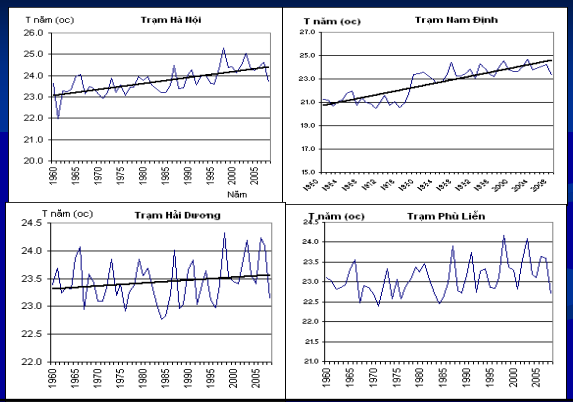
Rising average of temperature (°C) compared to that of the period 1980-1999 in area with average emission B2 and high emission (2nd announcement of Ministry of Resources and Environment)

Area	Period	Scenario B2				Scenario A2			
		2020	2030	2050	2100	2020	2030	2050	2100
North Central	XII-II	0.6	0.8	1.4	2.9	0.6	0.9	1.6	3.7
	III-V	0.7	0.9	1.8	3.2	0.8	1.0	1.9	4.1
	VI-VIII	0.5	0.7	1.3	2.6	0.5	0.7	1.3	3.3
	I X-XI	0.5	0.8	1.4	2.7	0.6	0.8	1.4	3.4
South Central	XII-II	0.4	0.6	1.0	2.0	0.4	0.6	1.0	2.5
	III-V	0.4	0.6	1.0	2.2	0.4	0.5	0.9	2.2
	VI-VIII	0.3	0.4	0.7	1.4	0.5	0.6	1.1	2.8
	I X-XI	0.4	0.6	1.0	2.1	0.3	0.4	0.7	1.8

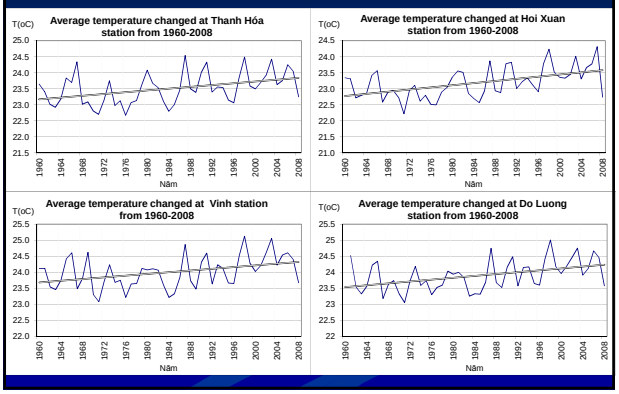
1.1.1. Trends of average temperature every year at the upstream Red river station



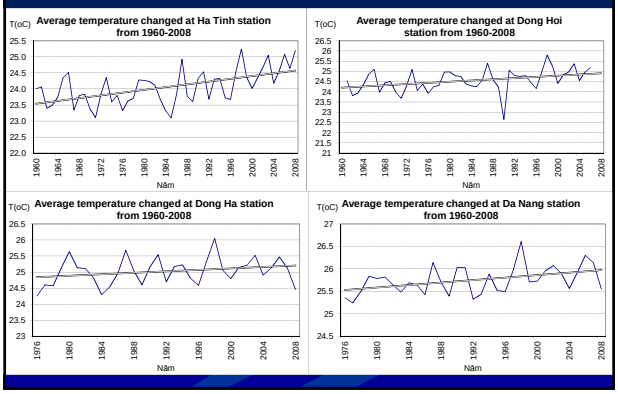
1.1.2. Trends of average temperature every year at the downstream Red river station



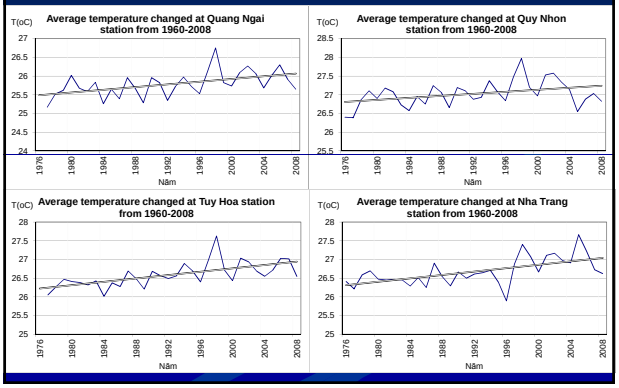
1.1.3. **Trend of average temperature changes every year at some stations...**



1.1.4. **Trend of average temperature changes every year at some stations...**



1.1.5. **Trend of average temperature changes every year at some stations...**



1.2. Trend of precipitation change in a period

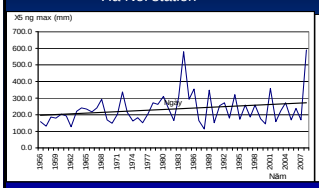
1.2.1. The right side of the Red river

a. Typical highest average precipitation in 5 days in a period at the right side of the Red river

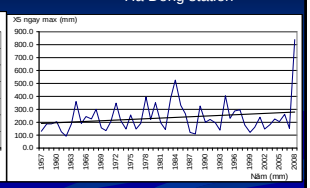
Period	Ha Noi	Ha Dong	Ba Tha	Thuong Tin	Van Dinh	Phu Xuyen	Phu Ly
1961-1970	209	201	206	188	222	207	254
1971-1980	230	248	302	223	297	255	272
1981-1990	272	260	264	253	284	269	274
1991-2000	222	224	276	204	277	233	255
2001-2008	272	282	250	235	269	206	279
TB(1960-2008)	239	241	259	219	268	235	268

b. Trend of average precipitation in 5 days at the right side of the Red river

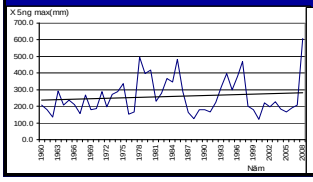
Ha Noi station



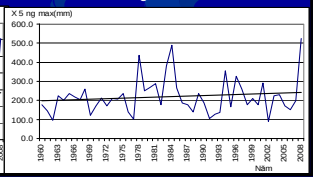
Ha Dong station



Ba Tha station



Thuong Tin station



1.2.2. The left side of the Red river

- Change of the highest average precipitation in a period at the left side of the Red river is smaller than that at the right side.

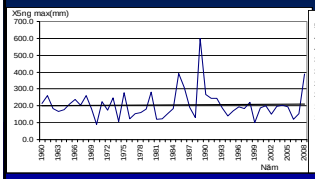
- The highest precipitation in 5 days in a period shows the difference of the increasing level of precipitation between a period and the average of that in many years.

a. The typically highest average precipitation in 5 days in a period at the left side of the Red river

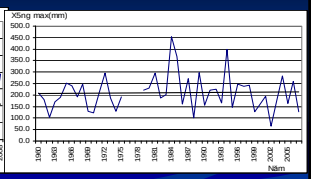
Period	Bac Ninh	Dong Anh	Gia Lam	Hung Yen	Van Giang	Thanh Mien	Hai Duong	Ninh Giang
1961-1970	198	124	183	189	190	213	253	263
1971-1980	193	215	210	245	223	248	251	260
1981-1990	247	258	250	201	217	221	184	192
1991-2000	187	216	217	183	248	220	176	216
2001-2008	201	234	182	164	225	231	253	278
TB (1960-2008)	205	216	210	198	220	226	222	237

b. Trend of the highest average precipitation at the left side of the Red river

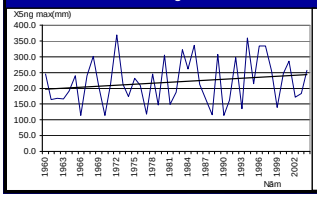
Bac Ninh station



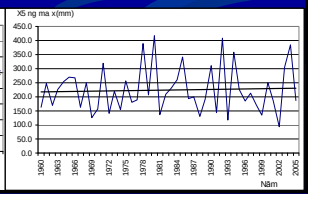
Gia Lam station



Van Giang station



Thanh Mien station



1.2.3. Coastal area from Hai Phong to Van Ly

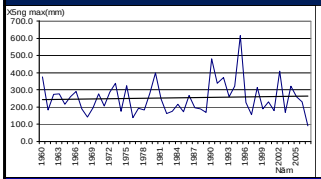
- The highest precipitation in 5 days in a period shows the difference of the increasing level of precipitation between a period and the average of that in many years.
- In the period from 1961 to 1970: In almost stations, the highest average precipitation in 5 days is always smaller than the average.
- In the period from 1971 to 1980: In almost stations, the highest average precipitation in 5 days is always greater than the average.
- In the period from 1981 to 1990: In almost stations, the minimum average precipitation in 5 days is always smaller than the average.

a. The typically hightest average precipitation in a period in the coastal area from Hai Phong to Van Ly

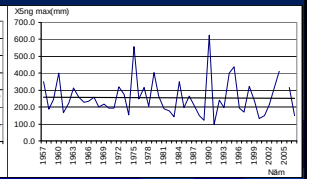
Period	Chi Linh	Thuy Nguyen	Tien Lang	Vinh Bao	Thai Binh	Phu Lien
1961-1970	205	230	230	224	281	230
1971-1980	186	252	252	272	294	293
1981-1990	168	228	228	199	266	243
1991-2000	194	302	302	213	189	242
2001-2008	216	237	237	228	309	260
TB(1960-2008)	191	251	251	227	265	253

b. The trend of the highest average precipitation in 5 days in the coastal area from Hai Phong to Van Ly

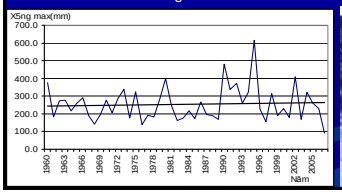
Thuy Nguyen station



Phu Lien station



Tien Lang station



Flood in 31/10/08,Ha Noi

1.2.4. North of Central Region

-. From Thanh Hoa to Ha Tinh : the rainfalls of the periods of 2001-2008, 2005-2008 and particularly in the 2007 flood, increased by 6-7%; even in one statton, five-day max rainfall reached 399% against the five-day average max rainfall which was maintained for many years, such as the Hoi Xuan station.

- From Quang Binh to Thua Thien Hue: the average five-day max rainfalls of the periods of 2001-2008, 2005-2008 and 2007 also increased greatly as compared to those average maintained for years.

- Big showers which frequently happen in the downstreams cause flood in a wide scale: the excessive rain in October 2007 caused an extremely big flood in the rivers of Ma, Ngan Pho, Ngan Sau, Hieu, Gianh, and Huong and so did the downpour of October 2010 in Ha Tinh and Quang Binh provinces.

1.3. Change of interval rainfalls

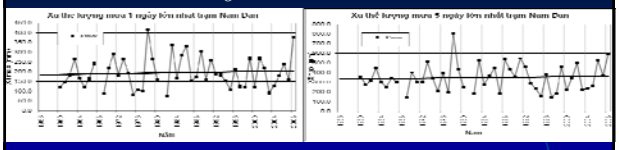
Percentage of Interval Rainfalls against the 1980-1999 Period

Station	Day-Interval	2020	2030	2050	2010
Hà Nội	1	2.6	3.8	6.9	13.2
	3	2.9	4.3	7.7	14.8
	5	2.7	3.9	7.9	13.7
Vân Đình	1	2.7	3.9	7.1	13.6
	3	3.2	4.8	8.3	15.9
	5	3.3	4.9	8.4	16.2
Phủ Lý	1	1.7	2.5	4.5	8.6
	3	1.9	2.8	5	9.7
	5	2	2.9	5.2	10
Gia Lâm	1	2.3	3.4	6.1	13.3
	3	2.6	3.8	6.9	12.2
	5	2.4	3.5	6.3	6.4

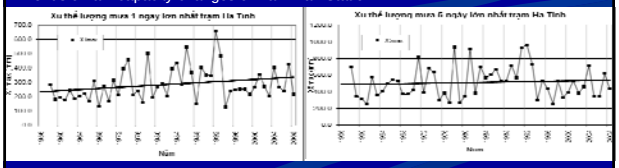
Percentage of Interval Rainfalls Against 1980-1999 Period

Station	Day Interval	2020	2030	2050	2010
Hải Dương	1	2.1	3.1	5.5	10.1
	3	2.5	3.7	6.5	12.7
	5	2.9	4.2	7.5	14.5
Nam Định	1	2.1	3.1	5.6	10.8
	3	2.3	3.3	5.9	11.3
	5	2.4	3.5	6.3	12.1
Ninh Bình	1	2.5	3.6	6.6	12.6
	3	2.7	3.9	7.1	13.6
	5	2.7	3.9	7	12.4
Phù Liễn	1	2.1	3	5.4	10.4
	3	2.2	3.2	5.9	11.2
	5	2.6	3.8	6.9	13.3
Thái Bình	1	2.8	4	7.3	14
	3	2.8	4	7.3	14.2
	5	2.9	4.2	7.6	14.6

II. Trends of Rain and Flood Changes

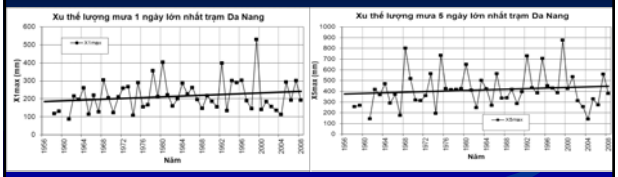


Trends of rain capacity changes of Nam Dan Station

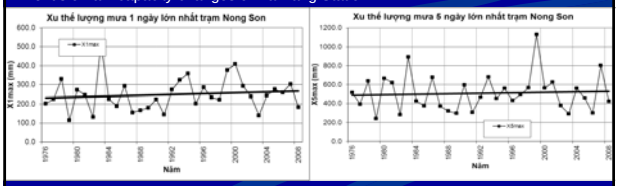


Trends of rain capacity changes of Ha Tinh Station

II. Trends of Rain and Flood Changes

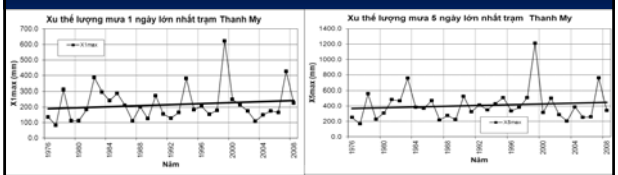


Trends of rain capacity changes of Da Nang Station

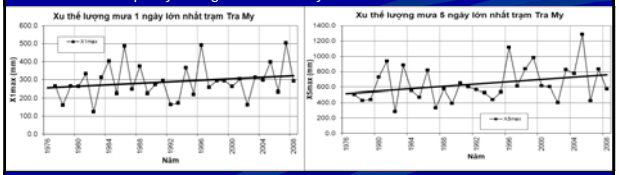


Trends of rain capacity changes of Nong Son Station

II. Trends of Rain and Flood Changes



Trends of rain capacity changes of Thanh My Station

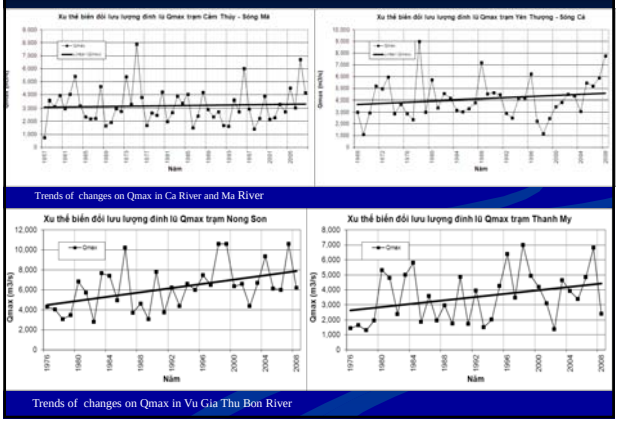


Trends of rain capacity changes of Tra My Station

Scope of Changes of One-day and Five-Day Max Rainfalls towards Periods of B2 Scenario.

Region		Rate of Increase in Periods (%)		
		2020	2030	2050
Ca River Basin	X1max	1.82	3.28	6.27
	X5max	2.9	5.1	9.5
Vu Gia Thu Bon River Basin	X1max	1.4	2.1	3.9
	X5max	1.8	2.6	4.7

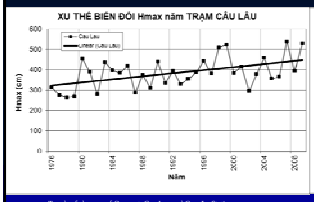
III. Trends of Flood Changes

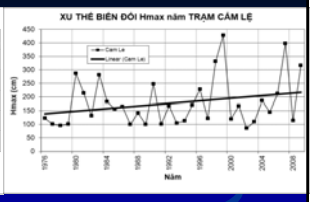


Trends of changes on Qmax in Ca River and Ma River

Trends of changes on Qmax in Vu Gia Thu Bon River

III. Trends of Flood Changes





Trends of changes of Qmax at Cau Lau and Cam Le Stations

1.4. Changes of Flows in Basins

Rate of Changes of Annual Flows for Years of 2020,2030 and 2050 Against the 1980-1999 Period.

Station	River	Periods	Xo (mm)	Ztn (mm)	Zlv (mm)	Yo (mm)	Difference (mm)	%
Hòa Bình	Đà	1980-1999	1849	1117	801	1049		
		2020	1875	1215	887	988	-61	-5.8
		2030	1888	1223	917	971	-78	-7.5
		2050	1920	1241	956	964	-85	-8.1
Yên Bái	Thao	1980-1999	1345	1015	881	464		
		2020	1364	1120	963	401	-63	-6.04
		2030	1373	1130	981	392	-72	-6.83
		2050	1396	1142	994	403	-61	-13.24
Tuyên Quang	Lô	1980-1999	1800	1076	941	859		
		2020	1825	1160	1021	804	-55	-6.36
		2030	1838	1179	1038	800	-59	-6.84
		2050	1868	1194	1075	794	-65	-7.59

1.5. Rate of Changes of Flows in Dry Season

Rate of Changes of Flows in Dry Seasons of the Periods of 2020,2030 and 2050 Against that of 1980-1999

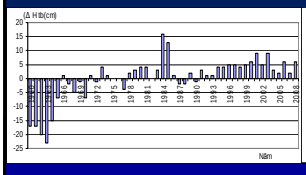
Position Measured	River s	Periods	Decrease (%)	Qo tv	Qtb Kiệt	Difference	% Kiệt
Hòa Bình	Đà	80-99		1734	726		
		2020	-5.80	1633	691	-35	-4.8
		2030	-7.50	1604	681	-45	-6.2
		2050	-8.10	1594	677	-49	-6.7
Yên Bái	Thao	80-99		712	370		
		2020	-6.00	669	350	-20	-5.4
		2030	-6.80	664	348	-22	-6.0
		2050	-13.20	618	326	-44	-11.8
Tuyên Quang	Lô	80-99	Qo	808	351		
		2020	-6.40	756	330	-21	-6.1
		2030	-6.80	753	328	-23	-6.4
		2050	-7.60	747	326	-25	-7.2

1.6. Changes of Flows in the Basin

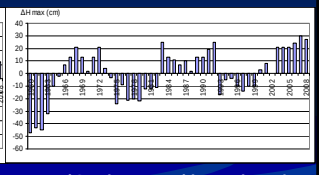
According to the notification from the Ministry of Natural Resources and Environment, in an extreme case that the daily rainfall increases by 25%, the flow at the peak flood in Son Tay in 2020 will rise by 4,28%, 2030 by 6,43%, 2050 by 10,7% and in 2100 by 21,4%.

1.7. Changes of Tidewater at Hon Dau

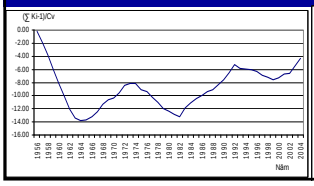
Deviation error between average tide level/year and the average tide level in many years



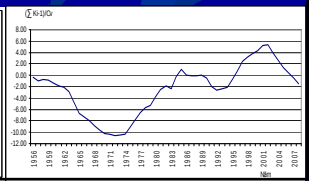
Deviation error between the highest tide crest /year and the highest crest tide in many years.



Line of Cumulative Error of highest crest tide in one year at Hon Dau Island. (1956 – 2008)



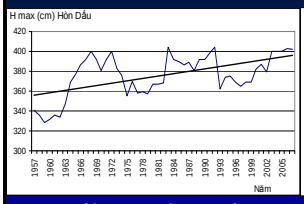
Line of Cumulative Error of lowest tide trough in one year at Hon Dau Island. (1956 – 2008)

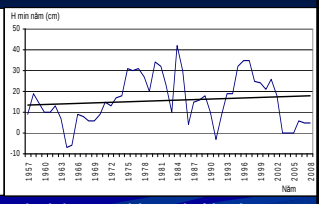


1.7. Changes of Tidewater at Hon Dau

Period	Crest of tide (H ma x)		Period	Trough of tide (H min)	
	Hmax Tb (cm)	ΔH (cm) compared with (1956 - 1972)		Hmin Tb (cm)	ΔH (cm) compared with (1956-1985)
TB (56-08)	376		TB (56-08)	16	
TB (56-72)	366	0	TB (56-85)	16	0
TB (73-92)	379	14	TB (86-08)	15	-1
TB (93-08)	384	18			

1.7. Changes of Tidewater at Hon Dau



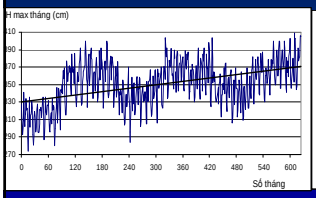


Rate of biggest annual increase of average water level, the crest and the trough of the tide along the trends of 1957-2008 period

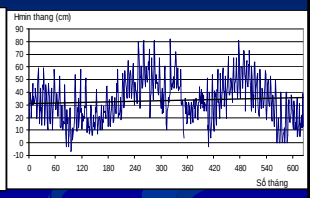
Characteristics	Trend, of Max, Average, Min/year	Difference ΔH (cm)	mm/year
Crest of tidewater	H max/year		8,7 (mm/year)
Average Water Level	Average/year	18,0	3,65 (mm/year)
Trough of tidewater	Hmin/year	4,41	0,80(mm/ year)

1.7. Changes of Tidewater at Hon Dau

Trends of highest water level at the crest of tidewater in a month at Hon Dau



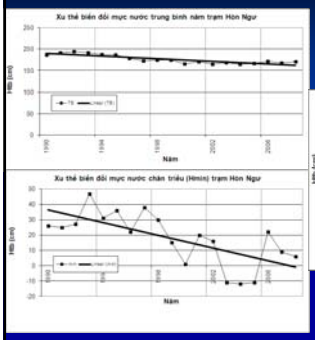
Trends of lowest water level at the trough of tidewater in a month at Hon Dau

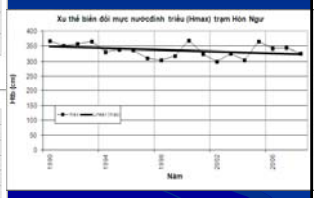


Conclusion : The increase of the water level at the crest of tide tends to be faster than that of the water level at the trough of the tide.

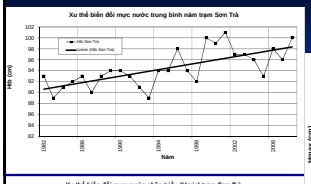
1.7 Trends of Change of Tidewater

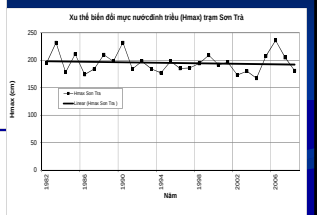
Trends of Change of Tidewater at Stations of Hon Ngu, Son Tra and Quy Nhon

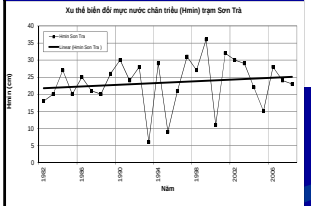




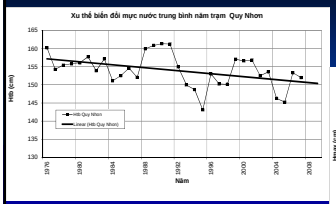
1.7 Trends of Change of Tidewater

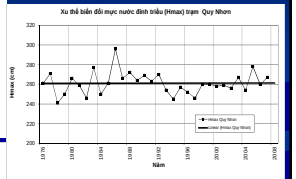


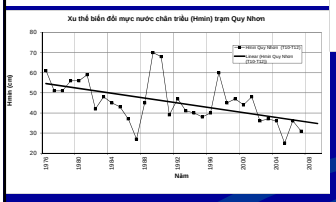




1.7 Trends of Change of Tidewater







1.7 Trends of Change of Tidewater

According to the Ministry of Mineral Resources and Environment, here is the comparison between the prospect sea level with the 1980-1999 period

Scenerio	Sea level rise scenerio								
	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low (B1)	11	17	23	28	35	42	50	57	65
Average (B2)	12	17	23	30	37	46	54	64	75
High (A2)	12	17	24	33	44	57	71	86	100

2. THE IMPACTS OF CLIMATE CHANGE

2.1. Impacts on water level and salinization

2.1.1. Red River Delta

Given the impact of climate change, Though detetion reservoirs may provide enough fresh water for the downstream, domestic land is salinized. (4‰ of salinity water is 25-40 km from the estuary) As the sea – level rises 0,75m or 1,0m the level of salt at some esturies goes beyond 4‰ .

2.1.2. Middle North

The impact of salinization by 2050 in Middle North

No.	Deltas	Affected area (ha)	Affected population (person)
1	Ma River and its vicinity	36.000	225.000
2	Ca River and its vicinity	23.500	300.000
3	Gianh River and its vicinity	1.450	120.000
4	Nhat Le River	2.200	37.000
5	Ben Hai – Thach Han – O Lau River	11.900	239.000
6	Huong River and its vicinity	6.060	90.000
	Total	**81.110**	**1.011.000**

2.1.3. Central High Coast

The whole delta in Central coast is affected.

-Vu Gia Thu Bon River: 25-35km from the river bank is salinization at 4‰ (To An Trạch dam Yen River).

- Tra Khuc river: 20 – 25 km from the river bank is salinization at 4‰ .
- Lai Giang river: 15-20 km from the river bank is salinization at 4‰ .
- Kone river: 20-25 km from the river bank is salinization at 4‰ .
- Ba river: 15-20 km from the river bank is salinization at 4‰ .
- Cai Ninh Hoa river: 15-20 km from the river bank is salinization at 4‰ .
- Cai Nha Trang river: 20-25 km from the river bank is salinization at 4‰ (to Nha Trang Cai river dam).

If the sea level rises 1,0 m, the affected area in Da Nang – Quang Nam is 18.000 ha, Quang Ngai 35.000 ha, Binh Dinh 24.000 ha, Phu Yen 16.000 ha, Khanh Hoa 10.000ha. About 4.5 million people living in the coastal area are lack of fresh water.

2.2. Impact on drainage system

2.2.1. Red river Delta

Drainage index will increase in each stage of development:

+ 2010: 6,48 ÷ 8,91 l/s/ha.
+ 2020: 6,81 ÷ 9,09 l/s/ha.
+ 2030: 7,21÷ 10,00 l/s/ha.
+ 2050: 9,38 ÷ 11,40 l/s/ha.
+ 2100: 12,20 ÷ 14,25 l/s/ha.

2.2.2. North Central

The need for extra drainage per ha in comparison with normal climate condition

Area	Drainage Indexx 10% (l/s/ha)	The increase of drainage index in comparison with normal climate condition (%)		
		2020	2030	2050
Ma river and its vicinity	5,9 - 7,4	3,6 - 4,8	4,0 - 5,8	7,5 - 10,0
Ca river and its vicinity	5,2 - 6,6	3,5 - 10,0	6,6 - 15,6	14,0 - 24,4
Gianh- Nhat Le river	6,1 - 6,7	6,5 - 10,0	8,0 - 13,0	15,3 - 23,6
Thach Han	6,6 - 6,8	7,0 - 8,7	10,0 - 14,0	20,0 - 27,0
Huong river	6,7 - 7,3	7,0 - 10,0	10,0 - 15,0	17,2 - 25,5

2.2.3. Central High Coast

- Provided that the shape of the tide doesn't change when the sea level rises, the lowest tide is still high. As the drainage capacity of infastructure is low, some area will have to pump.

- Provided that the sea level rises 1.0 m, an area of 33.000 ha of Đa Nang - Quang Nam, 45.000 ha of Quang Ngai, 16.000 ha of Binh Dinh, 14.000 ha of Phu Yen, 6.000 ha of Khanh Hoa will be flooded.

2.3. Impacts on flood management and the safety of the irrigation system

2.3.1. Red River Delta

2.2.2. North Central

Table: Flooding in North Central under the effect of rising sea level.

No.	Deltas	Area (ha)	Affected area (ha)			
			Rising 30 cm		Rising 75 cm	
			Affected	At risk	Affected	At risk
1	Ma river dowstream delta and its vicinity	52.797	22.500	-	28.051	6.600
2	Ca river downstream delta and its vicinity	92.661	18.300	6.200	28.500	11.070
3	Gianh river downstream delta and its vicinity	49.966	11.900	6.410	17.295	8.500
4	Nhat Le river downstream delta	64.850	10.996	5.200	12.343	6.500
5	Ben Hai- Thach Han-O Lai downstream delta	24.963	7.500	3.750	7.500	3.750
6	Huong river delta and its vicinity	45.700	13.950	6.280	16.250	8.580
	Total	**330.937**	**85.146**	**27.840**	**109.939**	**45.000**

Impacts on flood management and the safety of the irrigation system

Thanh – Nghe- Tinh region: Areas that would be flooded according to medium and high sea – rising level

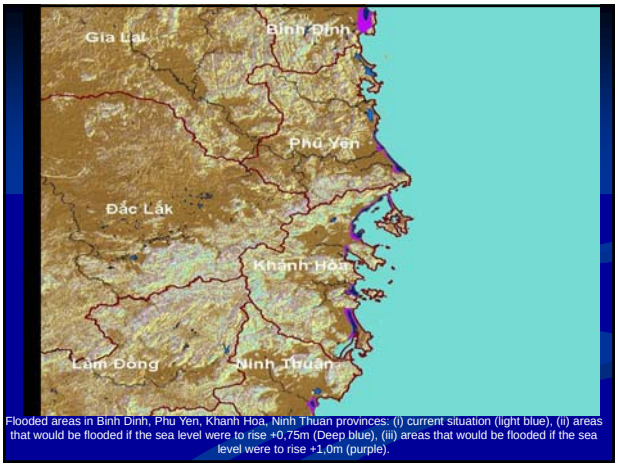
Impacts on flood management and the safety of the irrigation system

Binh – Tri- Thien region: Areas that would be flooded according to medium and high sea – rising level

2.3.3. The Central Coast of Viet Nam

No.	Delta	Basin	Area (Ha)	Increase 1,0 m	
				Half-flooded	Flooded
I	**Da Nang – Quang Nam**				
	Vu Gia - Thu Bon Downstream Delta	Vu Gia – Thu Bon	50.000	18.000	10.000
	Tam Ky River Delta	Tam Ky			
II	**Quang Ngai**				
	Tra Bong – Tra Khuc – Ve River downstream Delta	Tra Bong – Tra Khuc – Song Ve	55.000	35.000	15.000
	Tra Cau River Delta	Tra Cau			
III	**Binh Dinh**				
	Lai Giang Downstream Delta	Lai Giang	35.000	24.000	11.000
	La Tinh Downstream Delta	La Tinh			
	Kone- Ha Thanh Downstream Delta	Kone-Ha Thanh			
IV	**Phu Yen**				
	Ky Lo Downstream delta	Ky Lo	20.000	16.000	10.000
	Ba River- Ban Thach Downstream Delta	Ba – Ban Thach			
V	**Khanh Hoa**				
	Cai Ninh Hoa River Delta	Cai Ninh Hoa	12.000	10.000	7.000
	Nha Trang Cai River Southern Delta	Cai Nha Trang			
	Tổng		172.000	103.000	53.000

Flooded areas in Da Nang, Quang Nam. Quang Ngai and Binh Dinh provinces: (i) current situation (light blue), (ii) areas that would be flooded if the sea level were to rise +0,75m (Deep blue), (iii) areas that would be flooded if the sea level were to rise +1,0m (purple).



Flooded areas in Binh Dinh, Phu Yen, Khanh Hoa, Ninh Thuan provinces: (i) current situation (light blue), (ii) areas that would be flooded if the sea level were to rise +0,75m (Deep blue), (iii) areas that would be flooded if the sea level were to rise +1,0m (purple).

3. Ministry of Agriculture and Rural Development is now building an action plan to minimize the impact of climate change and adapt to it

3.1. Targets

- Guarantee stability and safety for inhabitants in cities and areas, especially Cuu Long Delta, Northern Delta, Central and mountainous areas. - Đảm bảo sản xuất nông nghiệp ổn định, an ninh lương thực; đảm bảo 3,8 triệu ha canh tác lúa hai vụ;
- Guarantee the safety of dike systems, other infastructures and disaster management.

3.2. Recommendations

- Increase the budget for managing disaster and adapting to climate change;
- Enhance international cooperation on disaster management and recovery, and on mitigating the negative impacts of climate change.
- Developing human resources and technology in the field;
- Integrate disaster management and recovery and mitigation of negative impact of climate change into socio-economic development strategy and plan of sectors, areas as well as locals.

Thank you for listening!

Asia-Pacific
Economic Cooperation

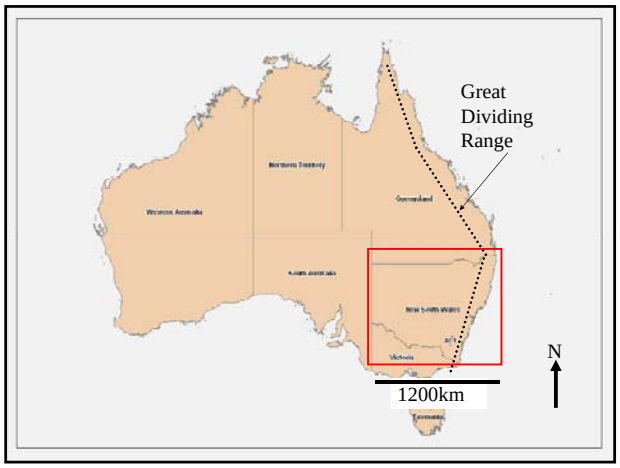
EPWG 01 2011A
Agenda Item : I.4

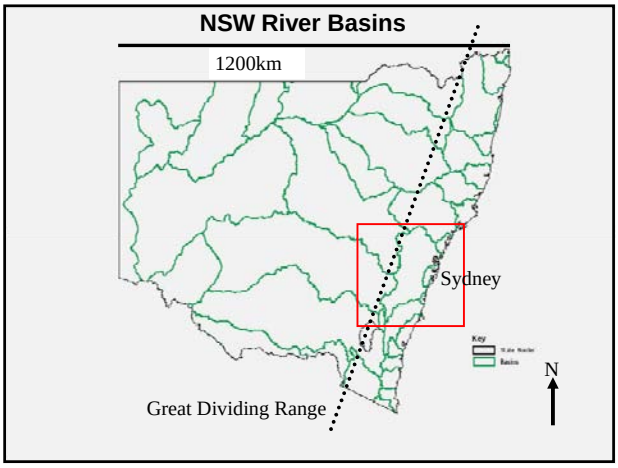
Experience in facing abnormal floods in Australia

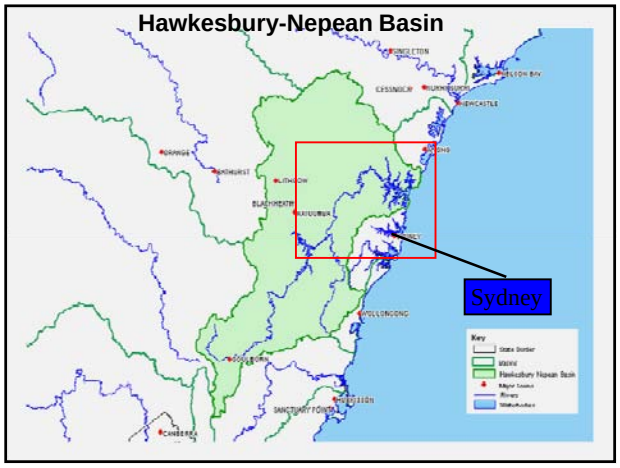
Purpose: Information
Submitted by: Australia

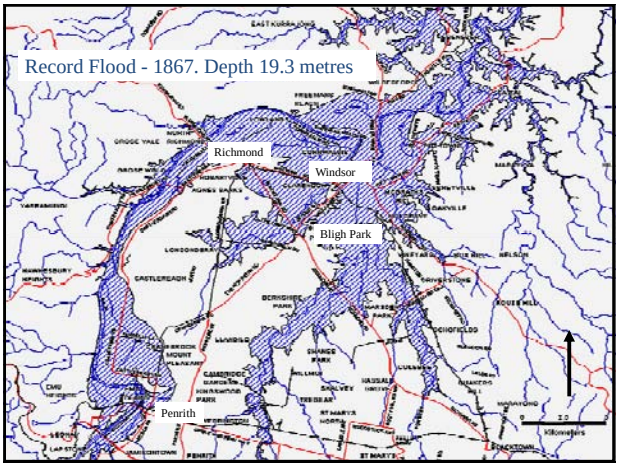
Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Responding to Abnormal Floods
An Australian Perspective From New South Wales State Emergency Service









Tools for Evacuation Planning

- Classification of hazard effect (for floods)
- Graphical Intelligence (for floods)
- Time Line analysis (of flood evacuation)

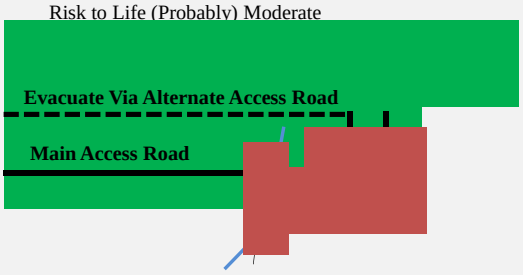
NSW SES Floodplain Classification

- Relates risk to community to EM options;
- Classification simplifies communication;
- Five Categories used:
  - Flood Islands (high or low) – HFI & LFI
  - Overland Escape Route - OER
  - Rising Road Access - RRA
  - Trapped Perimeter (high or low) – HTP & LTP
  - Indirectly Affected Areas - IAA

For full description see: Floodplain Risk Management Guideline - Flood Emergency Response Planning Classification Of Communities, NSW Office of Environment and Heritage www.environment.nsw.gov.au

Rising Road Access: (RRA)

Risk to Life (Probably) Moderate

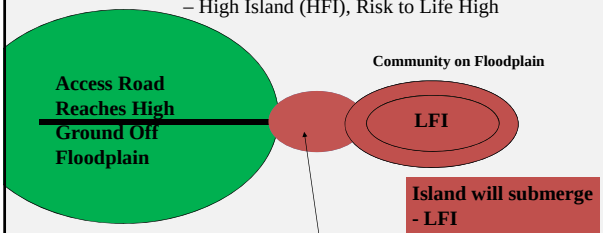


Main Road Cut by Flood

Risk to life in a Rising Road Access situation is heavily dependent on a number of factors including: rate of rise and depth of flood water, individual human behaviours and the type of buildings e.g. two-storey may lead people to stay in the belief they are safe.

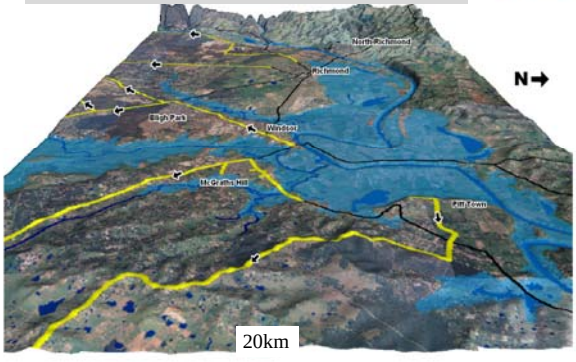
Flood Island:

- Low Island (LFI), Risk to Life Extreme
- High Island (HFI), Risk to Life High

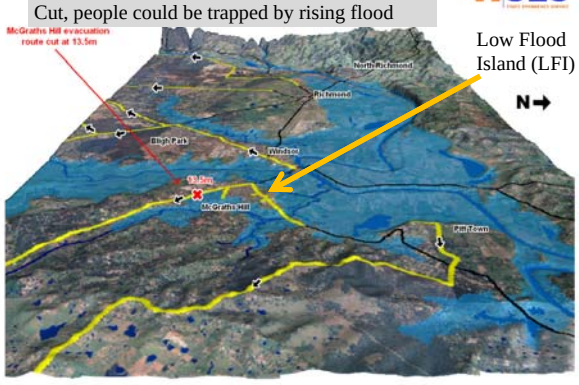


The risk to life in flood islands is highly dependent on a number of factors. In a Low Flood Island the risk of drowning will be high to inevitable depending on rate of rise, velocity and maximum depth of floodwater after access is lost. In a High Flood Island risk will be influenced by human behaviours, ability to maintain services and provide shelter etc.

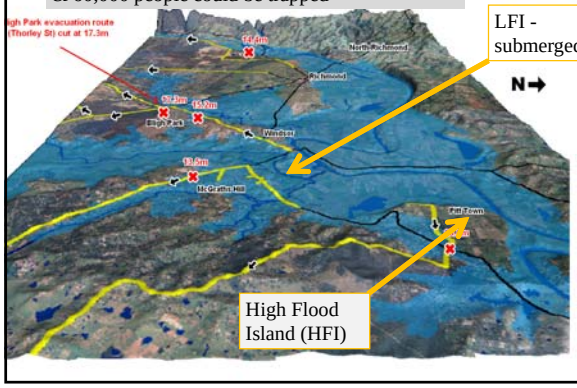
Flood = 11m - Farmlands Flooding but all Evacuation Routes are Open



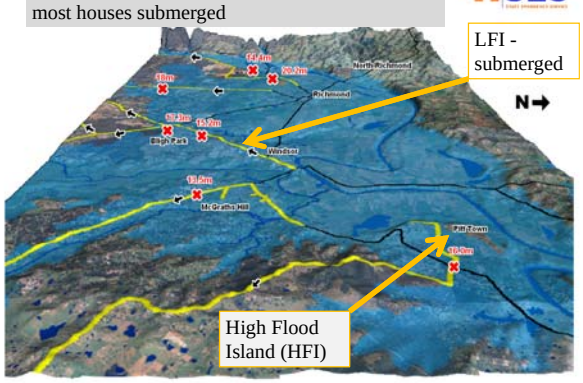
Flood = 14m - Lowest Evacuation Routes are Cut, people could be trapped by rising flood



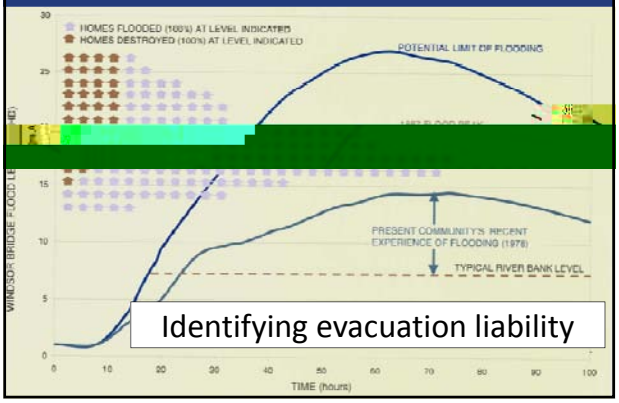
Flood = 18m - Most Evacuation Routes are Cut & 60,000 people could be trapped



Flood = 23m - All Evacuation Routes are Cut & most houses submerged



Graphical Representation of Flood Intelligence



Identifying evacuation liability

Flood Emergency Response Options

Faced with a developing flood, options are:

- Leave people to survive in-situ, or
- Evacuate before routes are cut by flood

- If flood depths are lethal and destructive Evacuation is the only safe option.
- Mass rescue is simply not a viable option.

Evacuation

- Purpose: To protect life

- Principle: Use of distance to separate people from hazard

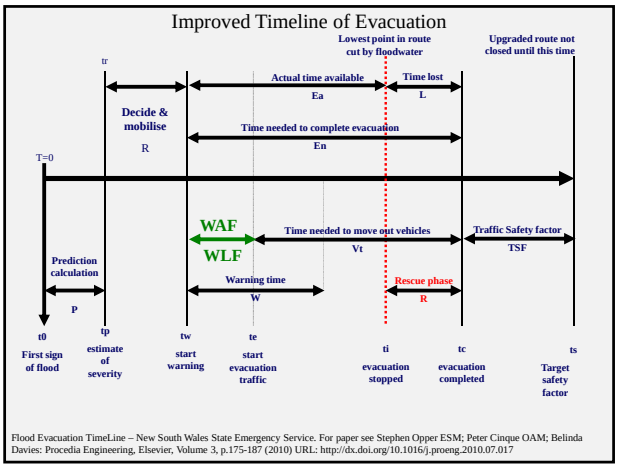
- Action: Movement of people from a place of danger to a place of safety

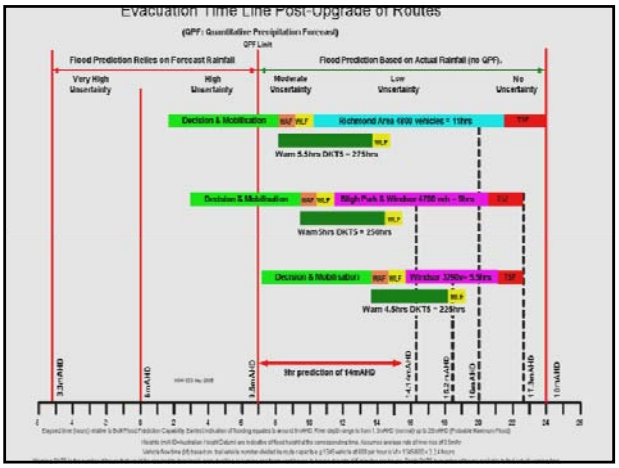
Evacuation Management

- Evacuation considerations:
  - Is evacuation necessary?
  - What is the trigger for evacuation?
  - When should evacuation commence?
  - How long does evacuation take?
  - What are the controlling parameters?
- Do emergency controllers know the answers?

Evacuation Management

- Evacuation requires Time Management
  - How much time to get ready (mobilise)?
  - How much time to warn community?
  - How much time to move people out?
  - How much time do you have as flood rises?
- MOST CRITCIAL - What is 'point of no return' for your decision?
- The answers can be shown on a Timeline





SES

END
Thankyou

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : I.5

Experience in facing abnormal flood in China

Purpose: Information
Submitted by: China

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Flood Disaster Reduction and Management in China

National Disaster Reduction Center of China (NDRCC)
Wang Dandan

Content

- Abnormal Flood in China
- Disaster management system and mechanism
- Flood Disaster Management
- Practice work

Abnormal Flood in China

Greater scope of affected region
Large quantity of affected population
Seriously affected in rural and urban
Drastic change of drought and flood

Crops suffered from serious waterlog, especially in Hunan, Hubei, Jiangxi, Sichuan, Anhui and Heilongjiang

Severe damage of infrastructural facilities

Hospital

Bridge and dam

School

Railway

Highway

Property damage

Rescue

Change of drought and flood

Drought in Hunan ,May 2011

Flood in Hunan, June 2011

Disaster management system and mechanism

Legal Framework Development

Since the early 1980s, the state has promulgated more than 30 laws and regulations concerning disaster prevention and reduction.

Emergency Response Law of P.R. China

Law of China on Water and Soil Conservation

Water Law of P.R. of China

Flood Control Law of the People's Republic of China

Flood Control Regulations of the People's Republic of China

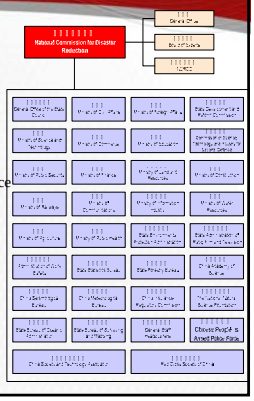
Regulations on the Security Control of Reservoirs and Dams

Regulations on Natural Disaster Relief

Institutional System Setup

The central government system

- National Committee for Disaster Reduction
- State Flood and Drought Control Headquarter
- State Earthquake Response and Rescue Headquarter
- State Forest Fire Control Headquarter
- National Disaster Control and Relief Coordination Office



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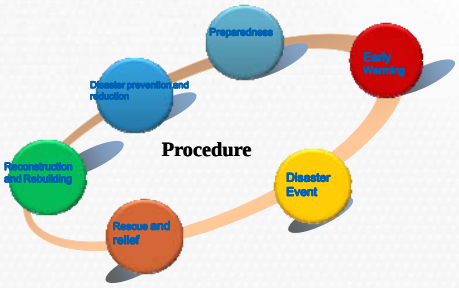
Working Mechanism Development



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Working Mechanism Development

- Disaster emergency response system
- Disaster information report mechanism
- Emergency relief material reserve system
- Disaster early warning, consultation and information-sharing system
- Major disaster rescue and relief joint coordination mechanism
- Emergency social mobilization mechanism
- International cooperation

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Working Mechanism Development

Disaster emergency response system

■The central government-stipulated responses to unexpected natural disasters are divided into four levels, which are determined by the degree of damages.

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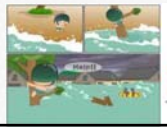
Working Mechanism Development

Disaster information report mechanism

▪Offering promptly through authorized releases, press releases, interviews and press conferences

▪The public information includes the disasters and their developments, progress of emergency response work, disaster prevention, and knowledge on disaster prevention and other information

▪The purpose is to ensure the public's rights to know and to monitor



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Working Mechanism Development

Emergency relief material reserve system

▪ China has built a relief material reserve network based on special storehouses, which has seen year-on-year improvements.

▪ The economy has now 10 such storehouses for daily necessities at the central level, and storage centers has continuously being built and improved.

▪In some provinces, cities and counties, the local storehouses have been established.

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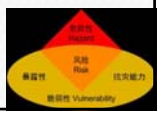
Working Mechanism Development
Disaster early warning, consultation and information-sharing system

- Involving relevant government departments such as civil affairs, land and resources, water resources, agriculture, forestry, statistics, seismology, maritime affairs and meteorology.
- Offer timely and effective support for the decision-making of the central government and local departments in the case of emergency
- Disaster information database , a public platform of national geographical information , a disaster information publishing and sharing system, a platform for national disaster reduction and risk management information.



Working Mechanism Development
Major disaster rescue and relief joint coordination mechanism

- Relevant departments play their roles and timely dispatch to disaster-hit areas working groups composed of personnel from these departments to gather first-hand information and guide disaster control and relief work on the spot.
- The groups are also required by the State Council to coordinate with the relevant departments to map out rescue plans, help with disaster relief work and prevent possible secondary disasters.

Working Mechanism Development
Emergency social mobilization mechanism

- A preliminary public mobilization system is now in place, focusing on efforts for rescue, search, first aid, relief, donation and other work.
- The government also encourages the full participation of non-governmental organizations such as mass organizations, the Red Cross, autonomous organizations and individual volunteers
- The work includes disaster prevention, emergency rescue, relief and donation work, medical assistance, hygiene and quarantine work, post-disaster reconstruction, psychological therapy support, and so forth.

Working Mechanism Development
International cooperation

- Adopting an open and cooperative attitude, China takes an active part in international efforts in the area of disaster reduction and disaster management
- The construction and improvement of an international cooperative disaster reduction mechanism
- Building up a worldwide capacity
- Providing mutual aid with other countries in major natural disasters
- Close partnership relationships with many UN organizations, other international/regional agencies.

Participating World Conference on Disaster Reduction

Organizing Asian Conference on Disaster Reduction

Shanghai Organization workshop

Sino-Africa workshop on disaster reduction

APEC training

Tsunami workshop

Flood Disaster Management

- Information management in Flood Disaster Management (FDM)
- Preparation in FDM
- Early warning system in FDM
- Assessment management in FDM
- Remote sensing techniques in FDM

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Information management in FDM

- Information Source: civil administration (internet, telephone, mail, field survey, local report), concerned departments, research institutes, foreign economy, medium
- National natural disaster information management system:
  1. Disaster information reporting system(报灾系统)
  2. Disaster information analysis system(分析系统)
  3. Disaster information monitor system(监测系统)
  4. Disaster information SMS system(短信系统)
- The system was launched on June 1,2009

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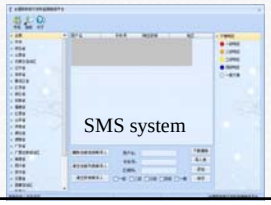
Information management in FDM

- It's a system for collecting statistics about disasters and the damage inflicted, and a reporting system covering the national, provincial, municipal and county levels.

Information management in FDM

Schematic plot

Monitor system



SMS system

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Preparation in FDM

- Funds reservation
- Material providing
- Telecommunications and information management
- Rescue equipment reservation
- Workforce
- Publicity, training and pre-arranged planning practice

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Material providing

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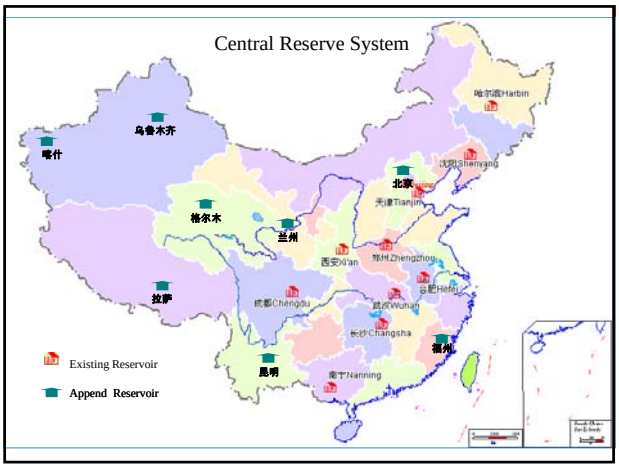

Early warning system in FDM

- Early warning response system in China
- Mid-range forecast
- Short term forecasting

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Early warning response systems in China

- National level:

  1.Meteorological early warning of geological disasters (Ministry of Land and Resource of China, Meteorological Administration of China, 2003.6)

  2.Meteorological disaster early warning (Meteorological Administration of China, 2004.8)

  3.City meteorological disaster early warning system (Meteorological Administration of China, 2005)

- Provincial level:

  Flood early warning system (Fujian Province Flood prevention and drought resisting Headquarters, 2001.3)

- Prefecture level:

  Meteorological disaster early warning (Municipal Meteorological Bureau,2004.7)

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Mid-range forecast

- Flood disaster avoidance plan
- Establish disaster prevention and reduction system
- Inspection of dilapidated buildings and reinforcement
- Set evacuation routes
- Organize and train rescue teams
- Guard against possible geological disasters
- ……

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Short term forecasting

- Preparation rescue and relief work
- Evacuation from dangerous zone and dilapidated buildings
- Guarantee real-time communication
- Maintaining normal order
- ……

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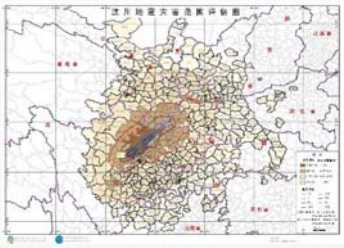
Assessment management in FDM

- Pre-disaster assessment
- During-disaster assessment
- Post-disaster assessment
- Risk assessment
- Hazards assessment
- Generalized assessments

Disaster Scope Assessment

- Take each assessment unit as the basic unit and assess a disaster's intensity distribution across a certain area.



Physical Quantity Assessment

- Various methods

  on-the-spot investigations

  empirical models

  local statistics reports

  remote sensing interpretation

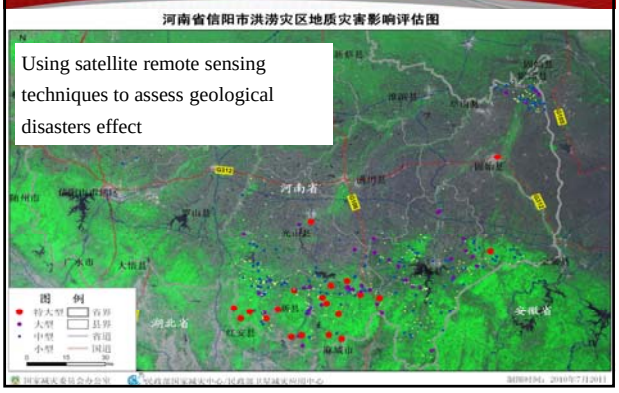
  …..
- Assessment of the physical quantities of damages and losses

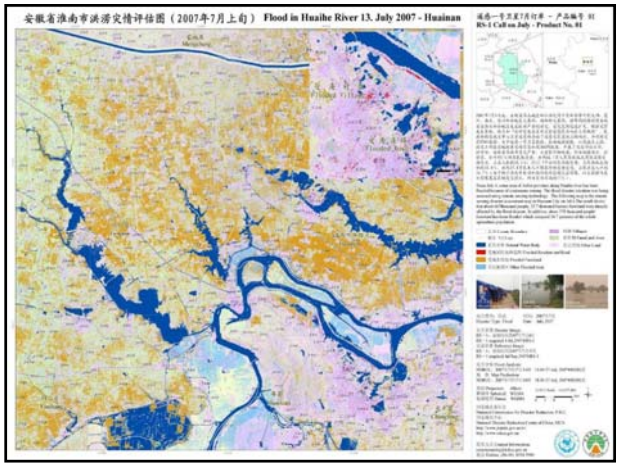
  casualties, house damages and ruins, agricultural losses, industrial losses, losses in the service sector, losses in infrastructures, losses in social undertakings, residents' property losses and losses of land resources

Direct Economic Loss Assessment

- On the basis of the physical quantity assessment, utilization of multiple methods such as economic loss accounting to assess the direct economic losses caused to houses, agriculture, industry, the service sector, infrastructures, social undertakings, residents' properties and land resources.

Remote sensing techniques in FDM





Practice work

- Recovery and Reconstruction work
- Personnel training

Recovery and Reconstruction work
Assessment

- Assessment objective: quantity, destructive degree(totally destroyed , seriously damaged, damaged, slightly damaged)
- Different Assessment Levels
- Local level: assessment from house to house in disaster spot，fill in the detailed forms
- Central level: classification of the forms, sample survey,

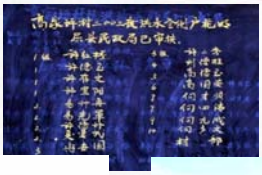
Recovery and Reconstruction work
Assessment

Field investigation

Recovery and Reconstruction work
Assessment Document

Record house situation

Recovery and Reconstruction work
Public Participation



Publish on disaster area and subject to supervision

Recovery and Reconstruction work

Procedure for Disaster Relief approval

Form for Approval of the reconstruction Assistance (2004 YEAR)

Personnel training

- Education of disaster prevention and reduction personnel is incorporated into the national talent development program. A national education system and a training platform for disaster reduction have been gradually established.
- The training contents include risk identify, disaster defense and relief , preparation ,
- A pilot place named “Xiao yu dong” town is in Sichuan Province

Disaster training for women in village

Mapping Community Risk

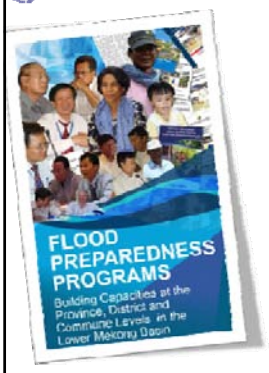
Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : II.1

Building Capacity for Mekong Flood: Experiences from Lower Mekong basin countries

Purpose: Information
Submitted by: Asian Disaster Preparedness Center

Workshop on Facing Abnormal Flood Disaster: New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011



APEC Workshop

Facing Abnormal Flood Disasters: New Vision for APEC Economies

Danang, Viet Nam, 28-29 July 2011

Building Capacity for Mekong Flood:

Experiences from Lower Mekong Basin Economies

Aslam Perwaiz and
Thanongdeth Insixiengmay
ADPC

Component 4: Flood Emergency Management Strengthening 2004-2010, GIZ and ECHO support

Principal objective:

Relevant authorities and other stakeholders in all riparian countries (at the province, district and commune levels) have enhanced capacities in flood preparedness and emergency management

Core Areas of Intervention

1. Flood Preparedness Programs Development and Implementation
2. Priority Activity Implementation to facilitate Flood Preparedness and Emergency Management
3. Capacity Building for Flood Risk Reduction
4. Flood Awareness and Education
5. Flood Knowledge Sharing and Documentation
6. Integration of Flood Risk Reduction into local development planning process
7. Trans-Boundary (Province to Province) Joint Planning and Information Exchange

---

Linkage with Mekong River Commission's Flood Management and Mitigation Program (FMMP)

Development objective

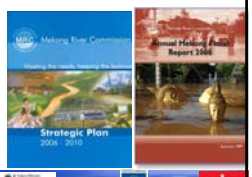
To prevent , minimize or mitigate people's suffering and economic losses due to floods, while preserving the environmental benefits of floods.

Key Objective

Balanced approach to Flood Management and Mitigation (FMMP) and reinforce the region's commitment to " Living with Floods"

Components of FMMP

1. Establishment of a Regional Flood Centre
2. Structural Measures and Flood Proofing
3. Mediation of Tran boundary Flood Issues
4. Flood Emergency Management Strengthening
5. Land Management



Scale of Intervention:

11 Provinces and 28 Districts

Cambodia:	**4 Provinces, 10 Districts**
Vietnam:	**4 Provinces, 10 Districts**
Lao PDR:	**2 Provinces, 6 Districts**
Thailand:	**1 Province, 2 Districts**

Cambodia

1. Prey Veng 2. Kandal 3. Kratie 4. Svay Rieng	• Peam Chor, Sithor Kandal, Peam Ro • Lovea Em, Leuk Dek, Kien Svay • Kratie, Sambour and Chhuloung • Svay Chrum

Lao PDR

5. Khammouane 6. Savannakhet	• Nong Bok , Xebangfai, Hin Boun, Mahaxay, Nhommalath • Xaybouly

Thailand

7. Nakhon Phanom	• Nakhon Phanom • Tha Uthen

Vietnam

8. An Giang 9. Dong Thap 10. Tien Giang 11. Ben Tre	• Chau Thanh, Tan Chau, An Phu • Thanh Binh ,Tan Hong, Tam Nong • Chau Thanh, Cai Be and Cai Lay • Cho Lach

---

Project Implementation Partners

Cambodia

Cambodia National Mekong Committee (CNMC)
#23 Mao Tse Toung Road
Phnom Penh, Cambodia
Tel.: (+855 23) 216 514; Fax: (+855 23) 218 506

National Committee for Disaster Management (NCDM)
Street 516, Sangkat Toul Sanke, Khan Russy Keo
Phnom Penh, Cambodia
Tel/Fax (855) (23) 882 045

Lao PDR

Lao National Mekong Committee (LNMC)
Director General of Department of Water Resources (WREA)
Prime Minister's Office, Lanexang Avenue, Vientiane, Lao PDR
Tel.: (+856 21) 260 981-3; Fax: (+856 21) 260 984

National Disaster Management Office (NDMO)
Ministry of Labor and Social Welfare, Lao PDR
Tel: (856-21) 219 450; Fax: (856-21) 213 287

Thailand

Thai National Mekong Committee (TNMC)
180/3 Rama 6 Road, Soi Phibul Watana Building
Phayathai, Bangkok 10400, Thailand
Tel.: (+66 2) 271 6165 / 271 6620; Fax: (+66 2) 271 6605

Department of Disaster Prevention and Mitigation (DDPM)
3/12 Uthong-Nok Road, Dusit, Bangkok, 10300, Thailand
Tel. 02-637-3381; Fax. 02-2432209

Vietnam

Vietnam National Mekong Committee (VNMC)
No. 23 Hang Tre, Hanoi, Vietnam
Tel: 84 4 3825 4785 Fax: 84 4 3825 6929
Liaison Office: No. 135 Pasteur, District 3, Ho Chi Minh City
Tel: 84 8 38 272 652; Fax: +84 8 38 272 609

Department of Dyke Management and Flood Storm Control (DDMFSC)
No. 02 Ngoc Ha, Ba Dinh Hanoi, Vietnam
Tel: 84 4 3733 5686; Fax: 84 4 3733 5701

Project Funding Support

gtz

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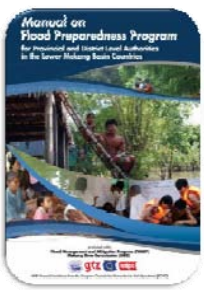
1. Development of Flood Preparedness Programs



- **Annual or Multi-year Disaster Risk Reduction Plans at Province and District level**
- **Clear roles and responsibilities for each line ministries,**
- **Systematic inventories of resources**
- **Actions to be taken before, during and after floods**
- **Identification of flood focused measures**

2. Implementation of Flood Priority Activities

Innovative partnership and cost-sharing implementation of flood risk reduction measures i.e., Emergency Kindergarten, Safe Area, Search and Rescue etc.

3. Building Capacities at Sub-National levels

Enhanced capacity of provincial, district, commune level disaster management authorities on *Planning for Flood Preparedness and Emergency Management , Community Based Flood Management, Search & Rescue, Swimming Lesson for Children and Teachers Training on School Flood Safety*

4. Raising Flood Awareness and Public Education

Partnership and capacity building of concern line ministries on flood awareness activities i.e., Posters and Information Booklet, Cultural Shows, Flood Information Billboards etc

Promoting partnerships between local authorities and private sectors for public awareness activities

5. Improved Access to and Dissemination of Flood Early Warning

Flood Information Boards and Flood Marks are seen as a good tool for flood preparedness by vulnerable communities

Local authority and community people effectively prepare for, respond to and cope with flood

6. Integration of Flood Risk Reduction into Local Development Planning

Implementation of Flood Risk Reduction measure through local socio economic development planning.

7. Flood Information dissemination and Knowledge Sharing

- Good practice documentation through *Safer Communities* series on innovative flood risk reduction in the LMB
- Regional and Domestic Workshops/ Domestic Flood Forums

8. Province to Province trans boundary cooperation in flood preparedness and emergency management

- Province to Province cooperation meeting (Vietnam - Cambodia and Thailand-Lao PDR),
- Joint-Planning for Information and Resource sharing during flood season
- Cross economy study visits

Key Lessons from Member Economies

- Flood Preparedness Planning has improved the **information sharing, understanding and cooperation** between the line departments at the provincial, district and commune levels as well as other Stakeholders.
- The lead role of DM Committees at Economy, Provincial and District in the planning process helps them **realize their capacity is not limited only to response**.
- Planning and follow-up implementation enables the line departments to **recognize their extended roles in Disaster Preparedness and the possibility of mobilizing internal resources**.
- The **involvement** of **DM** officials at all levels is significant as it helps to ensure the sustainability of the process.
- **Confidence** building in Local Authorities and Communities on DRR takes time but rewarding.

Key Lessons from Member Economies

- **Partnerships** at Economy and Provincial level is the key to up scale implementation , dissemination and integration of disaster preparedness activities.
- **Linkages** with on going programs of Governments, NGOs and other Donor programs is important but often difficult.
- **Fostering multi-stakeholder including Public Private Partnership** is the key to sustain the FMMP activities in the long run.
- Linking with FMM activities with the **Economy projects** would be of great impact.

Way Ahead: Possible area of interventions in the future

- **Incorporating Flood Preparedness and Emergency Management into Integrated Water Resource Management** by taking into account the climate change and other environmental risks.
- **Up scaling (geographical + thematic areas)** with lead in implementation by the Member Economies and linking with ongoing programs at different levels of authority (domestic, provincial, district and commune).

Way Ahead: Possible area of interventions in the future

- **Enhance linkages between domestic flood forecasting centers and local levels for early warning dissemination**, thereby particularly focusing on the strengthening of capacities at local levels
- **Build synergies between domestic and local interventions** by involving other stakeholders (NGOs, UN and Bilateral Donors), and continue networking, sharing of experience; continued development and dissemination of tools

Thank You

FMMP C4 project information available at www.adpc.net/fpp

MRC's Flood Management and Mitigation Programme information available at www.mrcmekong.org

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : II.2

Best Practices of Flood Hazard Mapping in Japan

Purpose: Information
Submitted by: Japan

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

FACING ABNORMAL FLOOD DISASTERS: NEW VISION FOR APEC ECONOMIES
Da Nang, Viet Nam, July 28 – 29, 2011

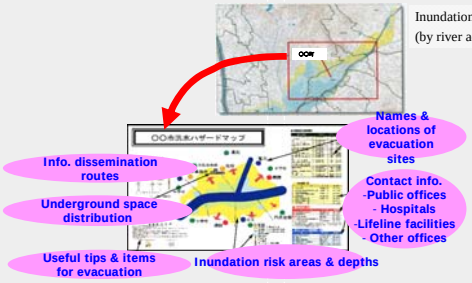
Best Practices of Flood Hazard Mapping in Japan

Kenichiro KOBAYASHI and Kaoru TAKARA
Disaster Prevention Research Institute and GCOE-ARS
Kyoto University

2011/7/28

A non-structural measure "flood hazard map"

Flood hazard maps are a tool to show inundation risk areas, evacuation sites, etc. to residents in an easy-to-understand way based on inundation risk area maps produced by river administrators. The maps aims to help residents' quick and safe evacuation. The hazard map making become mandatory by the ammendament of Flood Control Law in 2005.



Flood in Nagoya (2000.9)

Inner water

River water

Flood in Fukuoka（1999.6）

Flood in Fukuoka (2003.7)

Hakata JR Station 7:30 a.m. July 19,2003

Water flow into underground space

Preparedness: Hazard Maps in Municipalities in Japan (as of March 2011)

Hazard	Maps prepared	Available on Internet
Tsunami	357	249
Flood	1,170	1,020
Landslide/debris flow	701	508
Earthquake	670	389
High tide	101	79
Volcano Eruption	78	52
Inland water inundation	146	121

Preparedness: Hazard Maps

Tsunami: 357
(available on Internet: 249)

Flood: 1,170
(available on Internet: 1,020)

After MLIT web

Preparedness: Hazard Maps

Landslides: 701
(available on Internet: 508)

(including debris flow and sediment hazard)

Earthquake: 670
(available on Internet: 389)

After MLIT web

Preparedness: Hazard Maps

High tide: 101
(available on Internet: 79)

(including debris flow and sediment hazard)

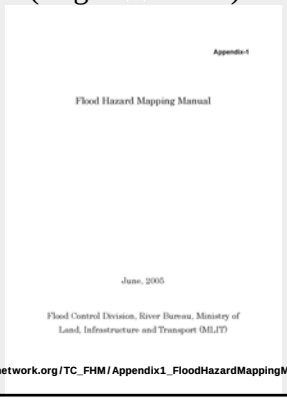
Volcano: 78
(available on Internet: 2)

After MLIT web

Manual of flood hazard map preparation (Japanese version)

http://www.mlit.go.jp/river/shishin_guideline/bousai/saigai/tisiki/hm_gaiyou/hm_gaiyou.pdf

Manual of flood hazard map preparation (English version)


Appendix-1

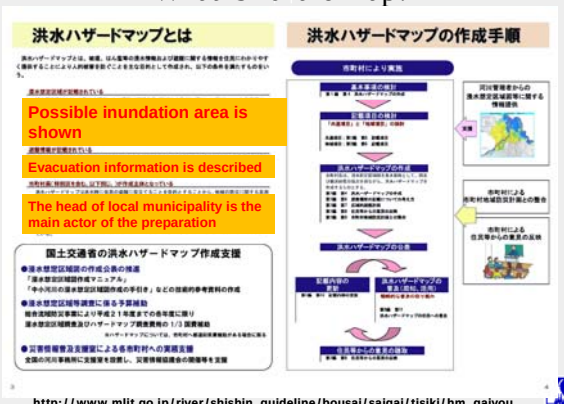
Flood Hazard Mapping Manual

June, 2005

Flood Control Division, River Bureau, Ministry of Land, Infrastructure and Transport (MLIT)

http://www.internationalfloodnetwork.org/TC_FHM/Appendix1_FloodHazardMappingManual2005%20for%20INFNet.pdf

What is hazard map?

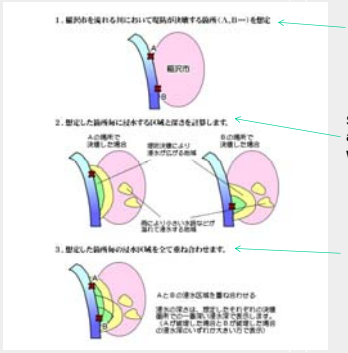


http://www.mlit.go.jp/river/shishin_guideline/bousai/saigai/tisiki/hm_gaiyou/hm_gaiyou.pdf

Necessary items in the hazard map

http://www.mlit.go.jp/river/shishin_guideline/bousai/saigai/tisiki/hm_gaiyou/hm_gaiyou.pdf

How to make an hazard map; the example of Inazawa city (稲沢市), Aichi Prefecture, Japan



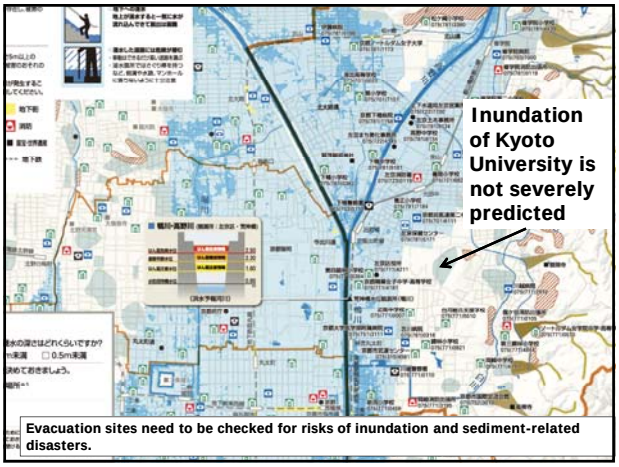
Assume the dike break point A, B at a river across the Inazawa city

Simulate the flood inundation area and depth from the A or B with the 100-year rainfall

Superpose the inundation areas and depths of the two simulations

Where is Kyoto University Main Campas?

Inundation of Kyoto University is not severely predicted



Evacuation sites need to be checked for risks of inundation and sediment-related disasters.

What should be cared for the evacuation?

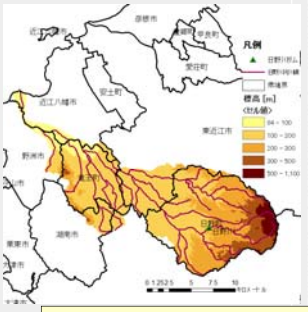
http://www.city.kyoto.lg.jp/suido/cmsfiles/contents/0000089/89718/03WB_sakyo_joho_mizu.pdf

Whole town hazard map

Machigoto marugoto hazard map

http://www.mlit.go.jp/kisha/kisha06/05/050703_.html

Our Activities: Ryuou Town



Ryuou Town

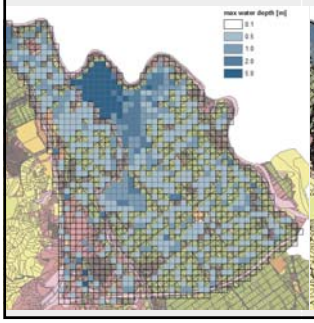
- Located in the middle to downstream region of the Hinogawa river
- Large part of the town is surrounded by Yukinoyma in the east, Kagamiyama in the west, hilly terrain in the south and the Hinogawa river in the north
- Town area: 44.52km^2, population:13674（male:7529, female: 6145）, 5045 households（as of March 1, 2008)

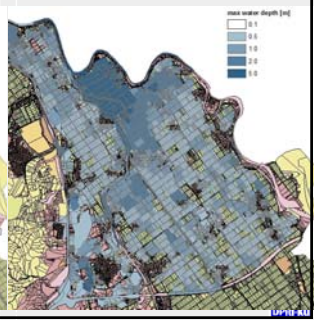
Flood Inundation simulation (movie)

Utilizing GIS vector data

Raster type water depth overlaid on the vector map

Integrated result





The relation between the house damage ratio and the inundation depth

Inundation depth

Ground slope

表-4. 2 浸水深別被害率

地盤勾配＼浸水深	床下	床上 50cm未満	床上 50～99	床上 100～199	床上 200～299	床上 300cm以上	土砂堆積（床上） 50cm未満	土砂堆積（床上） 50cm以上
Aグループ	0.032	0.092	0.119	0.266	0.580	0.834	0.43	0.785
Bグループ	0.044	0.126	0.176	0.343	0.647	0.870		
Cグループ	0.050	0.144	0.205	0.382	0.681	0.888		

A：1/1000未満、B：1/1000～1/500、C：1/500以上

注：1．平成5年～平成8年の「水害被害実態調査」により求められた被害率。（ただし、土砂堆積は従来の被害率）

2．家屋の全半壊についても考慮した数値である。

Chisui Keizai Chousa Manual (2005 version)

The relationship between the crop damage ratio and the inundation depth + duration

Inundation depth

Inundation duration

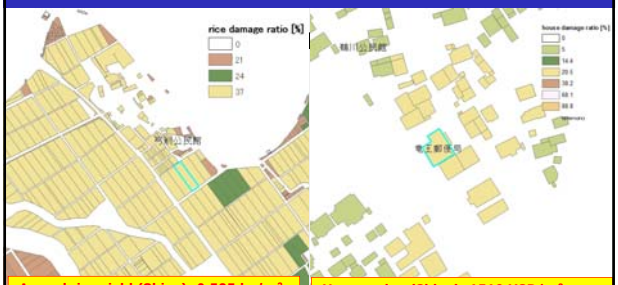
Rice field

Crop field

Chinese cabbage

Chisui Keizai Chousa Manual (2005 version)

Economic loss



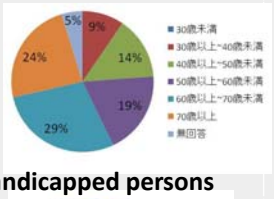
•Annual rice yield (Shiga): 0.525 kg/m²
•Rice price per Kg (Shiga): 2.89 USD/kg
•Paddy field area: 3419 m²
•Water depth: 2.5 m, crop damage:37 %
Economic loss of the crop:
3419×0.525×2.89×0.37=1920 USD
Following: Chisui Keizai Chousa Manual (2005 version)

•House value (Shiga) :1519 USD/m²
•House area (Ryuou post office): 376 m²
•Water depth: 0.71 m, House damage ratio:20.5 %
Economic loss of the building:
376×1519×0.205=117084 USD
Following: Chisui Keizai Chousa Manual (2005 version)

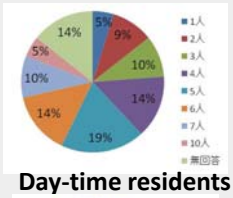
A workshop with people and a local government for discussing flood simulation in a river basin

Attributes of respondents

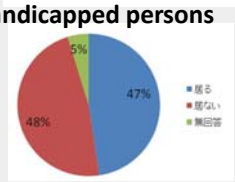
Age



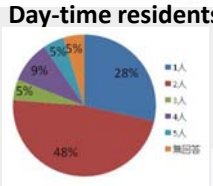
# of family members



Handicapped persons



Day-time residents



Discussions at Workshop

- The damage of the paddy rice is different according to the season. It is totally damaged by 1-hr inundation before the spike of the paddy rice grows. The evaluation should be weekly-basis according to the growth of the spike. It is also different by the type.
- Paddy rice has still resistance against water. Vegetables such as cabbage is very week (0 or 100).
- A paddy field damage (e.g. 1920 USD) is affordable. The damage of cars or buildings are much harder.
- Inundation depth of Yuge (3.1m) is probably correct but the countermeasure has already been taken.
- The houses in Yuge is built on high foundation.
- To save human life by leading the floods to paddy field is acceptable. Paddy field can be used for the disaster prevention purpose.
- Water gate is controlled by community. The gate closes when the water level becomes higher.
- The simulation result is different from the Hazard map published by Ryuou Town. It should be clearly explained.
- House economic damage is too big. It was 33000 USD for example.

Projection of future Climate

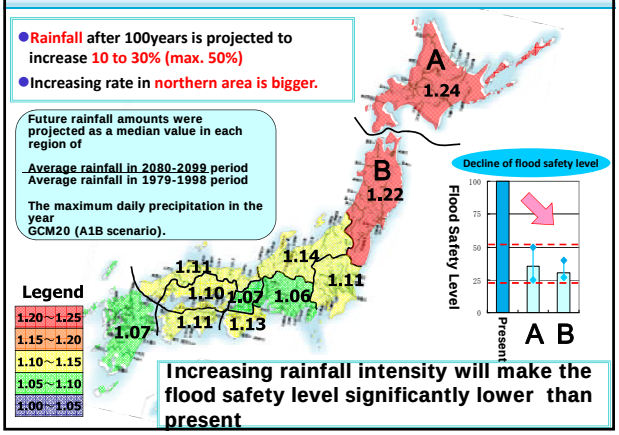
国土交通省

- Rainfall after 100years is projected to increase 10 to 30% (max. 50%)
- Increasing rate in northern area is bigger.

Future rainfall amounts were projected as a median value in each region of

Average rainfall in 2080-2099 period
Average rainfall in 1979-1998 period

The maximum daily precipitation in the year
GCM20 (A1B scenario).



Increasing rainfall intensity will make the flood safety level significantly lower than present

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : II.3

Local Flood Early Warning Based on Low-Tech Geo-informatics Approaches and Community Involvement - A solution for Rural Areas in the Philippines

Purpose: Information
Submitted by: Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ)

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Local flood early warning based on low-tech Geoinformatics approaches and community involvement A solution for rural areas in the Philippines

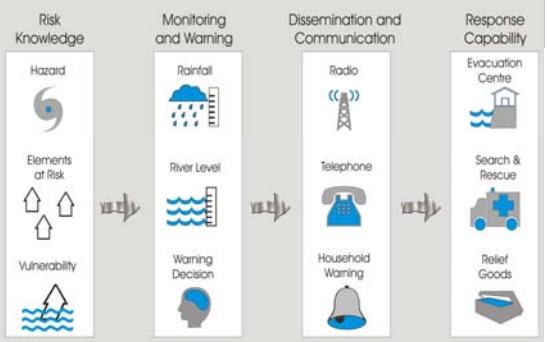
Dr. Norman Kerle (ITC, University of Twente), Olaf Neussner (GIZ)
28 July 2011

ITC an Associated Institution of the UNITED NATIONS UNIVERSITY

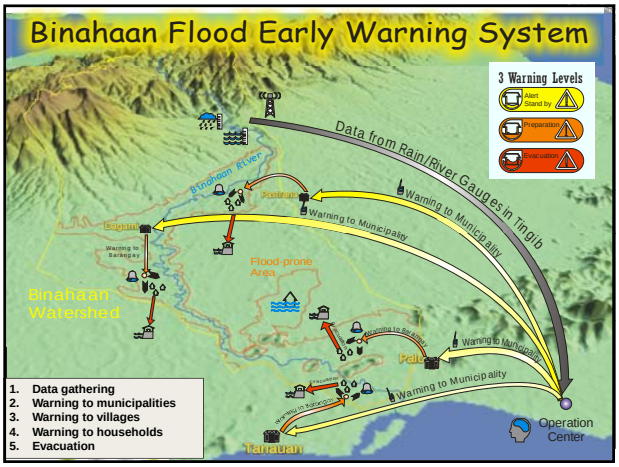
Introduction

- Many Asian economies experience floods but few are well prepared
- There is a need for innovative, inexpensive yet robust methods that are ideally also based on strong community participation
- The Philippines receive frequently excessive amounts of rain resulting in floods claiming lives and causing substantial damages.
- Economically it is not feasible setting up costly high tech Flood Early Warning Systems (FEWS) for many smaller rivers.
- GIZ and ITC assisted Local Government Units in the Philippines developing Local Flood Early Warning Systems (LFEWS) for smaller water basins with geo-information technology and with participation of local communities.

Key Elements of LFEWS



Binahaan Flood Early Warning System



Low cost data sources for risk knowledge and warning

Google Earth
- Easy access. Often very high resolution

Composite of 350 screen shots (1GB file size)

SPOT

- Good data for land cover mapping.
- Needed to identify the elements at risk.
- Selected historic images available for free at Planet Action.

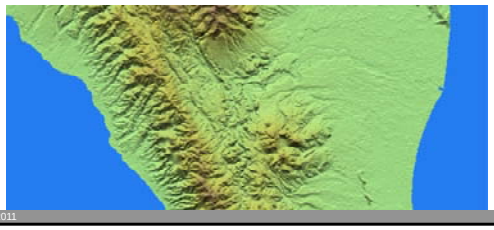
➢ http://www.planet-action.org/

GTZ project area
Leyte, Phil., May 2011

SRTM (Space Shuttle Radar Topographic Mission)

- Provides altitude for Digital Elevation Models (DEM)
- Pixel size: 90m x 90m
- Needed for hazard assessment
- Freely available in the internet

➢ srtm.csi.cgiar.org/SELECTION/inputCoord.asp

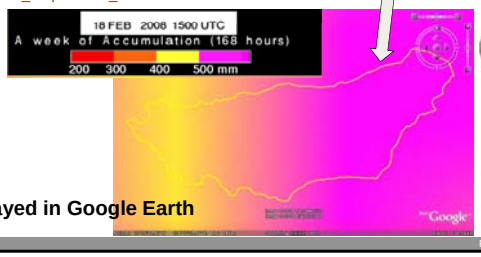


TRMM (Tropical Rainfall Monitoring Mission)

- Provides rainfall every 3 hours in 729km² pixels
- Identification of possible flood areas.
- Easy view in Google Earth

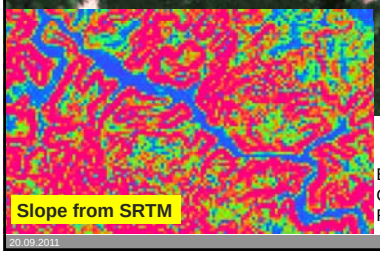
➢ http://trmm.gsfc.nasa.gov/publications_dir/potential_flood.html

Binahaan Watershed



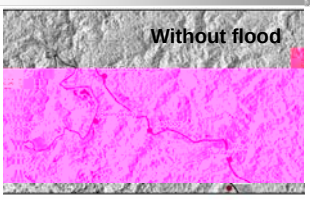
Displayed in Google Earth

SRTM and SPOT for Identification of Flood Prone Areas

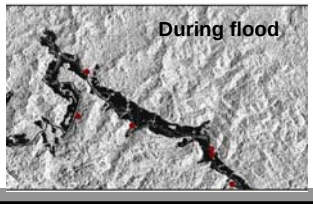


Blue: small slope
Green: medium slope
Red: big slope

TerraSAR-X for Identification of Flood Prone Areas

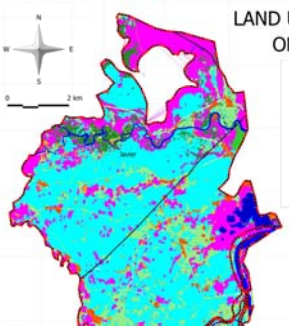


Black: water
Grey: other land cover



real-time image acquisition is expensive and not always possible

LAND USE IN FLOOD PRONE AREAS OF ABUYOG WATERSHEDS



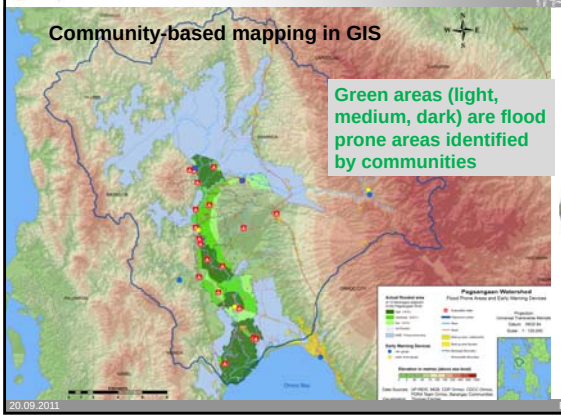
CLASS NAME	HA	%
Annual crop	4,966.18	40.15
Barren land	52.88	0.43
Closed forest	340.56	2.75
Mangrove forest	32.96	0.27
Pastures	2,572.33	20.80
Perennial crop	2,790.27	22.56
Shrubs	689.13	5.57
Built-up area	186.98	1.51
Fishpond, inland water, road	738.11	5.97
Total	12,369.41	100.00

Costs of land use were used to calculate losses

Community-based mapping

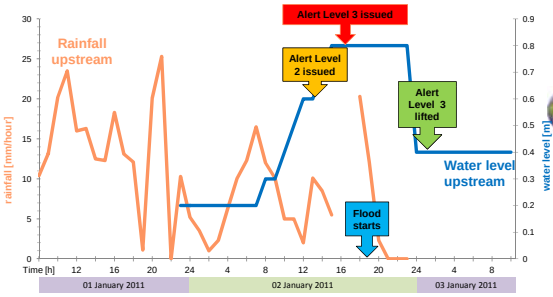
- People know frequently occurring hazard events well (e.g. floods).
- Location of households and other assets
- Encoded in GIS for overlaying with existing (scientific and topographic) maps.

Community-based mapping in GIS



Actual Performance of FEWS During a Flood

Binahaan Flood, 1-3 January 2011 (5 Hours Advance Warning)



Summary
How is the Local Flood Early Warning System established and how does it perform?

- A LFEWS costs 30,000 – 40,000 US$ in the Philippines
- Cost Benefit Analysis says this is “profitable” after eight years (less damages than costs)
- Run by “non professionals” but with guidance from professionals
- Many successful warnings were issued by eight LFEWS
- Very low failure rate (one false alarm only)
- Population has more time to prepare for floods; damages reduced
- Can be replicated in other economies without a problem

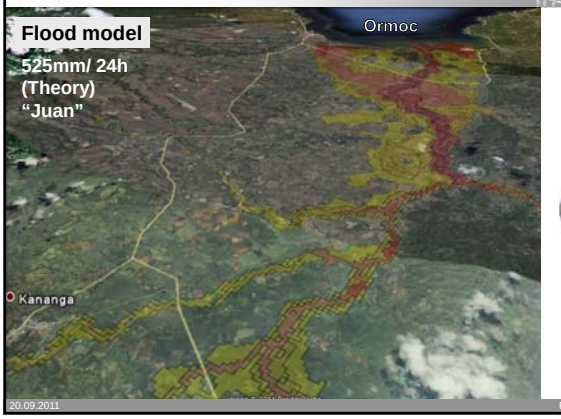
Way forward

Flood modelling

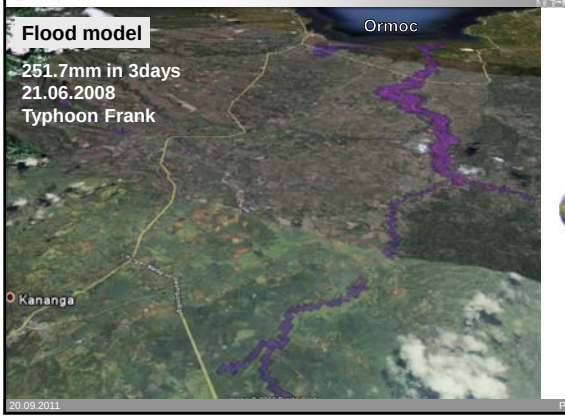
Simulation of situations that did not happen yet in order to be able to prepare for them, such as:

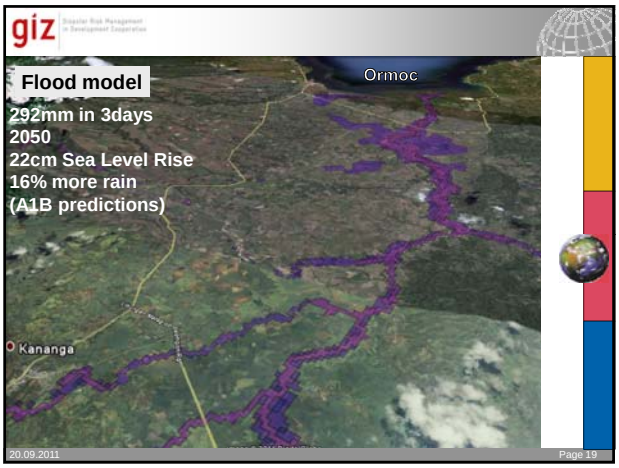
- short and much rain
- less and longer rain
- with high/low tide
- with sea level rise
- with CC-related rain increase

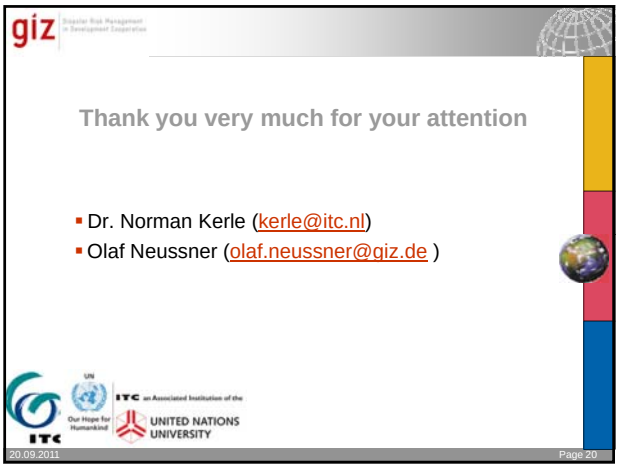
Flood model



Flood model




Flood model
292mm in 3days
2050
22cm Sea Level Rise
16% more rain
(A1B predictions)
Ormoc
Kananga
20.09.2011
Page 19


Thank you very much for your attention
Dr. Norman Kerle (kerle@itc.nl)
Olaf Neussner (olaf.neussner@giz.de)
ITC
UNITED NATIONS UNIVERSITY
20.09.2011
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Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : II.4

Flood Monitoring and Early Warning Decision Support System Pilot Project in Central Vietnam

Purpose: Information
Submitted by: United States

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Flood Monitoring and Early Warning Decision Support System: VinAWARE

Presentation Outline

- Project Overview and Background
- Key Components
  - Concept of Operations / Standard Operating Procedures
  - VinAWARE Decision Support System
  - Scenario-based Exercise / Training
- Current Project Status & Next Steps

VINAWARE 2

29 July 2011

VINAWARE 3

Project Overview

U.S. Government grant to Viet Nam MARD to strengthen capacity for flood monitoring and early warning at central and provincial levels

- March 2010: Project K/O with stakeholders in HN & Danang
- May 2010: S/H workshop in Danang and meeting with provinces to develop **Concept of Operations** (CONOPS)
- Fall 2010: Finalize CONOPS, Collect & Automate Data
- Winter 2011: Complete **VinAWARE System**, develop **Standard Operating Procedures** (SOPs)
- April 2011: Launch VinAWARE, provide user **training** in Hanoi and Danang
- Summer 2011: Evaluate VinAWARE
- October 2001: Final report, recommendations

VINAWARE 4

Study Area

- **Pilot area:** Seven coastal provinces from Quang Binh to Binh Dinh
- **Focus area:** Quang Nam Province

VINAWARE 5

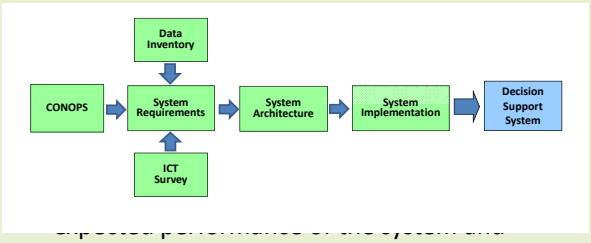
Project Partners

- Funding Agency: U.S. Trade and Development Agency (USTDA)
- Grantee: Viet Nam Ministry of Agriculture and Rural Development (MARD)
- Implementing Agency: Pacific Disaster Center (PDC) of the University of Hawaii
- Implementation Partner: Water Resources University (WRU)
- Period of Performance: March 2010 to October 2011

VINAWARE 6

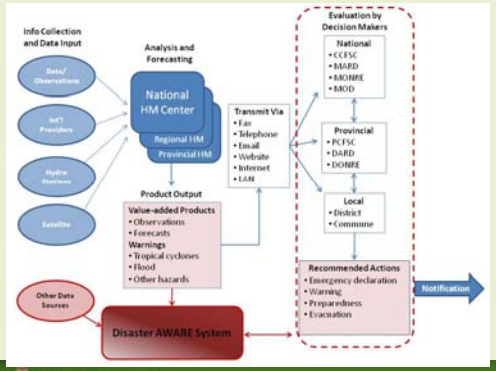
Concept of Operations

- **What is a Concept of Operations?:**

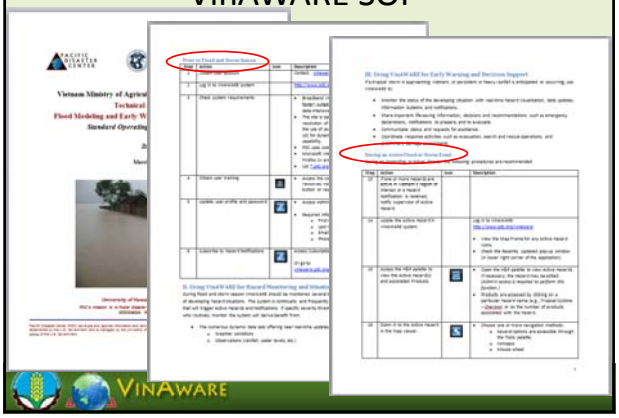


recommends strategies for filling the gaps.

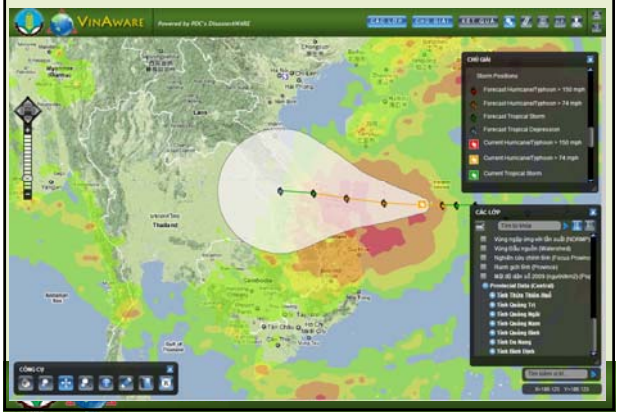
VinAWARE CONOPS



VinAWARE SOP

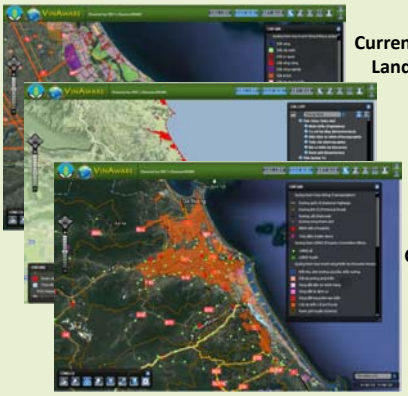


Storm Forecast Positions & Rainfall



Forecast Wind Speeds

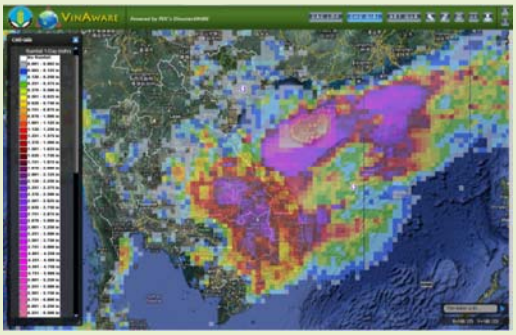
Current Infrastructure and Land Use Classification



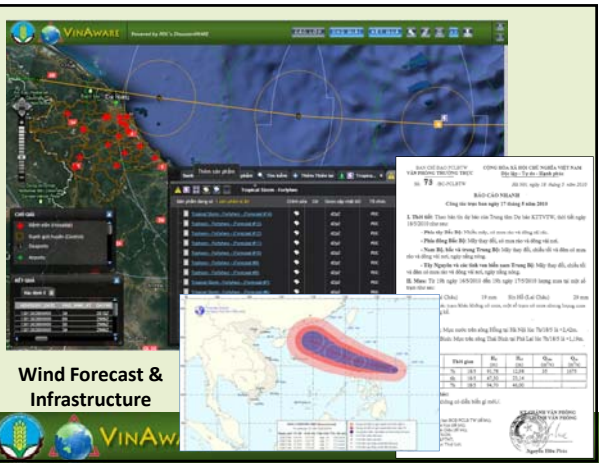
Historical Data

Current Infrastructure and Historical Hazards

Real-Time Rainfall Observations

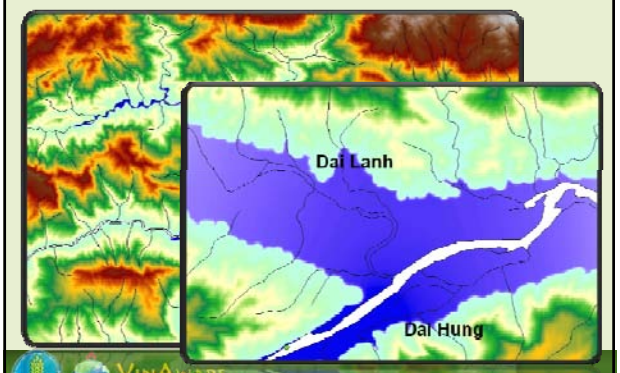


Wind Forecast & Infrastructure



Rainfall Forecast & Hydro Dams

MIKE 21 – Max Inundation



Flood Modeling

Hazard Notification Services

- Users subscribe to notification service to receive email alerts for specific hazards.

Training and Scenario-based Exercise (Hanoi and Danang)

VinAware 19

Current Status / Next Steps

- Now–Sept: Evaluate functionality and performance of VinAWARE during storm & flood season
- October: Submit Final Report, including 4-year full-scale implementation plan
- Next Step: Secure funding to expand pilot to include more data, hazards & provinces and fully operationalize/institutional its use

VinAware 20

Points of Contact

- PDC Project Director: Chris Chiesa (cchiesa@pdc.org)
- PDC In-country Representative: Nathan Sage (nsage@pdc.org)
- PDC Technical Lead: David Askov (daskov@pdc.org)
- MARD Project Director: Dr. Nguyen Huu Phuc
- MARD Tech Focal Point: Nguyen Huynh Quang

VinAware 22

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : II.5

Application of new technologies for forecasting abnormal flood disasters in Chinese Taipei

Purpose: Information
Submitted by: Chinese Taipei

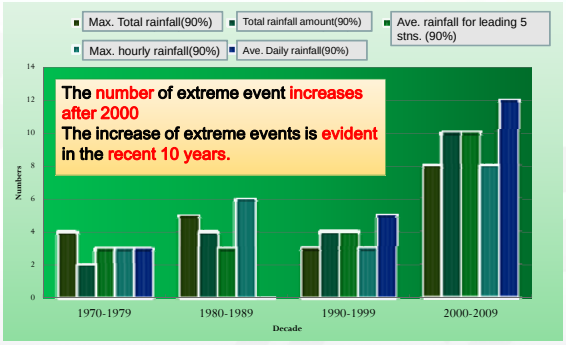
Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

National Science & Technology Center for Disaster Reduction

Application of new technologies for forecasting abnormal flood disasters in Chinese Taipei

Wei-Sen Li
Chinese Taipei
2011/07/29

Typhoons with extreme rainfall event in CT (TOP 20 during 1970~2009)

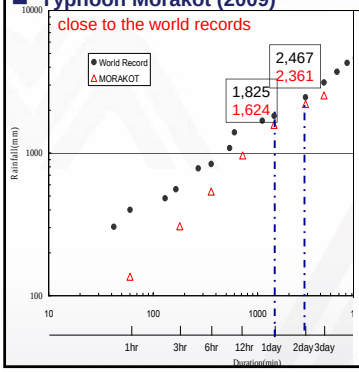


2

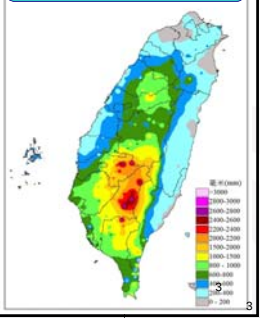
More and More Extreme?

■ Typhoon Morakot (2009)

close to the world records



2009, 0805-0810 accumulated rainfall



3

Typhoon Morakot claimed almost 700 lives

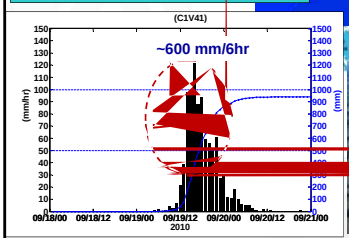
■ Massive deep landslides caused by Morakot

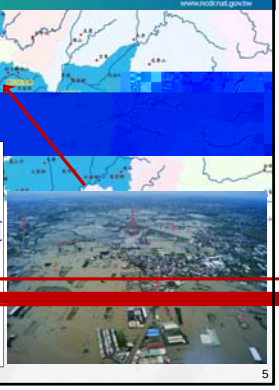
4

More and More?

- **Typhoon Fanapi (2010)**

■ Totally 600mm accumulated rainfall during 6 hours was found at Gang-Shan station.

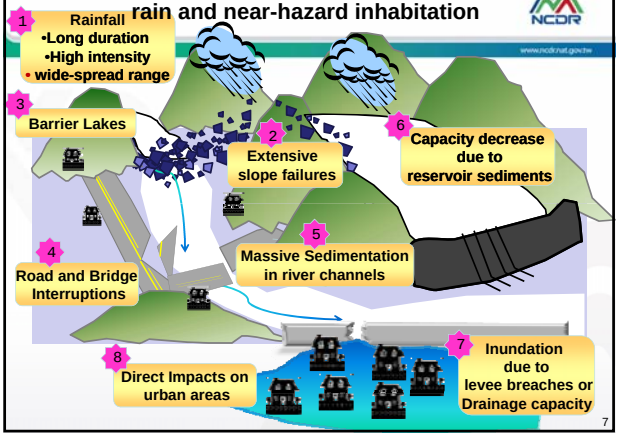




5

More and More?

Recipe of disaster: topography, high intensity of rain and near-hazard inhabitation



7

Issue 1: Scenario-based disaster risk management for large-scale compound disasters

Hurricane Katrina•

Typhoon Morakot •

Great East Japan Eq

Cases of large-scale compound disasters in recent years

- 2005 Hurricane Katrina, 2009 Typhoon Morakot, 2011 the Great Tohoku Kanto Earthquake and Tsunami

Problems founds

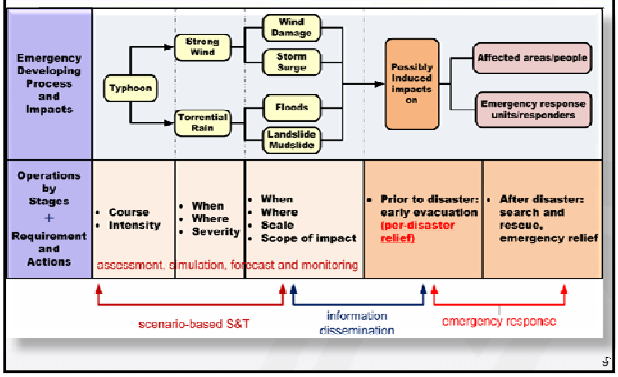
- 1) "Unprecedented and complicated" impacts, 2) continuously developing situations, 3) simultaneous urgent demands, 4) challenges to engineering-based measures, 5) lacks of information integration….

Demands for disaster risk management

- Tools to build up scenarios for planning and drills
- Design of information system to provide situation awareness
- Estimation of emergency relief demands after large-scale compound disasters
- Study of evolutional characteristics of compound disasters

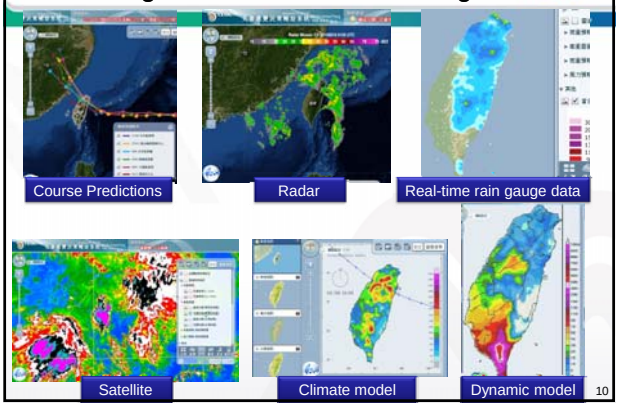
8

Demands and supports of S&T according to emergency operation stages



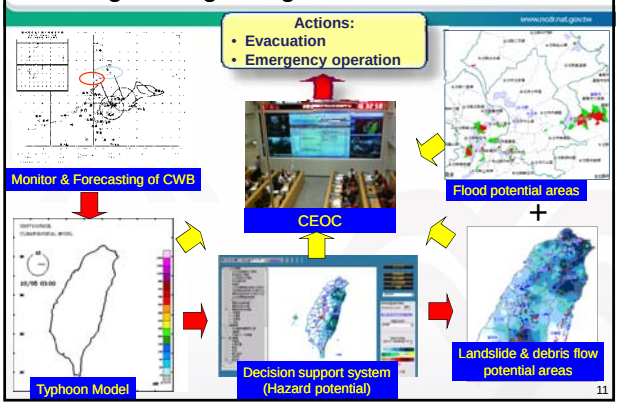
9

Information platform based on "Mapping and Modeling" and "Real-time Monitoring"



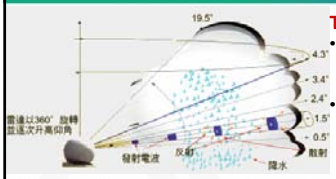
10

Technology support to reduce possible damage through integrated information



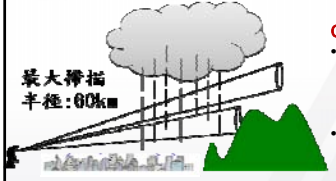
11

New radar network to upgrade nowcasting capability



Traditional S-band Doppler Radar:

- Long range, scanning vertical profile; but low spatial resolution and low refreshing time.
- Sufficient for regional forecast,; Insufficient for emergency operation



C-band Doppler Radar Network:

- Short rang, scanning low-altitude rain cloud; but offering high spatial resolution and high refreshing time.
- Sufficient for emergency operation (1~2hr lead time)

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Coverage of new radar network

- **Priorities of radar network installation :**
  1. Metropolitan areas
  2. Low-lying and flood-prone areas
  3. High landslide-risk areas
  4. Disaster hotspots

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Case of successful pre-disaster relief during Typhoon Fanapi , in Lai-Yi village, Sep. 2010

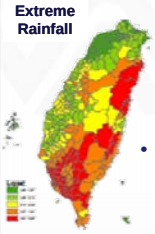
9/18 05:30 — 14:00 — 15:00 — 9/19 08:40 — 23:00

照片來源：水保局

- Landside in Lai-Yi
- Typhoon landfall time
- Evacuation operation in villages
- Early warning based on rainfall forecast
- Issue the land warning

14

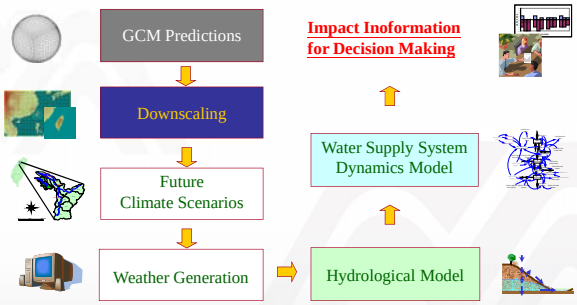
Issue 2: Climate change impacts on future flood events and accompanying hazards



- **Challenges of climate-change-related disasters in Chinese Taipei**
  - Direct impacts: ***1)*** Higher temperature; ***2)*** Higher sea level; ***3)*** Rainfall distribution change; ***4)*** More extreme rainfall events; ***5)*** Typhoon and storm surge
  - Evolving impacts: ***1)*** Slope land disasters; ***2)*** distribution of water resource; ***3)*** investment on new development projects…..
- **Demands for develop CCA and DRR**
  - Download scaling techniques to produce scientific projection for coming decades
  - Risk map to identify risk potential based on impacts by hazards like flood, slope land, land subsidence, vulnerability of costal areas

15

Major approaches to analyze impacts by climate change



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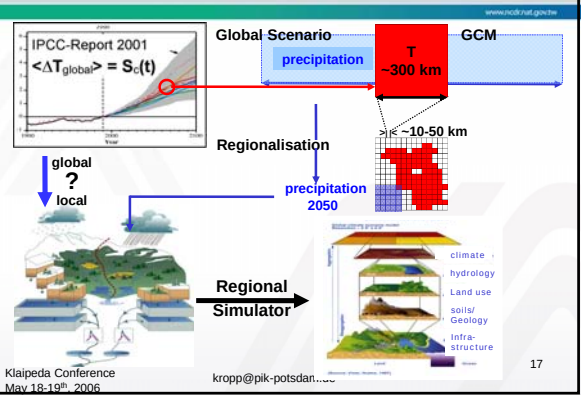
Global Climate ⇒ Regional Climate



Klaipeda Conference
May 18-19th, 2006

kropp@pik-potsdam...

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Modeling improvement and data precision enhancement

East-Asia Climate Diagnosis	1. Asian monsoon system and hydrological cycle 2. East Asian summer monsoon 3. NW Pacific typhoon 4. Winter monsoon
Domestic Climate Analysis	1. Seasonal precipitation analysis 2. Temperature and extreme temperature 3. Typhoon, Meiyu 4. Winds, sea level
Station Data Conduction	1. QA, QC of precipitation data from 19xx-20xx 2. Build up precipitation measurement data base(Regrid)
Model evaluation (IPCC, MRI)	1. Monsoon system 2. Precipitation & Temperature simulation 3. Statistics of NW Pacific typhoons 4. Statistics of Meiyu precipitation 5. extreme precipitation events

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Identifying local characteristics

Statistical Downscaling	1. Build up statistical downscaling methodology(25Km x2 5Km) 2. Development statistical downscaling methodology for grid points and stations(1Km x 1Km)
Dynamic Downscaling	1. Select model domain and apply local land-use data 2. Test physical parameterization 3. Dynamic downscaling based on high resolution GCM data
Station Data Re-griding	1. Station data analysis 2. Method develop 3. Gridded data evaluation
Uncertainty Analysis	1. Probability analysis 2. Projection data analysis

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Exploring possible impacts

Extreme Rainfall Variability and Flood Impact	1. Historical statistics of extreme rainfall events and flood disasters 2. High resolution Model Verification and Projection on extreme weather variability.
Seasonal Rainfall Variability and Drought Impact	1. Historical statistics of drought events 2. Model Verification and Projection on seasonal variability.
Flood Impact Simulation	1. Hydrological Model Experiment for Flood Simulation 2. Uncertainty Analysis
Drought Impact and Water Resource Management	1. Hydrological Model and Water Resource Model Simulation 2. Uncertainty Analysis

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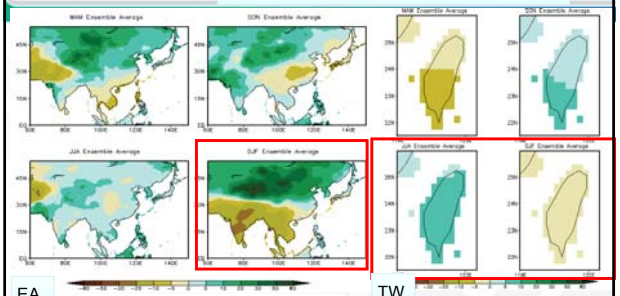
Statistical Downscaling

Change rate of projected monthly rainfall climatology (2020~2039) A1B



EA

1. Increasing rainfall is expected for most of EA in general
2. Decreasing rainfall is found in mid-China and Japan
3. change of rainfall is evident in Winter

TW

1. Decreasing in DJF and MAM
2. Increasing in JJA and SON

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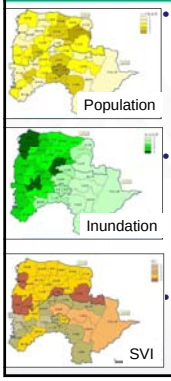
Issue 3: Social risk vulnerability assessment

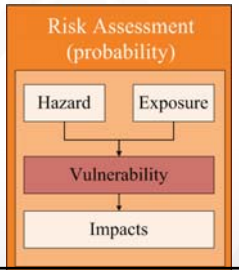


- **Overlapping of hazard map and population exposure to identify "hot spots"**
  - **Considered social factors: *1)* population density and structure, *2)* education and income, *3)* economic activities, *4)* past events and perception, *5)* social support, *6)* insurance ….**
- **Problems founds due to social development**
  - ***1)* Rapid urbanization, *2)* land use management, *3)* aging society, *4)* vulnerability of indigenous tribes, *5)* tools for risk communication, *6)* disaster resilience at community level ….**
- **Products to be delivered**
  - **Models for loss estimation**
  - **Establishment of Social-economic Vulnerability Index (SVI) and Human Development Index (HDI)**

22

The Disaster Risk Map

To enhance the nation's adaptive capacity to climate change, it is necessary to proceed the disaster vulnerability and risk assessments, like the disaster risk map to highlight the hotspot of the high risk areas.



- Inundation Risk Map
- Slop land Disaster Risk Map
- Costal Disaster Risk Map

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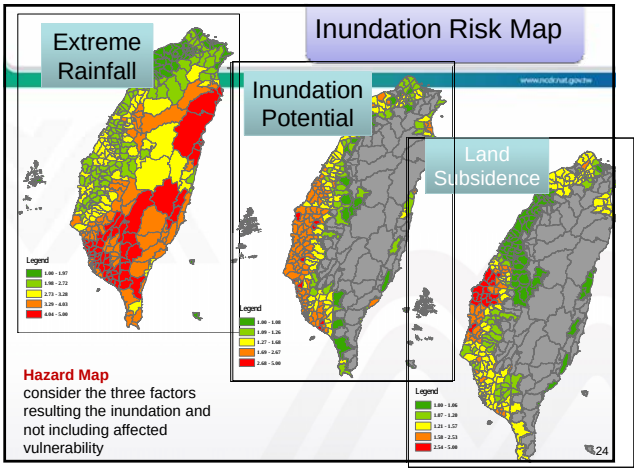
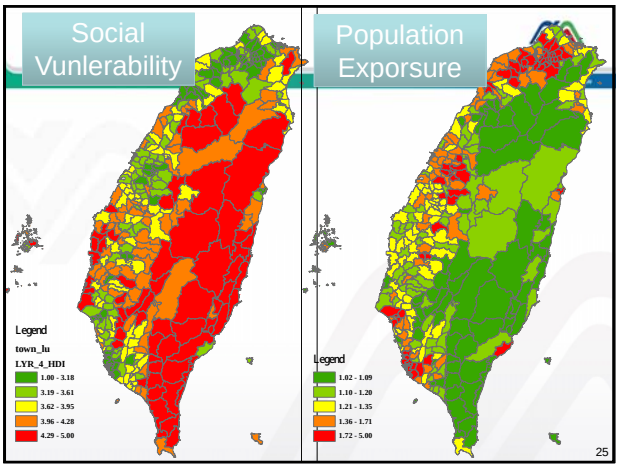
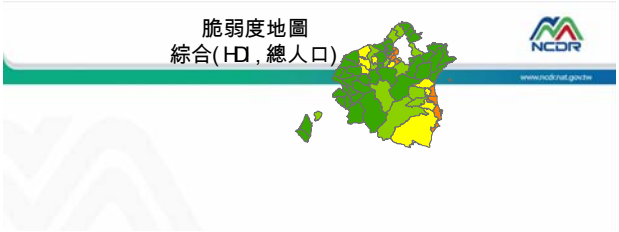
Inundation Risk Map



Hazard Map
consider the three factors resulting the inundation and not including affected vulnerability

24


Social Vunlerability
Population Exporsure
Legend
town_lu
LYR_4_HDI
1.00 - 3.18
3.19 - 3.61
3.62 - 3.95
3.96 - 4.28
4.29 - 5.00
Legend
1.02 - 1.09
1.10 - 1.20
1.21 - 1.35
1.36 - 1.71
1.72 - 5.00
25


脆弱度地圖
綜合(HDI，總人口)
NCDR

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : II.6

Flood hazard and Risk assessment in Yen Bai city: a combination of alluvial - and flash-floods

Purpose: Information
Submitted by: Viet Nam

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Flood hazard and risk assessment in Yen Bai city: a case study for riverine- and flash-floods

by

Nguyen Thi Hai Van[1], Dinand Alkema[2], Victor Jetten[2], Le Thi Chau Ha[3], Le Quoc Hung[1]

[1] Vietnam Institute of Geosciences and Mineral Resources (VIGMR)
[2] Faculty of Geoinformation and Earth Observation, University of Twente (ITC)
[3] Water Resources University (WRU)

With support of the ADB-funded GITHRA project

Da Nang, J... 11

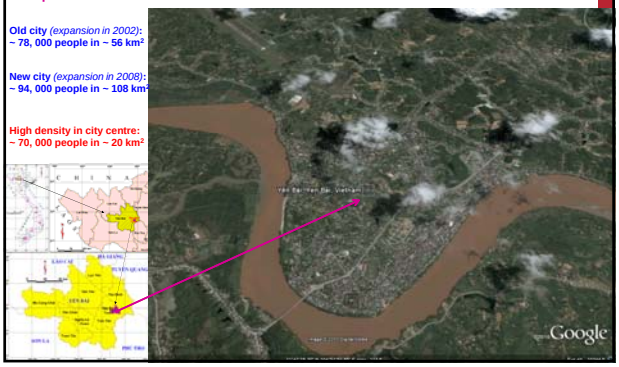
Yen Bai city

-A low mountainous urbanized area, flood plain of Red river in Northern Vietnam
- Political, economic, cultural centre of Yen Bai province
-Rapid urbanization

Old city *(expansion in 2002)*: **~ 78, 000 people in ~ 56 km²**

New city *(expansion in 2008)*: **~ 94, 000 people in ~ 108 km²**

High density in city centre: ~ 70, 000 people in ~ 20 km²



Flood hazard and risk in Yen Bai city: Why & How?

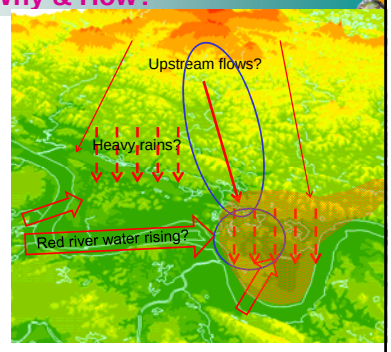
Always threatened by floods every rainy season:

-**riverine (alluvial) flood** ***from Red River ⇔ may come from other provinces (inside and outside Vietnam)***

- **urban (local) flood** ***due to heavy rain in the city and blocked drainage system***

- **flash flood** ***from torrent upstream flow of two upstream catchment***

City center: ***most prone to flood hazards ➔ High risk to flood***



8/2002	10/2003	7/2005	8/2006	10/2007	8/2008
(main causes?)					
Red river	Heavy rains&upstream flows	Heavy rains&upstream flows	Heavy rains&upstream flows	Red river	Combination

Floods: consequences

Always threatened by floods every rainy season:
-**riverine (alluvial) flood** ***from Red River***
- **urban (local) flood** ***due to heavy rain and blocked drainage system***
- **flash flood** ***from torrent upstream flow***

City center: ***most prone to flood hazards ➔ High risk to flood***

Floods on 12/7/2005 *(source: VnExpress.net)*

Floods on 19/8/2006 *(source: VnExpress.net)*

Floods: consequences

Market, school, road, farmland, houses... in Yen Bai city after Kummari typhoon on 8-9/8/2008

Flood Risk = Hazard x Vulnerability

- Flood hazard assessment:
  - What cause floods? How, when and where floods happen?

➔ *Can we predict / monitor flood hazard? prevent a flood? How?*

- Vulnerability assessment:
  - What are consequences if a flood occurs?
  - How much damage& loss can we expect?

➔ *Can we reduce the risk (damage&loss) of a flood? How?*

A disaster is a past event.
Risk is the probability of a future disaster.

Methodology

- Flood hazard assessment:
  - Flash floods from upstream: hydrological modelling.
  - Red river floods: hydraulic modelling.
- Vulnerability assessment:
  - Element at risk mapping (buildings)
  - Using local knowledge and past experiences
    - ✓ PGIS approach: mainly for 2008 flood reconstruction
    - ✓ Household samples to assess
      - the vulnerability of elements at risk (people, properties, infrastructures)
      - perception of risk, coping capacity of individual family
    - ✓ Workshops with groups of key people (representatives from flood prone areas, communal and municipal authorities

Measurements for flood hazard assessment

Flashfloods from Cuong No stream

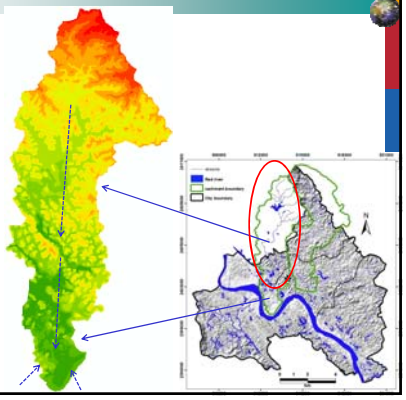
Upstream:
Flash flood

Flash flood from up- to down-stream area

City center:
- lowest land
- high population
- well-infrastructures

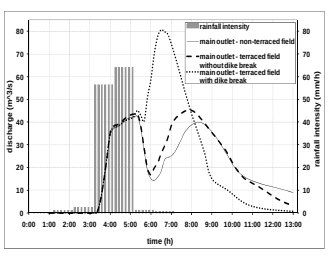
➔ ***high flood hazard and risk***

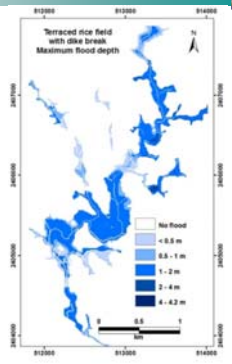
Downstream:
Red River flood



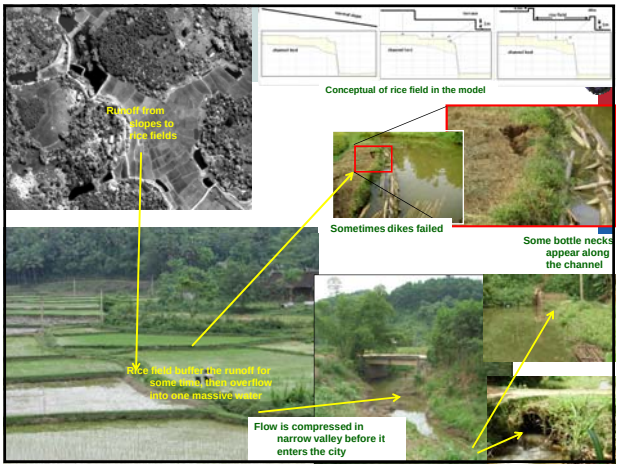
Flash flood – effect of rice paddies

The effect of rice paddy dam-breaks on the flash-floods





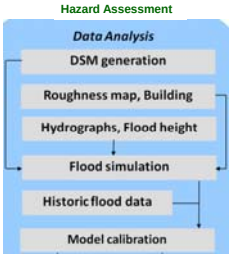
Flood depth map

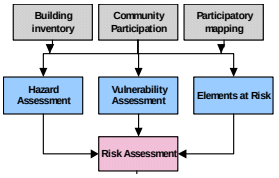


Downstream: Red river flood

Hazard assessment + Vulnerability analysis

Hazard Assessment

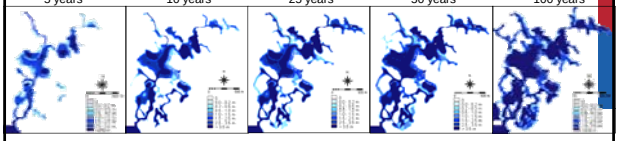




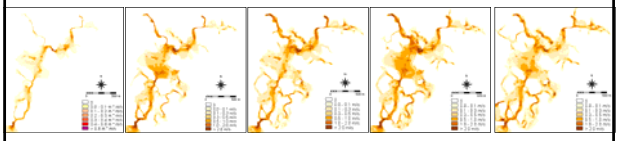
Red river flood hazard assessment

Return period scenarios for rising Red River water level

5 years | 10 years | 25 years | 50 years | 100 years



Maximum flood depth



Maximum flood velocity

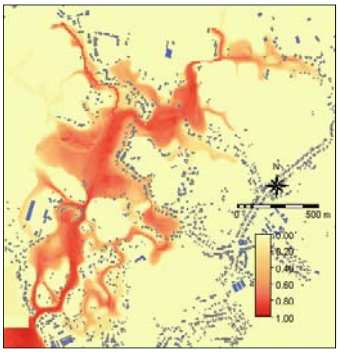
Vulnerability assessment: inhabitants

Measurment of water depth of the 2008 flood using water marks on buildings

Vulnerabillity assessment: Community involvement

2008 flood extent and depth by key people

Flood Risk



Example of a combined modelling/community based Flood risk map

Conclusion (1/2)

- Flood hazard assessment: focusing on factors that increase abnormal floods nowadays
  - Riverine and local floods: heavy rains
    - ✓ ➔ *need attention in urban planning by aithe\orities, perception of risk by local community*
  - Flash-flood: strong influence of terraced fields and local topography
    - ✓ ➔ *need attention in farming practices*

Conclusion

- Flood risk assessment for Yen Bai
  - Local knowledge is useful in a data scared environment
  - Drainage is problematic during high-intensity rains;
  - Hazard mitigation is difficult and expensive; to achieve risk reduction, vulnerability must decrease (awareness and preparedness must increase)
    - ✓ *River flood: lowland along the Red river ➔ need to re-locate dwellers to other places, or creat*
  - Hazard mitigation (e.g. dike construction) may increase the hazard elsewhere (e.g. downstream).

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : III.1

New vision and strategy for NGOs in strengthening the community's response and resilience in facing flood disaster and climate change

Purpose: Information
Submitted by: CARE International

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

An example on how various NGOs 'networks can contribute to strengthen the community's response and resilience in facing disaster and climate change in Vietnam.

Mr Eric Debert,
DRR program manager.
Presentation made on behalf of JANI

1

Disaster Management Working Group

- History: I.N.G.Os coordination of flood relief in 1999
- I.N.G.Os (CARE, Oxfam, Plan, WV, IFRC, SC, AAV etc) U.Ns (UNDP, WHO,UNICEF..) Government (DMC, PACCOM)

- Improve coordination/collaboration in emergency preparedness and responses
- Build capacity of relevant agencies & individual practitioners in disaster management.

2

Climate Change Working Group

- Since 2008- A Forum for INGOs/VNGOs to debate about climate change
- Core group and thematic groups: ABC, adaptation, mitigation, health & CC
- Mailing list: over 400 members
- Website: www.ngocentre.org.vn/ccwg

CCWG seeks to contribute to reducing the vulnerability of poor people in Vietnam to the impacts of CC

3

Joint Advocacy Network Initiative

- A project implemented by a consortium of 14 organizations coordinated by CARE
- Main donor: ECHO
- Period: 2006-2011
- 3rd phase: 15 months: Jul 2010-Sept 2011
- 4 main results and 26 activities

Increase DRM capacities through support to national programs that enable the public to better prepare for, mitigate and respond to natural disasters.

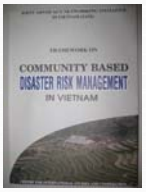
4

Main achievements of these groups

Advocacy

- Joint advocacy strategy and action plan for JANI, DMWG and CCWG
- Training package on advocacy on DRR
- Celebration of International & National DRR days
- Joint DRR/CCA/redd/mitigation advocacy messages to the Consultative Group of donors
- Policy development (NTP on climate change, Nat Strategy on CC, National program on CBDRM, MARD Action Framework on Climate Change; inputs to DRR legal reform process)
- National workshop on CBDRM & CCA
- Media tour on CBDRM and CCA
- Support to the implementation of the AADMER agreement through the ECHO-funded project of the APG (ASEAN Partnership Group)

JANI – I.E.C materials



CBDRM framework

Four-on-spots motto

Poster on Drowning prevention for children

JANI Postcard

Information leaflet on VCA

Capacity building

- ToT training on CBDRM, CC adaptation and mitigation, Emergency Preparedness, gender mainstreaming guideline in DRR.
- Joint preparedness trainings, joint assessments, joint guidelines and joint emergency operations
- Joint Contingency plan

Learning and sharing

- Study tours for JANI, DMWG, VNGO & Climate Change network and CCWG members
- Support the development of CCFSC website: www.ccfsc.gov.vn
- Knowledge sharing through: www.ngocentre.org.vn

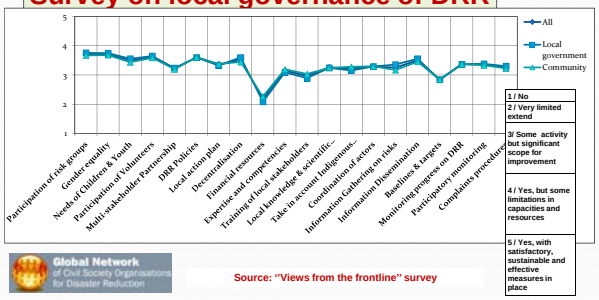
http://www.ccfsc.gov.vn

- **Knowledge management:**

- Best practice on CBDRM;
- CBDRM framework document;
- DRR/CCA mainstreaming guideline;
- Best practice and lessons learned on CBDRM in upland areas.
- Emergency Joint assessment tools

'Invest Today for a Safer Tomorrow - Increased Investment in Local Action"

Survey on local governance of DRR



Global Network of Civil Society Organisations for Disaster Reduction

Source: "Views from the frontline" survey

Support to Domestic consultation on Public-Private Partnership for Disaster Risk Reduction

Research on private sector & DRR

Support to the Implementation of Viet Nam CBDRM program

National level:

- Support to the development and implementation of the " building blocks " through the CBDRM-TWG of the CBDRM program. (T.o.T training package, M&E framework, National implementation guidelines, provincial/commune guidelines ...)
- Secondment of I.T and Communication staff to DMC
- Sharing coordination between related stakeholders in implementing CBDRM program especially between DMC, UNDP, INGOs and mass organizations (VNRD, VNWU)

Support to the Implementation of the National CBDRM program

- JANI members work with the Ministry of Education to develop extra curriculum IEC materials and teaching books to mainstream DRR and CC into the formal education system.

Provincial level:

- Early support to the provinces to roll out the CBDRM program (T. o. T trainings, workshops, development of provincial and training action plans)
- Support in establishing core trainers in CBDRM implementation in Mekong Delta and South Central region

Recommendations

- **Continue the involvement** of DMWG, CCWG, JANI and local organizations in the implementation of the CBDRM program and in the forthcoming Economy Platform on DRR and CCA.
- Strengthen the **coordination of provincial/district CFSC** to better coordinate with NGOs for identification of damage needs (DANA), CCA needs and response capacity.
- **Sound Cooperation** among relevant ministries (MARD, MONRE, etc), stakeholders to ensure synergies and effective DRR and CCA in Viet Nam
- **DRR/CCA mainstreaming** into SEDP

17

Thank you for your attention!

'Invest Today for a Safer Tomorrow - Increased Investment in Local Action"

18

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : III.2

UN new vision in cooperating and capacity building on flood management and adapting to climate change

Purpose: Information
Submitted by: United Nations Development Programme

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

United Nations in Viet Nam:
A new vision in cooperating and capacity building on flood management and adapting to climate change

Ian Wilderspin
Technical Specialist, Disaster Risk Management

FACING ABNORMAL FLOOD DISASTERS:
NEW VISION FOR APEC ECONOMIES
Da Nang, Viet Nam, July 28 – 29, 2011

An overview

… in cooperating and capacity building on flood management and adapting to climate change
Situation analysis
Challenges
Looking back – *what have we done?*
UN comparative advantages
What have we learnt?

..new vision
One UN
UNDP's support for disaster risk management
Community based disaster risk management programme
Early recovery
National Platform for disaster risk reduction and climate change adaptation

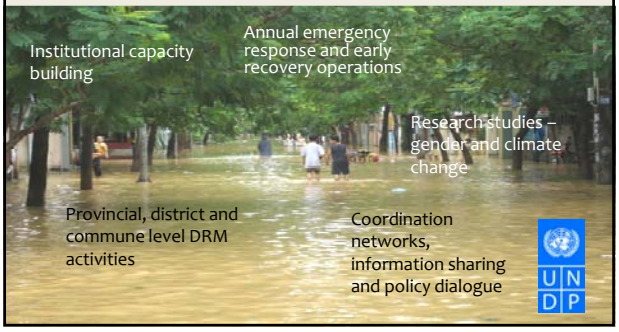
Situation analysis

- Viet Nam is a disaster prone economy
- Climate change is worsening the situation
- Vulnerable people in rural and urban settings increasingly faced with emerging hazards and other stresses
- Established institutional structures and historical experience – mainly focused on flood and storm control

Challenges

- Insufficient institutional capacity and challenges with coordination among ministries, departments and other stakeholders
- Focus mainly on infrastructure and response and less on disaster risk reduction and in addressing longer term socio-economic impacts of disasters
- Fragmented legislative framework
- Inadequate resilience of people
- Emerging hazards and other stresses – many low level insidious disasters

What have we undertaken in disaster risk management?



UN comparative advantages

- **Disaster risk management is a UN mandate** - including humanitarian response
- **Climate change** (adaptation) is a **global priority** for the UN
- The multi-lateral nature of the UN enables it to **promote international norms and standards**
- Impartial and **trusted partner;** so can address controversial and new issues
- **Convening role** - the UN can bring a broad range of DRM stakeholders together and facilitate policy dialogue
- Rich and wide ranging global **expertise** to draw upon
- Able to mobilize significant **Technical Assistance** and deliver on institutional development and system strengthening
- UN strengths on **human rights based approaches** and **gender analysis**

What lessons have we learnt?

- ✓ Advocate for a **broader disaster risk management and climate change adaptation agenda**
- ✓ **Enhance capacities for coordination, policy analysis and exchange of information and learning**
- ✓ Strengthen **methodological guidance** and **multi-disciplinary engagement**
- ✓ **Support research and capacity building to undertake research** on disaster impacts on vulnerability and poverty to help formulate evidence based policy
- ✓ **Develop partnerships**
- ✓ Increase support to **capacity development at provincial, district and commune levels**
- ✓ **Result-based management** in project implementation

Today: the UN agencies working together under One Plan..

- **UN reform** in Viet Nam - towards a harmonized approach
- **One Plan**
- **Disaster risk management** is a priority
- The **Programme Coordination Groups** and the PCG for natural disasters and emergencies

Programme Coordination Group for Natural Disasters and Emergencies

- **UN agencies working together**
- The aim is to provide **technical assistance** and added value without increased costs
- Opportunity to integrate **cross cutting issues** in a coherent and professional manner, e.g. gender equality and mainstreaming
- International **experience/information** to back up national initiatives
- Support to **MARD, MoNRE, MPI, MoH, MoET** and others

Some of UNDP's support for disaster risk management

- **Institutional development** and **capacity building initiatives**
- DRM **legislative reform – the development of a Law on Disaster Risk Management**
- **National guidelines for emergency response and early recovery**
- **Disaster and needs assessment** tools and methodology
- Central level and three provincial level **DRM Centres**
- Interim review of **Hyogo Framework for Action**

UNDP's proposed support for disaster risk management

- Continued **institutional development** and **capacity building** of the Central Committee for Flood and Storm Control at national and sub-national levels
- Prioritise the development of the the **Law on Disaster Risk Management** – wide stakeholder engagement
- Support to the GoV implementation of the **Community based disaster risk management programme** – the CBDRM Technical Working Group
- Establish and support the development the **National Platform** - to strengthen **cooperation** among various disaster risk reduction and climate change adaptation stakeholders through information exchange and increased policy dialogue

UNDP's proposed support for disaster risk management

- Review of implementation of the **National Strategy**
- Work towards integration of **community based approaches to disaster risk reduction** and **climate change** into **socio-economic development** plans at sub- and national levels
- Explore further **synergies** and **partnerships** between the GoV with I/NGOs, Mass Organizations, the UN and other bodies
- Develop an **early recovery network** and promote increased understanding of early recovery
- Undertake **applied research:**
  - o **climate change** and consequent DRM programming
  - o impact of climate change on **migration**, evacuation and resettlement
  - o **poverty, vulnerability and disaster risk reduction**

Community awareness raising and community based disaster risk management

Component I: strengthening capacity for managing and implementing CBDRM

Legal documentation
CBDRM training, materials and courses
Equipping agencies and authorities
Upgrading, improving and building **offices** at provincial levels and in cities

Component II: improving communication and education, enhancing the capacity of the community in DRM

Implementing group for CBDRM
Hazard, vulnerability and capacity mapping and updating
Community based DRM plans
Development plans that incorporate disaster risk reduction
DRM handbook for community
Simulation exercises
Early warning communication
Small scale disaster mitigation works in communities
M&E

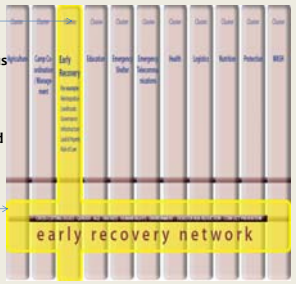
An early recovery network versus a cluster

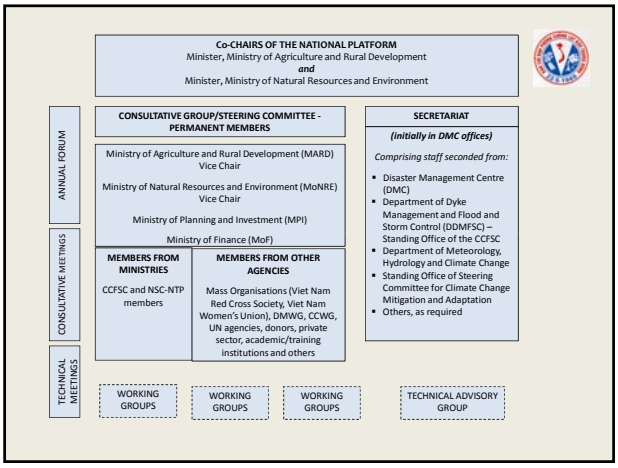
An important distinction:

A network: coordinates early recovery activities across the various clusters

A cluster: intervenes with early recovery issues that are not covered in any other cluster

The network approach is the model that the international humanitarian community is generally moving towards

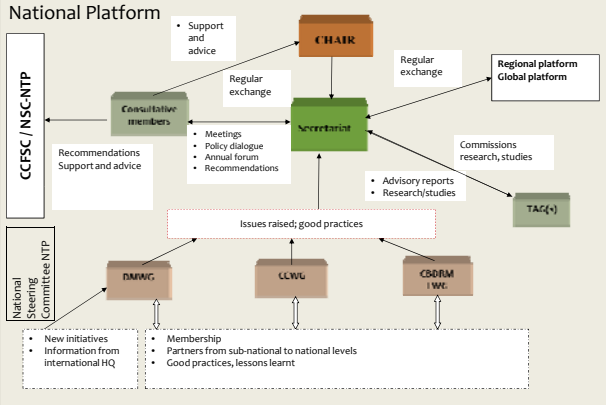




What will be the structure of the National Platform in Viet Nam?

- The **Ministers of MARD and MoNRE** will **co-chair** the National Platform
- The will Leaders from MARD and MoNRE will act as Vice-chairs of the **Consultative Group** (or Steering Committee), who will manage the National Platform through a Secretariat
- The Platform will be established **based on the existing organizations** that have been working in the field of disaster risk reduction and climate change adaptation: the Central Committee for Flood and Storm Control, the National Steering Committee for the National Target Program and non-Government networks
- **Members** will include: Government ministries, Mass Organizations, donors, UN agencies, I/NGOs, Red Cross societies, academic institutions, regional/international organizations, media and private sector representatives as well as other stakeholders involved in disaster risk reduction and climate change adaptation in the economy
- A **Secretariat** will be set-up comprised of staff seconded from departments within MARD, MoNRE and other ministries
- **Technical Working Groups** will be established for focused discussion and activities on a particular themes (e.g. CBDRM, disaster risk reduction and climate change adaptation in education, etc.)
- A **Technical Advisory Group** - comprised of specialists/experts from the academic institutions, Red Cross, INGOs, UN and others will be established to provide advice to the steering committee and the Technical Working Groups

Flow diagram to illustrate the mechanism of operation of the National Platform



Thank you for your kind attention!

For further details visit our website:

http://www.undp.org.vn
or
http://www.ccfsc.gov.vn

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : III.3

APEC cooperation in natural disaster response – Challenges and Ways Forward

Purpose: Information
Submitted by: Indonesia

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

APEC Workshop on Facing the Abnormal Flood: New Vision for APEC Member Economies

Da Nang, Viet Nam, 28-29 July 2011

APEC COOPERATION IN NATURAL DISASTER RESPONSE – CHALLENGES AND WAYS FORWARD

DEDE A. RIFAI
ACTING DEPUTY DIRECTOR FOR APEC

DIRECTORATE OF INTRA REGIONAL COOPERATION IN ASIA, PACIFIC AND AFRICA
MINISTRY OF FOREIGN AFFAIRS OF INDONESIA

OUTLINE

I. **APEC Cooperation in the Natural Disaster Response.**

II. **Challenges of APEC Cooperation in the Natural Disaster Response.**

III. **Ways Forward of APEC Cooperation in the Natural Disaster Response.**

INTRODUCTION

Due to the natural disaster, the Asia-Pacific region has suffered a lot of the economic losses. The Asia-Pacific region experiences over 70 percent of the world's natural disasters. A number of these events have had trans-boundary impacts and have required regional responses. With the climate change, natural disaster may increase in severity and frequency.

Natural disasters in the region - such as the 2004 Indian Ocean Tsunami, the 2008 earthquake in China, the 2010 earthquake in Chile, and the 2011 earthquakes in New Zealand and Japan - have encouraged APEC to further promote cooperation in the natural disaster management (prevention/mitigation, preparedness, response and recovery).

I. APEC Cooperation in the Natural Disaster Response

- APEC in 2005 established APEC's Task Force for Emergency Preparedness (TFEP), originally called Virtual Task Force for Emergency Preparedness. The TFEP, carrying out much of its work via electronic communications, had mandate to coordinate and facilitate emergency and disaster preparedness within APEC.

- Recognizing the importance of its work, in 2010 the TFEP was upgraded its status to a permanent Emergency Preparedness Working Group (EPWG).

The goals and objectives of EPWG:

To improve coordination and enhance intra-APEC cooperation and integration of natural disaster preparedness efforts in APEC, including by fostering research and collaboration, sharing knowledge, lessons learnt and best practice to better protect business, trade and economic growth and communities in the Asia Pacific region from disruptions related to natural disasters.

To build capacity in the region so that APEC members can better mitigate, prepare for, respond to and recover from natural disasters, including by building business and community resilience and fostering private-public partnerships to protect business, trade and economic growth and communities from disruption.

Key Achievements of EPWG

- Development of EPWG Medium-term Work Plan;
- Workshop on Public-Private for disaster resilience;
- Seminar on integrating disaster risk reduction into disaster recovery;
- APEC Emergency Management CEO Forum;
- Senior Disaster Management Officials Forum.

Joint Activities and Programs to Strengthen Cooperation in Natural Disaster Response:

- Projects to improve capacity building in natural disaster response through training courses, exchange of personnel, seminars and trade exhibitions;
- Improved access to information in natural disaster response through development of an internet website to facilitate information exchange;
- Sharing of best practice information on advance monitoring systems and legislative frameworks;
- Ongoing dialogue with relevant international, regional and sub-regional organizations to maximize use of existing activities and avoid duplication of effort;
- Engaging with local communities, including volunteer emergency response organizations, scientific research institutions, and businesses.

Disaster Response Coordination

- Varied coordinating platforms for preparedness between disaster management authorities:

  - Under a government body, like Department of Homeland Security (USA), Department of Internal Affairs (New Zealand), Federal Attorney General's Department (Australia), Ministry of Home Affairs (Brunei, Singapore), Ministry of the Interior (Chile, Mexico), and Prime Minister's Department (Malaysia).
  - Inter-agency coordinating body (ad-hoc) such as China, Chinese Taipei, HK China, Japan, Peru, Republic of Korea, and Vietnam.
  - A single national authority responsible for disaster management (Canada and Indonesia).

II. Challenges of APEC Cooperation in the Natural Disaster Response

- APEC diversity
- Lack of consensus
- Failure to engage with civil society
- Failure to extend meaningful help or cooperation to its members in a time of natural disaster
- Limited fund
- Less effective organization

Specific Challenges in Five Main Areas:

1. Governance: organizational, legal and policy frameworks;
2. Risk identification, assessment, monitoring and early warning;
3. Knowledge management and education;
4. Reducing underlying risk factors;
5. Preparedness for effective response and recovery.

III. Ways Forward of APEC Cooperation in Natural Disaster Response

1. Transforming the Emergency Preparedness Working Group (EPWG) into the Disaster Management Working Group (DMWG) – long term goal;

2. Improving coordination and enhancing intra-APEC cooperation, such as between EPWG and:

- Telecommunication & Information Working Group (TELWG) – to enhance efficient domestic and international communication for natural disaster response and recovery.

- Tourism Working Group (TWG) – to ensure that tourists and the tourism industry are prepared against natural disaster.

- Small and Medium Enterprises Working Group (SMEWG) and Industrial, Scientific and Technology Working Group (ISTWG) – To gain widespread access to knowledge about industrial science and technology related to natural disaster for facilitating SME.

3. Enhancing cooperation with other forum dealing with natural disaster response in the Asia Pacific region, such ASEAN Regional Forum and East Asian Summit;

4. Engaging Multi National Companies (MNCs) and reminding MNCs on risks that affect economies in which they invest, or from which they receive goods and services;

5. Formalizing Public-Private Partnerships (PPP)
   - The private sector is often willing to assist, but it is preferable to formalize a relationship between governments and businesses;

6. Facilitating the deployment of APEC Humanitarian Missions for Disaster Relief.

7. More empowering local communities.

- Self-help is a significant component of emergency preparedness;
- Local communities should develop a culture of preparedness; and
- Local communities need to be made aware of the risks they face, how best to prepare, and what can be done in response to natural disasters.

****

THANK YOU

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : III.4

Enhancing APEC cooperation in abnormal flood preparedness and response

Purpose: Information
Submitted by: Viet Nam

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

APEC WORKSHOP
ON FACING ABNORMAL FLOOD DISASTERS :
NEW VISION FOR APEC MEMBER ECONOMIES
(29th July 2011, Da Nang, Viet Nam)

Enhancing APEC Cooperation
in Abnormal Flood Preparedness and Response

by Mrs. Nguyen Nguyet Nga,
DG of the Department of Multilateral Economic Cooperation
of the Ministry of Foreign Affairs of Viet Nam

Emergency preparedness – a key priority of APEC

- Asia-Pacific region comprises: 52% of the earth's surface area, 59% of the world's population, 70 percent of the world's natural disasters.
- Human security and emergency preparedness: key priority of APEC.
- Various projects and programs were implemented by the Emergency Preparedness Task Force.
- The setup of the APEC Emergency Preparedness Working Group in 2010, the *APEC-wide Strategy for Disaster Risk Reduction and Emergency Preparedness and Response in 2009 – 2015*.

Why stronger and more concerted actions by APEC are needed?

- Evolving global architecture
- APEC: reform, efficiency, human security
- More devastating natural disasters and abnormal floods in our region
- The increasing intensity, frequency of disasters in the region and the scope of their impact in the decades ahead.
- The situation will be exacerbated by unplanned urbanization, poor land-use management and climate change.

Suggestions

1. To set up ***APEC Network of Flood Management*** with the participation of experts, agencies and institutes concerned.
2. To work on ***APEC Best Practices on Emergency Preparedness including flood management .***
3. To encourage ***private sector engagement*** in APEC efforts in flood management.
4. To set up a ***support fund for emergency preparedness and disasters response*** (like the APEC fund for combating avian influenza).
5. To ensure ***better and closer coordination between APEC and regional and international institutions***.

THANK YOU!

Asia-Pacific
Economic Cooperation

EPWG 01 2011A
Agenda Item : III.5

Proposal for International Cooperation on Water-related Disasters

Purpose: Information
Submitted by: Japan

Workshop on Facing Abnormal Flood Disaster:
New vision for APEC member economies
Da Nang, Viet Nam
28 – 29 July, 2011

Facilitating Global Discussion on Water and Disaster

What is happening around the world?
How can we confront unprecedented water-related disasters?

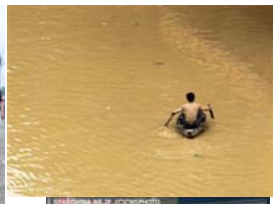
APEC Workshop on Facing the Abnormal Flood Disaster:
New vision for APEC member economies

July 29, 2011
Da Nang, Viet Nam

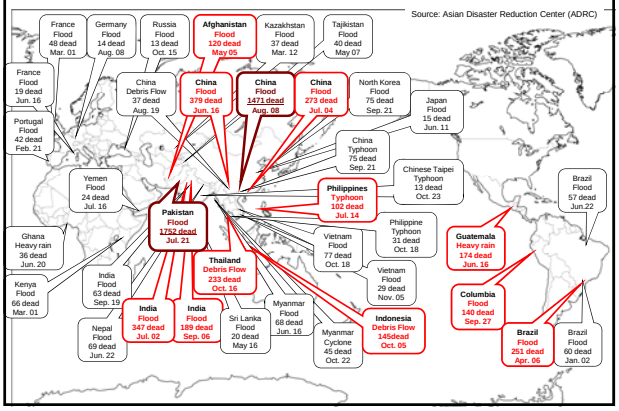
Tomoo Inoue
Director for Water Management Coordination,
Water and Disaster Management Bureau,
Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
Japan

Flood Disaster in Pakistan (August, 2010)

Flood Disaster in China (June - July - August, 2010)

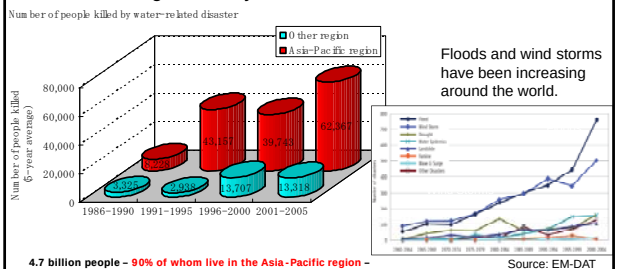


Major Water-Related Disasters in 2010



Asia-Pacific Water Forum

Asia-Pacific region is very vulnerable to Water-related Disasters.



Floods and wind storms have been increasing around the world.

4.7 billion people – 90% of whom live in the Asia-Pacific region – were affected by water-related disasters from 1980 to 2006.

Source: EM-DAT

Asia-Pacific region is easily affected by climate changes.
Adaptation to climate change is needed immediately
especially for large-scale deltas, small islands, coastal areas and Himalayan region.

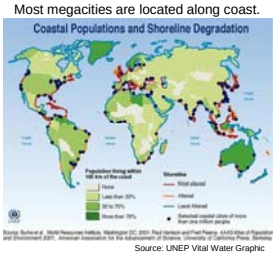
Flood Disaster in Australia (January, 2011)

Flood Disaster in Brazil (January, 2011)

Flood Disaster in South Africa (January, 2011)

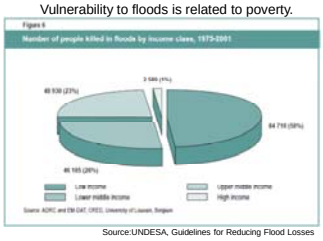
Distribution of Vulnerability to Floods

Most megacities are located along coast.



Source: UNEP Vital Water Graphic

Vulnerability to floods is related to poverty.



Source:UNDESA, Guidelines for Reducing Flood Losses

Prioritization to flood disaster management is crucial for sustainable development.

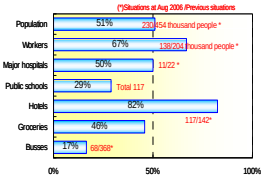
Disaster by Hurricane Katrina in the USA (August, 2005)

The flooded area at the metropolitan of New Orleans

The flushed houses and household effects

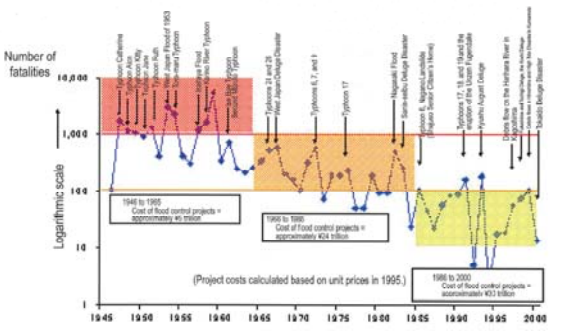
Situation at New Orleans (a year later)

Population decreased to approx. 51% .
Workers decreased by approx. 33% .
Approx. 70% of public schools were closing.
Approx. 80% of public houses were closing.



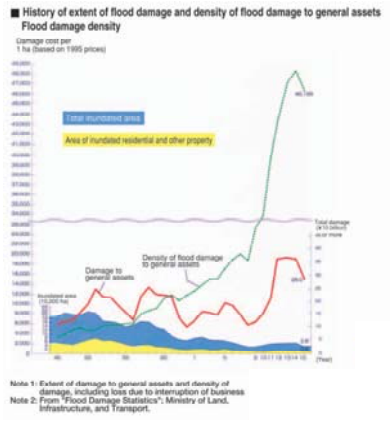
The disaster caused long-term stagnation of economic activities and battered economy.

Experiences of flood disaster management in Japan



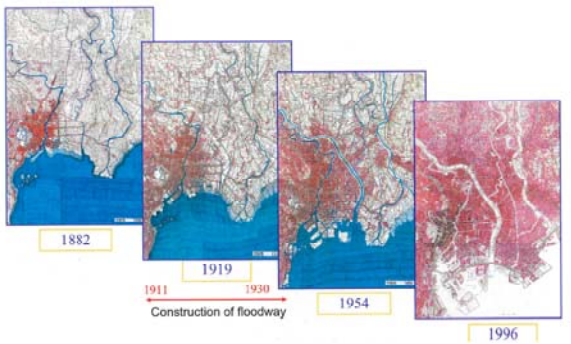
© Ministry of Land, Infrastructure, Transport and Tourism, Japan

The number of fatalities has been dramatically decreased in Japan due to continuous investment in and efforts for flood mitigation.



Note 1: Extent of damage to general assets and density of damage, including loss due to interruption of business
Note 2: From "Flood Damage Statistics"; Ministry of Land, Infrastructure, and Transport.

Tokyo area has been rapidly developed due to the improvement of safety against floods.



Sustainable Development through Water-related Disaster Risk Reduction

(Ultimate Goal) Sustainable Development

Breaking vicious cycles of poverty — Adapting to climate change intensified

International community resilient to water-related disasters

Green Growth
Low carbon cities with safety

Ensuring Safety
Continuous efforts for DRR

(Future) Continuous efforts for preventive measures against water-related disasters

Water-related DRR into development planning — Continuous investments in preventive measures

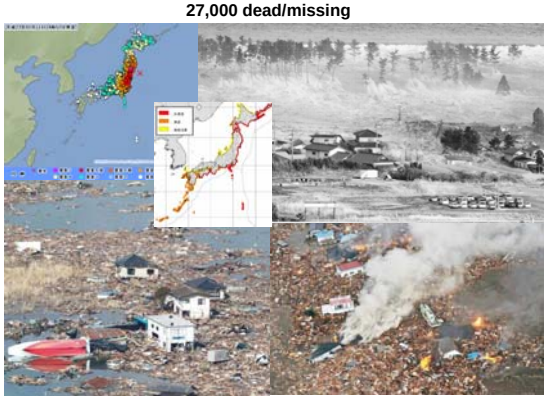
1. Creating common understanding among the UN member states
2. Raising public awareness raising and promoting media coverage
3. Evidencing effectiveness of investments on preventive measures
4. Monitoring and evaluating actions taken according to Action Plan
5. Enabling the government to implement water-related DRR planning
6. Providing information and guidelines for water-related DRR

(Present) Water-related disasters that are likely to happen repeatedly

Residence of the poor in vulnerable areas — Disaster relief as humanitarian affairs

Tsunami Disaster in Japan (March 11, 2011)

27,000 dead/missing

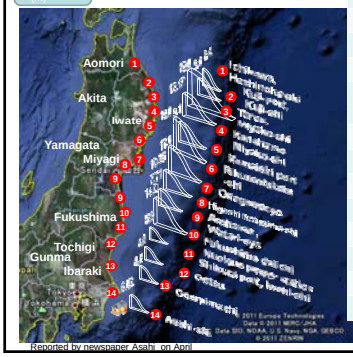


Damage of Great earthquake and Tsunami in East Japan

At April 21st 2011

Height of Tsunami (m)

Tsunami arrival time
Oohunato port 22min (maximum height).
Miyako 40min (maximum height)



Prefecture	Casualties	Missing
Hokkaido	1	0
Aomori	3	1
Iwate	4,078	3,598
Miyagi	8,586	7,732
Fukushima	1,432	1,835
Ibaraki	23	1
Chiba	18	2
Yamagata	2	0
Gunma	1	0
Tochigi	4	0
Kanagawa	4	0
Tokyo	7	0
Total	14,159	13,169

Reported by newspaper Asahi on April

International Solidarity on Emergency Rescue

Draft Roadmap on 'Water and Disaster'

Inadequate actions against mega disasters with low frequency

Gradually invading climate change effects

Mega disasters beyond designed levels

Droughts (China,..), Floods (Pakistan,..), Tsunamis (Japan,..), Earthquakes (Haiti,..)

Catastrophic damages not to be recovered in the short-term

(Water-related disasters

Effects widely through inter-connected international community

Sep. 2011 ICFM5 in Tokyo

Feb. 2012 Asia-Pacific Water Summit in Bangkok

Lessons learned on water-related disasters

Mar. 2012 World Water Forum in Marseille

= Enhance of preventive measures rather than responsive measures

Jun. 2012 Rio+20 in Rio de Janeiro

= Disaster risk reduction as the key for sustainable development

Summer 2012 Conf. on mega natural disasters in JP

= Continuous investments in prevention

Autumn 2012 Annual Meeting of WB & IMF in JP

2015 UN World Conf. on Disaster Management in JP

MDGs Review

Hyogo Framework for Action Review

Urgent Message on the Great Earthquake and Tsunami Disaster in East Japan

Date: April 27th through 28th, 2011
Venue: JICA Research Institute, Ichigaya, Tokyo
Organizers: High-level Expert Panel on Water and Disaster (HLEP/UNSGAB) and JICA with WWC
Chair: Dr. Han Seung-soo, Former Prime Minister, the Republic of Korea

i. The United Nations should hold a Special Session, or at least a Plenary Session on water and disaster, to discuss mitigation and preparedness actions against large-scale disasters learning from past disasters including the one in Japan.
It should also establish a UN mechanism to ensure regular dialogue and actions in order to globally share experiences and lessons and develop effective counter measures to mitigate mega disasters.

Note) Above is related to the HLEP's request (c) and (d).

ii. OECD, the World Bank and international economic institutions addressing global economy should study and monitor effects of mega-disasters to global regional and national economy and discuss measures to minimize them as well as effective paths for quick recovery.

Note) Above is related to the HLEP's request (b).

iii. Regional bodies, including UN Regional Commissions and regional development banks should establish mechanisms for regional cooperation to ensure concerted disaster response.
Collaborative actions such as joint drills will help smooth deployment of activities in emergent environment as we are entering into new era when international cooperation is a norm in responding to large-scale disasters.
Report to Rio+20 should include issue of water and disaster as its important element of sustainable development.

Note) Above is related to the HLEP's request (b).

iv. International community together with Japan should make efforts to ensure smooth, timely circulation of correct and detailed information.
Japan is requested to make use of its overseas arms to share information and experience of the disaster.
In particular, JICA is expected to play an important role to share such experience and knowledge with the other countries using networks so far established, and to reflect these lessons to its future ODA actions.
HLEP will support these actions in a concrete manner and urge international community to do the same.