RESEARCH NETWORKS ON COSTAL DISASTERS

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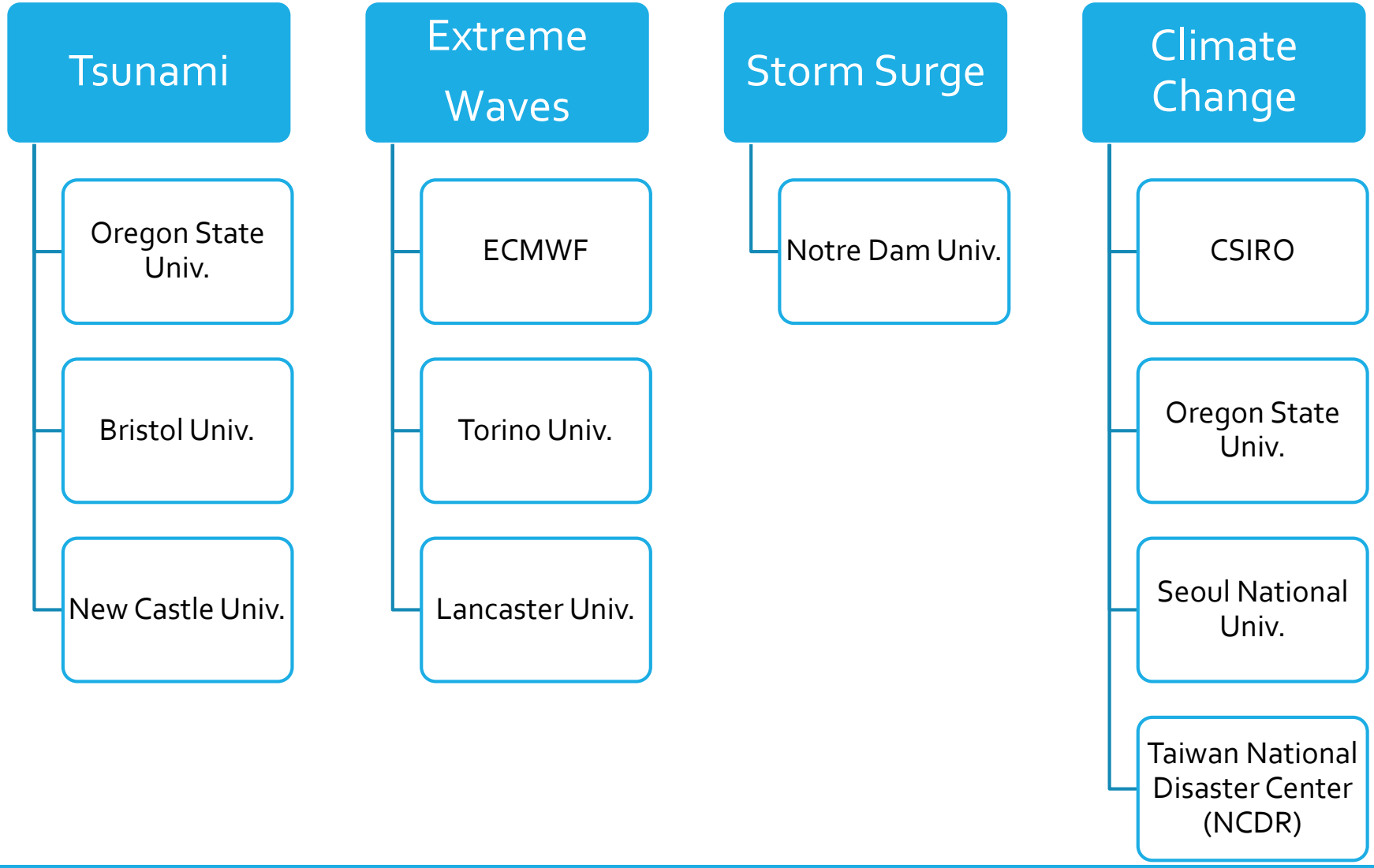
Coastal Related Disasters

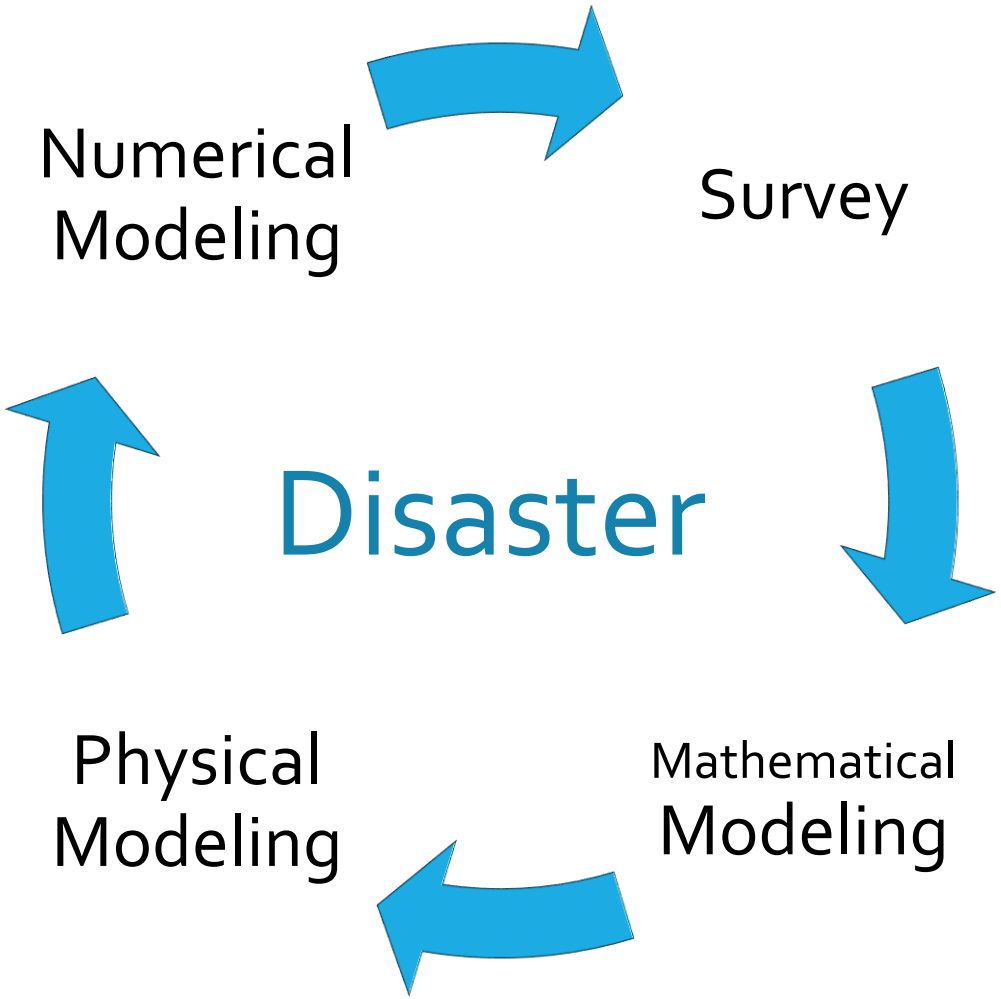
- Earthquake/Landslide
  - ✓ Tsunami
- Tropical cyclone/ Storm
  - ✓ Extreme waves, storm surge

- Inundation, structure failure, beach erosion and etc

DPRI International Network on Coastal Research



Is Research Collaborations Necessary?



Rare Event

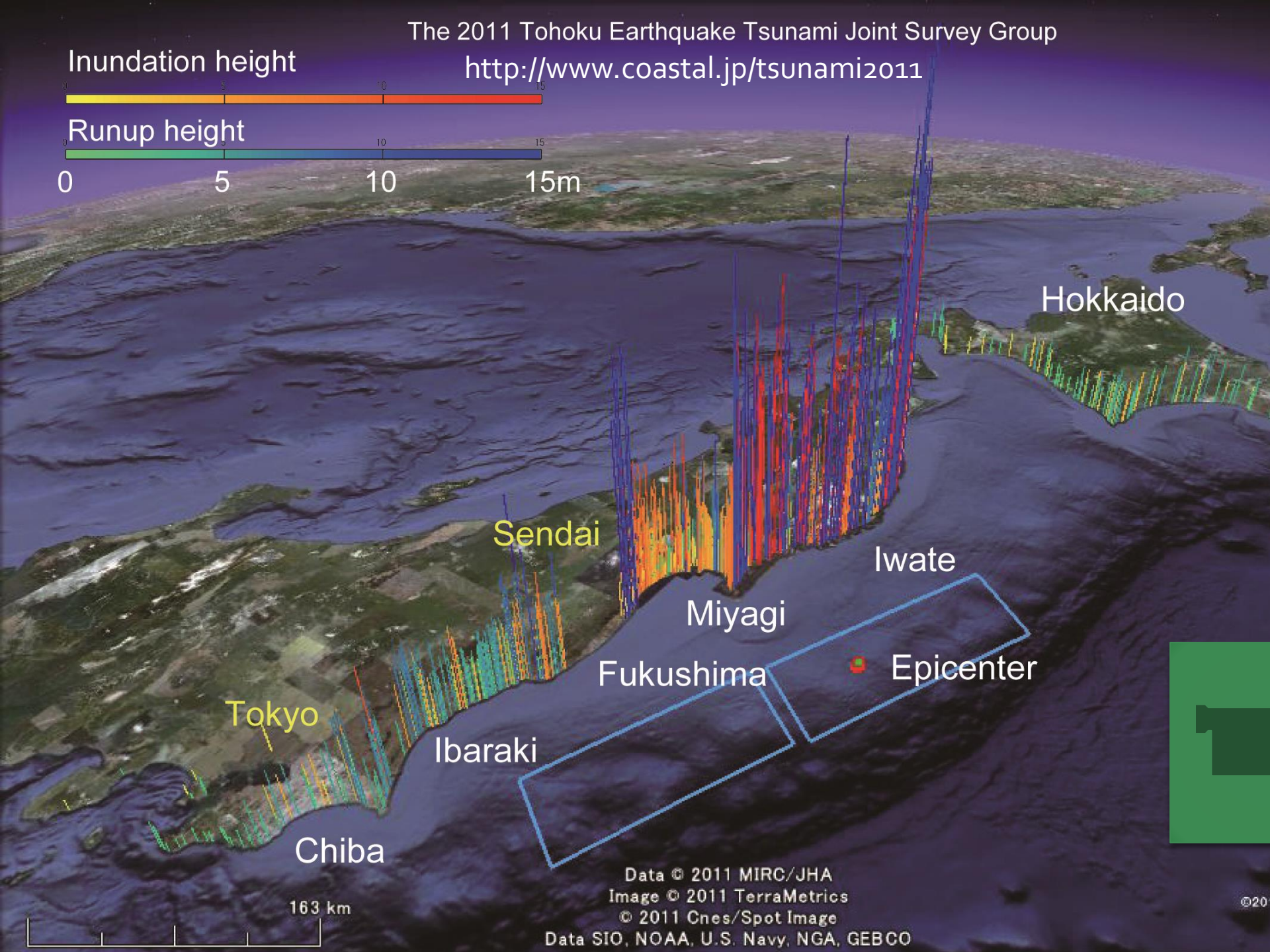
- Collaboration of survey
- Sharing data
- Sharing knowledge

Example

The 2011 Tohoku Earthquake Tsunami Joint Survey

http://www.coastal.jp/tsunami2011

- Autonomous Inter-Academic Society Group
- Members
  - ✓Tsunami, Coastal Engineers, Physical Oceanographer and etc
  - ✓64 Research Institutes and Universities + Central and local government
  - ✓300 participants
  - ✓Secretary Office DPRI-KU and Kansai University
- Activities
  - ✓Coordinate of survey area, organization of survey teams
  - ✓Making survey data set for public
- International collaboration
  - ✓ASCE, IOC and other agencies


The 2011 Tohoku Earthquake Tsunami Joint Survey Group
http://www.coastal.jp/tsunami2011
Inundation height
Runup height
0
5
10
15m
Hokkaido
Sendai
Iwate
Miyagi
Fukushima
Epicenter
Tokyo
Ibaraki
Chiba
163 km
Data © 2011 MIRC/JHA
Image © 2011 TerraMetrics
© 2011 Cnes/Spot Image
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Outcome

- Short-term
  - ✓Understanding tsunami behavior on landside
  - ✓Improvement of tsunami modeling
- Long-term
  - ✓International research collaborations
  - ✓Funding and etc

- Wide range of natural disaster cooperation platform is necessary

International Forum on Research Institutes for Disaster Risk Reduction

Uji Campus, DPRI, Kyoto University
March 11-13, 2013

Research Networks & BRGM

The French Geological Survey

Dr. Evelyne FOERSTER
Deputy Director of Risks & Prevention Division

- Geology
- Mineral resources
- Geothermal energy
- Geological storage of CO_2
- Water
- Post-mining
- Risks
- Polluted soils and waste
- Metrology
- Information systems

Geoscience for a sustainable Earth
brgm

As the France's leading public institution in Earth Sciences applications related to surface and underground resources and risks,

BRGM is actively involved in a number of research networks related to Disaster Risk Reduction at national and international levels:

- ***Prevention of natural (geological or climate-related) and environmental (pollutions, …) risks,***
- ***Development of public policy responses to climate change.***

Géosciences pour une Terre durable
brgm

National Research and Innovation Strategy

French National Alliances for research coordination

Main missions:

- To define priorities for research programming process at national level
- To strengthen collaborations between research & academic institutes and economic actors mainly on innovation and transfer issues

As a member of two of the 4 thematic Alliances, BRGM is involved in the development of France's research policy:

AllEnvi: for Environment

- **Climate** (evolution, adaptation, observation, impact)
- **Risks** (environmental, natural and eco-toxicological)
- **Water** (resources & use)
- **Sea** (sciences and marine resources)
- **Eco-technologies** and green chemicals
- **Infrastructures, observation systems and platforms**…

ANCRE: for Energy

- **Fossils and geothermal energy**
- **Buildings**

BRGM is involved in various Working Groups

Research Networks

The Carnot Institutes

A multidisciplinary research network bringing public research closer to the economic world and favoring company innovation (French National Research Agency)

The **Carnot Environment Alliance** is a partnership research offer, serving eco-companies and local authorities to:

- **Manage risks and measure impacts**
- Reduce environmental impacts
- Save energy
- Reduce greenhouse gas emissions…

⇒ ***CAPTIVEN project:***

Environmental quality sensors and data on water and soils (platforms)

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ANR

brgm

Risks and Prevention Division

8 EXCHANGES DPRI-BRGM

5 stays of BRGM's researchers at DPRI

3 stays of DPRI's researchers at BRGM

Supported by

INSTITUT CARNOT brgm

文部科学省 MEXT

Research Networks
Tools for Geoscience communities

National investments for the future:

Institute for high level research on decarbonated energies:

- Risks reduction and safety issues related to CO2 underground storage (GEODENERGIES)

Laboratories of Excellence:

- Clervolc (volcanic risks)

Transnational collaborations:

ANR Bilateral Joint Calls:

- Concepts, Tools and Systems for Global Security and Inter-Carnot Fraunhofer Programme (BMBF, Germany)
- Flash call for proposals "Great Tohoku Earthquake“ (JST, Japan)

Risks and Prevention Division

8 EXCHANGES DPRI-BRGM

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3 stays of DPRI's researchers at BRGM

Supported by

Research Networks

BRGM in the French research: recent ANR projects

CASAVA	Volcanic hazards, scenarios, and risks in the Lesser Antilles – implications for decision-making, crisis management, and pragmatic development
BELLE-PLAINE	Study of liquefiable soils in natural conditions ; pilot borehole site and predictive (numerical / experimental) models (Guadeloupe)
DEBATE	Development of Broadband Acceleration Time-histories for Engineers
DYNTOHOKU	Dynamics of the 2011 Tohoku earthquake: from long term stress accumulation to asperities
EVSIM	Seismic vulnerability of masonry buildings: a mechanical approach
ONAMAZU	Quantitative assessment of nonlinear soil response during the great Tohoku earthquake
SEISMULATOR	Seismic simulation in complex source-site context
URBASIS	Urban Seismology: seismic vulnerability and damages assessment using innovative methods
CECILE	Coastal environmental changes: impact of sea level rise
MISEEVA	Marine inundation hazard exposure modeling and social, economic and environmental vulnerability assessment
VULSACO	Vulnerability of coastal systems faced to climate change and human pressures
SAMCO	Society adaptation for coping with mountain risks in a global changes context
SISCA	Integrated Early Warning System of Landslide Crises
D2SOU	Considering soil and subsoil as sustainable criterion for land use planning
EM-HONTOMIN	CSEM/electric methods for the monitoring of CO2 and application to the Hontomin pilot site (Spain)
FISIC	Faults and induced seismicity under CO2 injection conditions
BIO-PHY	Process optimization of bio-clean-up of contaminated groundwater by hydrocarbon by a geophysical monitoring and gas analysis
DSS_EVAC	Decision Support System for Large-Scale Evacuation Logistics

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Risks and Prevention Division

24 ANR* PROJECTS

12 as coordinator

***ANR: French National Research Agency**

Research Networks

A strong European involvement of BRGM (e.g. FP7)

NEMOH	Numerical, Experimental and stochastic Modelling of volcanic processes and Hazard: an Initial Training Network for the next generation of European Volcanologists
MedSuv	MEDiterranean SUpersite Volcanoes
Mia-Vita brgm	Mitigate and Assess risk from Volcanic Impact on Terrain and human Activities
MarSite	New Directions in Seismic Hazard Assessment through focused Earth Observation in the Marmara Supersite
PERPETUATE	Performance-based approach to the earthquake protection of cultural heritage in European and Mediterranean countries
REAKT	Real-time earthquake risk reduction
SHARE	Seismic Hazard Harmonization in Europe
Syner-G	Systemic seismic vulnerability and risk analysis for buildings, lifeline networks and infrastructures safety gain
Mi-Core	Morphological Impacts and Coastal Risks induced by Extreme storm Events
THESEUS	Innovative technologies for safer European coasts in a changing climate
ENSURE brgm	Enhancing resilience of communities and territories facing natural and na-tech hazards
MOVE	Methods for the improvement of vulnerability assessment in Europe
MATRIX	New multi-hazard and multi-risk assessment methods for Europe
SafeLand	Living with landslide risk in Europe: assessment, effects of global change and risk management strategies
DigiSoil brgm	An integrated system of data collection technologies for mapping soil properties

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Risks and Prevention Division

18 FP7* PROJECTS

3 as coordinator

***FP7 : 7th Framework Program (Europe)**

IRDR
Integrated Research on Disaster Risk

Integrated Research on Disaster Risk (IRDR): an example of collaborative & policy-oriented research

Symposium on Collaborative Research & Education in Safety & Security Areas
International Forum on Research Institutes for Disaster Risk Reduction
Disaster Prevention Research Institute - DPRI, Uji Campus
Kyoto University, 11-13 March 2013

Sálvano Briceño
Vice-Chair, Science Committee
IRDR (ICSU/ISSC/UNISDR)
www.irdrinternational.org

ICSU
International Council for Science
Integrated Research on Disaster Risk

ISDR

ISSC
international social science council

Significant natural catastrophes 1980 - 2011

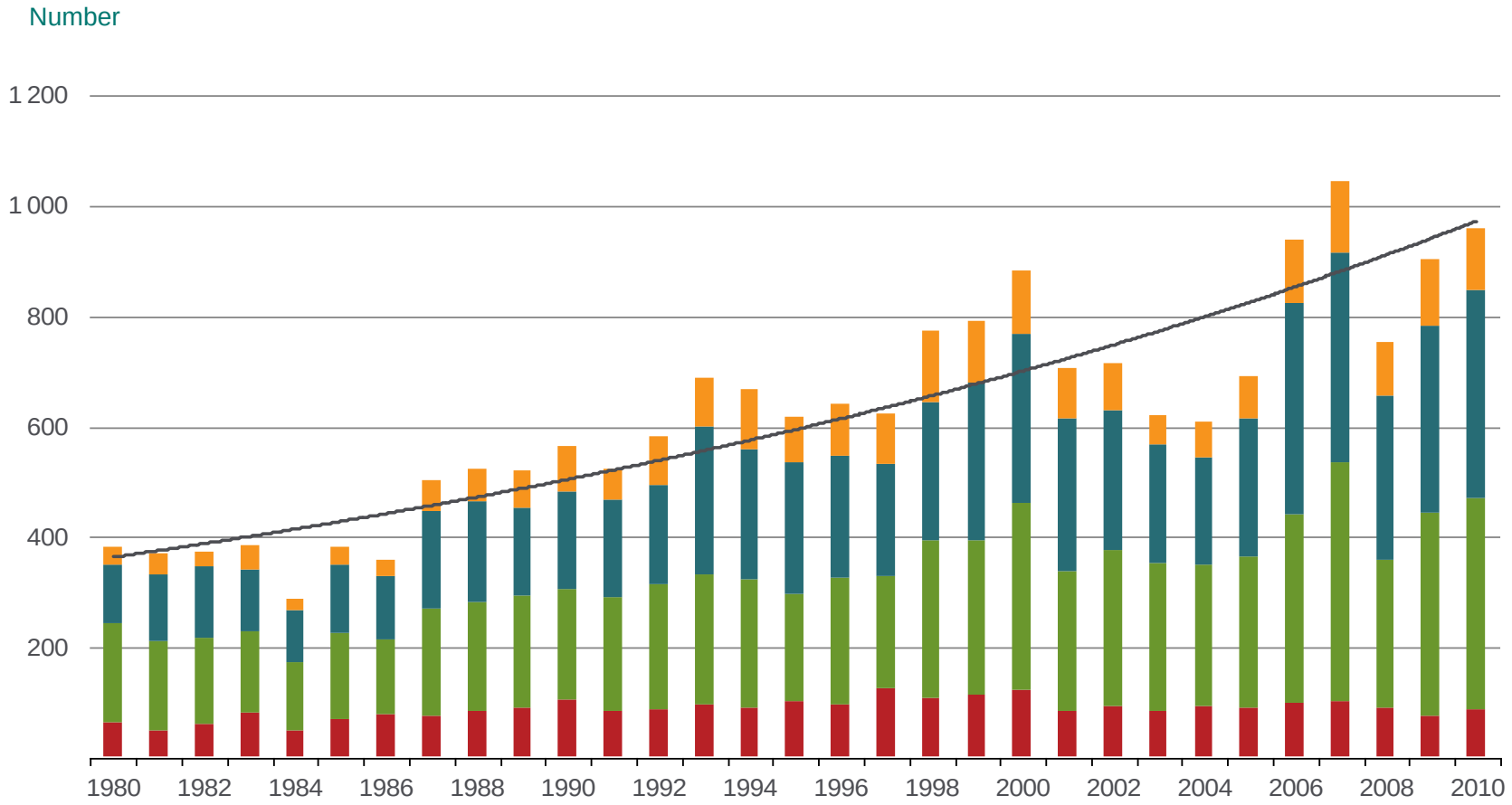
10 costliest events worldwide ordered by overall losses

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
11.3.2011	Earthquake, tsunami	Japan: Honshu, Aomori, Tohoku; Miyagi, Sendai; Fukushima, Mito; Ibaraki; Tochigi, Utsunomiya	210,000	35,000-40,000	15,840
25-30.8.2005	Hurricane Katrina, storm surge	USA: LA, New Orleans, Slidell; MS, Biloxi, Pascagoula, Waveland, Gulfport	125,000	62,200	1,322
17.1.1995	Earthquake	Japan: Hyogo, Kobe, Osaka, Kyoto	100,000	3,000	6,430
12.5.2008	Earthquake	China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an	85,000	300	84,000
17.1.1994	Earthquake	USA: CA, Northridge, Los Angeles, San Fernando Valley, Ventura, Orange	44,000	15,300	61
1.8-15.11.2011	Floods	Thailand: Phichit, Nakhon Sawan, Phra Nakhon Si Ayuttaya, Pathumthani, Nonthaburi, Bangkok	40,000	10,000	813
6-14.9.2008	Hurricane Ike	USA, Cuba, Haiti, Dominican Republic, Turks and Caicos Islands, Bahamas	38,300	18,500	170
May-Sept 1998	Floods	China: Jangtsekiang, Songhua Jiang	30,700	1,000	4,159
27.2.2010	Earthquake, tsunami	Chile: Bió Bió, Concepción, Talcahuano, Coronel, Dichato, Chillán; Del Maule, Talca, Curicó	30,000	8,000	520
23.10.2004	Earthquake	Japan: Honshu, Niigata, Ojiya, Tokyo, Nagaoka, Yamakoshi	28,000	760	46

Significant “natural“ catastrophes worldwide 1980 – 2010
10 deadliest events

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
12.1.2010	Earthquake	Haiti: Port-au-Prince, Petionville	8,000	200	222,570
26.12.2004	Earthquake, tsunami	Sri Lanka. Indonesia. Thailand. India. Bangladesh. Myanmar. Malediven. Malaysia	10,000	1,000	220,000
2-5.5.2008	Cyclon Nargis	Myanmar: Ayeyawaddy, Yangon, Bugalay, Irrawaddy, Bago, Karen, Mon, Laputta, Haing Kyi	4,000		140,000
29-30.4.1991	Tropical cyclon	Bangladesh: Bay of Bengal, Cox's Bazar, Chittagong, Bola, Noakhali districts, esp. Kutubdia	3,000	100	139,000
8.10.2005	Earthquake	Pakistan. India. Afghanistan	5,200	5	88,000
12.5.2008	Earthquake	China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an	85,000	300	84,000
July-August 2003	Heatwave, drought	France. Germany. Italy. Portugal. Romania. Spain. United Kingdom	13,800	20	70,000
July-Sept. 2010	Heatwave, drought	Russia	2,000	20	56,000
21.6.1990	Earthquake	Iran: Caspian Sea, Gilan Provinz, Manjil, Rudbar, Zanjan, Safid, Qazvin	7,100	100	40,000
8-19.12.1999	Floods, flash floods	Venezuela: Vargas, La Guaira Punta de Mulatos, Miranda, Nueva Esparta, Yaracuy. Kolumbien	3,200	220	30,000

“Natural“ catastrophes worldwide 1980 – 2010
Number of events with trend



Geophysical events (Earthquake, tsunami, volcanic eruption)

Meteorological events (Storm)

Hydrological events (Flood, mass movement)

Climatological events (Extreme temperature, drought, forest fire)

Global Trends - Disasters are NOT natural

Greater exposure to natural and human-induced hazards, climate change and variability

Socio-economic: poverty & unsustainable development styles, unplanned urban growth and migrations, lack of risk awareness & risk governance institutions & accountability...

Physical: insufficient land use planning, housing & critical infrastructure in hazard prone areas, little safety awareness...

Ecosystem & natural resource depletion (coastal - coral reefs, mangroves…-, mountains, watersheds, wetlands, forests…)

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Main intergovernmental processes for disaster risk reduction or building resilience

- *International Strategy for Disaster Reduction (ISDR) & Hyogo Framework for Action (2005-2015): Building the Resilience of Nations and Communities to Disasters (HFA) Secretariat: UNISDR*

- *Two other major negotiating processes, in which DRR is an essential component: the Millennium Development Goals (UNDESA & UNDG) and climate change negotiations (UNFCCC & IPCC), both also at a turning point in 2015*

- *The three will change in 2015 for a post-Hyogo new guidance, post-MDGs becoming SDGs and a post-Kyoto agreement*

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Major international scientific processes on disaster risk

- *Integrated Disaster Risk Management (IDRIM), annual forum, managed by DPRI, Kyoto University in collaboration with partners*
- *International Disaster and Risk Conference (IDRC), biennial conference managed by the Global Risk Forum (GRF), Davos, Switzerland*
- *Integrated Research on Disaster Risk (IRDR), programme of ICSU/ISSC/UNISDR with FORIN, RIA, DATA, SERA & AIRDR working groups, managed by the IRDR/IPO, Beijing, China*
- *Regional academic networks, such as AUEDM (Asia), PeriPeri (Africa), La Red (Latin America and Caribbean) and other.*

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United Nations
International Strategy for Disaster Reduction

Timeline of Main Events for Post-2015 Framework for Disaster Risk Reduction

Version: 16 February 2012

HFA Mid-Term Review

Rio +20: UN Conference for Sustainable Development (Rio de Janeiro - June)

World Conference on Disaster Reduction (Japan)

Global Platform for Disaster Risk Reduction (Geneva - May)

Global Platform for Disaster Risk Reduction (Geneva - May)

2011 2012 2013 2014 2015

High-Level Conference on Large-Scale Natural Disasters (Sendai - July)

Post 2015 Development Consensus - MDGs (TBD)

Fourth High Level Forum on Aid Effectiveness (Busan - November)

Ministerial Conferences and Regional Platforms on Disaster Risk Reduction

Europe (Norway - TBD)
Africa (TBD)

Ministerial Conferences and Regional Platforms on Disaster Risk Reduction

Arab States (Egypt - Apr)
Pacific (New Caledonia- Sept)
Asia (Indonesia - Oct)
Americas (Argentina - Oct)
Europe (Croatia - Oct)

Ministerial Conferences and Regional Platforms on Disaster Risk Reduction

Africa
Americas
Arab States
Asia-Pacific
Europe

Note: These reflect the key milestone events for disaster risk reduction. Other events and consultation meetings will also be part of the process.

Integrated Research on Disaster Risk
(ICSU/ISSC/UNISDR)
Key questions & a response:

Why, despite advances in the natural and social science of hazards and disasters, do losses continue to increase?

To what extent is the world-wide growth in disaster losses a symptom and indicator of unsustainable development?

The IRDR Science Plan: addressing the challenge of natural and human-induced environmental hazards with an integrated approach to research on disaster risk through: an international, multidisciplinary (natural, health, engineering and social sciences, including socio-economic analysis) collaborative research programme.

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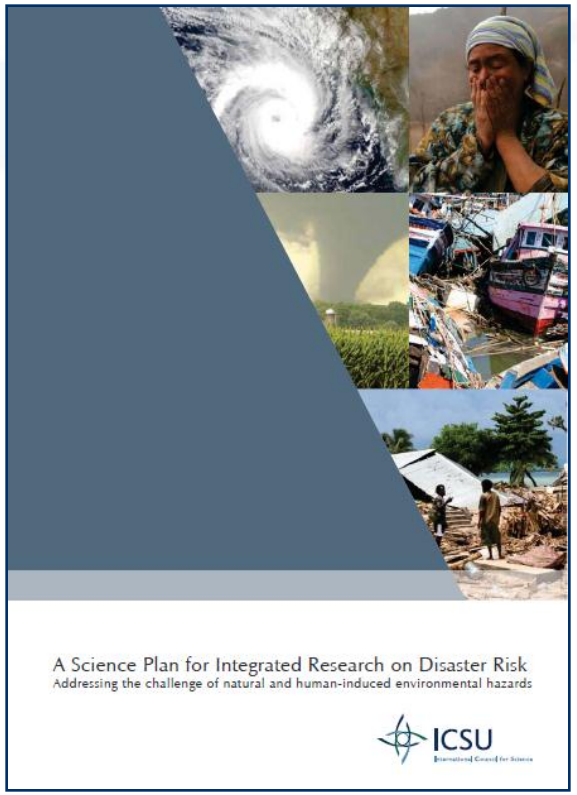
Integrated Research on Disaster Risk

Science Plan

An ***integrated approach*** to research on disaster risk (trans-disciplinary, collaborative research programme)

1. Characterization of hazard, vulnerability and risk
2. Effective decision-making in complex and changing risk context
3. Reducing risk and curbing losses through knowledge-based actions



IRDR Science Plan at:

http://www.irdrinternational.org/

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Introduction

- Debunking “natural” of disaster
- From nature to society; from natural construction to social construction of risk
- Gaps in past efforts to understand disasters
  - hazard or technological focus
  - sectorial or disciplinary based
  - emergency response priority

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DATA Research

Accurate and precise data is needed for more effective policies, legislation, organizational arrangements in risk governance

Need to reverse the trend of rapidly increasing negative impacts of disasters due mainly to:

- rapid urban growth, especially in coastal areas;
- unequal distribution of wealth and poverty (reinforced by disasters);
- ecosystem degradation; and
- climate change.

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Data needed for managing and reducing the risk of disasters

Three main types of data:

- Data on disaster losses
- Data on natural events or phenomena
- Data on vulnerability (human, social, physical, institutional, economic, ecological)

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Data needed for managing and reducing the risk of disasters (cont…)

(1) Data on disasters losses

- To assess impacts, relief & recovery requirements, insurance claims, identify trends..
- Main global sources currently: CRED, MUNICH RE…
- Data is approximate, collected in different ways for various purposes by different agencies (relief, recovery by each sector, for insurance claims, by donors, etc.)
- Sometimes high variation, e.g., Venezuela 2001…
- Effort of IRDR DATA Working Group aims at rendering these efforts more accurate and reliable…

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Data needed for managing and reducing the risk of disasters (cont…)

(2) Data on natural events or phenomena

- Needed to understand them better, identify trends with possible/expected occurrence, frequency & magnitude
- Main sources globally: WMO network, FAO, GEM, USGS, US/NCDC, US/NDMC, EMSC, among many other…
- In general, widely covered by specialized research centres and global networks of observatories

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Data needed for managing and reducing the risk of disasters (cont…)

(3) Data on vulnerability (human, social, economic, institutional, physical, ecological…)

- Needed to identify trends and more importantly, to reverse them with sound land-use planning and sustainable development approaches in all sectors (agriculture, health, transport, critical infrastructure, education, tourism, energy, etc.)
- No systematic data source available at global level for the only area in which policy can change behavior!!!

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IRDR/CODATA WG DATA for Disaster Loss Data

- Identify what data and quality are needed to improve integrated disaster data management for risk reduction
- Bring together loss data stakeholders and utilize synergies for recognized standards to minimize uncertainty and advice more effective policy
- Define of “losses” and creation of methodology for assessing it for more accurate research
- Educate users on data interpretation and biases
- Increase downscaling of loss data to sub-national geographies for policy makers

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IRDR WG FORIN for Forensic Disaster Investigations

- Establish basis for analysis based on actual evidence and applied scientific methodologies/principles
- Dig more deeply into causes of specific disasters
  - integrated
  - comprehensive
  - transparent
  - investigative or forensic style

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FORIN Research

- In-depth investigation into complex and underlying causes
- Common template & methodology
  - Fundamental causes of disasters
  - Trace out and assign causal explanation of losses and intervening conditions that increased or reduce losses
- Series of case studies

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FORIN Narratives

Illustrate that the spatial and temporal scales in which disaster causation is understood must be both broadened and deepened.

Include perspectives from variety of communities involved in and affected by the disaster, including representative disciplinary viewpoints and most especially those of local population groups.

Identify the roles and responsibilities of specific actors and institutions in the creation, and/or prevention of the growth and expansion of vulnerability and exposure

Be framed in ways that permit the assimilation of the information and create a space for those involved in constructive engagement

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Objectives….

Management objectives

- Focus on the link between research findings and improved policy application.
- Develop a reference bank of quality case studies to be available to interested parties, in close coordination with relevant databases and networks in this field, as well as those at regional organizations.
- Effectively communicate the causes of disasters.

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Objectives…

Scientific research objectives

- Advance methodological diversity
- Test existing theories and concepts.
- Implement science-based results.
- Build a strong, interdisciplinary, ‘in-country’ capacity of young researchers for policy-oriented research.

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Objectives…

Development objectives

- Substantiate that generic causes have local manifestations: “one size solutions do not work everywhere”.
- Promote a ‘learning culture’ amongst all stakeholders.
- Advance understanding of how causal factors can be major impediments to development.
- Identify situations where development initiatives can become causal factors in disasters.
- Guide recovery and reconstruction effort.
- Communicate key messages to shape values, perceptions and behavior for a paradigm shift

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Objectives...

DRR objectives

- Promote sustainable risk management/reduction policy-making through science-based research
- Guide implementation of the Hyogo Framework and post-HFA needs
- Give priority focus on reducing human consequences, with a secondary concern for physical or environmental losses.
- Change paradigms, shifting responsibility from nature, physical environment and distributing to real circumstances and conditions involving all sectors of society
- Develop case studies that illustrate ‘risk-drivers’

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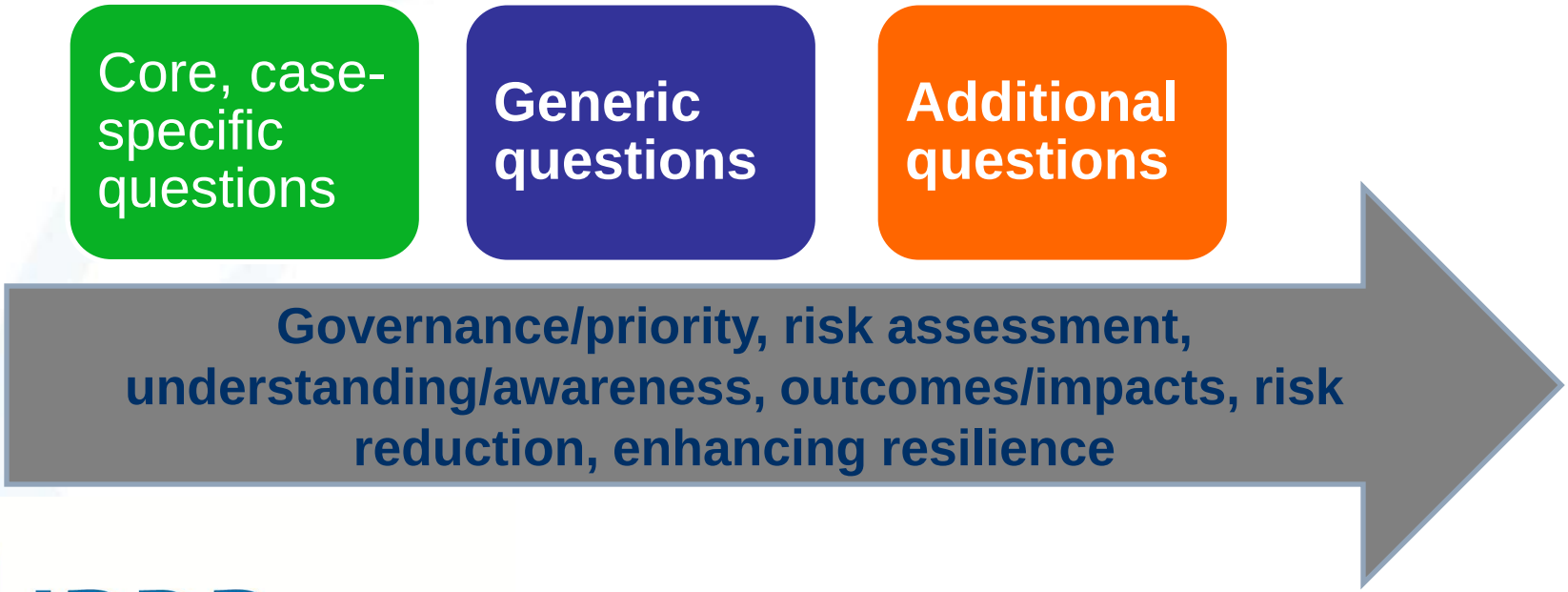
FORIN questions

A series of questions has been formulated to serve as the central structure of the FORIN investigations:



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Types of Studies

- Open source, independent and participatory
- Four types of study identified:
- specific events (e.g., Great Hanshin Awaji, Great East Japan EQ, Tsunami and Fukushima explosions…)
  - recurrent events (e.g. floods in Mozambique, hurricanes in Haiti, coupled with 2010 EQ, EQs in New Zealand…)
  - thematically important dimensions (school and hospital safety, trans-boundary risks...)
  - risk drivers (urban management, poverty, governance…

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IRDR WG AIRDR for Assessment of Integrated Research on Disaster Risk

- First systematic, critical global assessment of published research on disaster risk
- Provide a baseline
- Use to identify and support longer-term science agenda
- Provide scientific evidentiary basis in support of policy and practice

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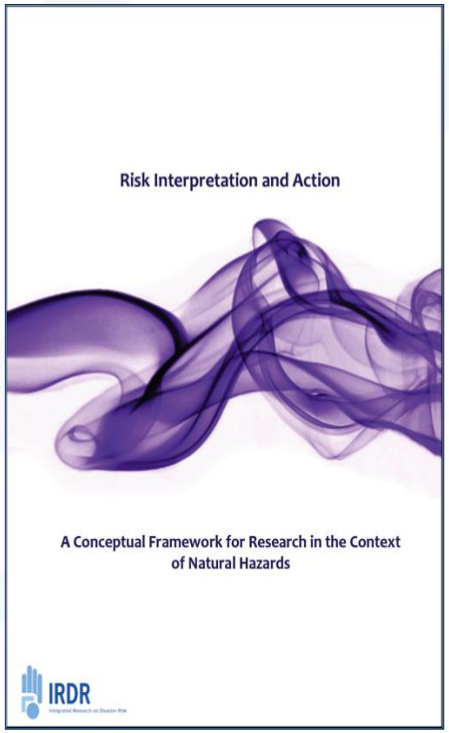
IRDR WG RIA for Risk Interpretation and Action



- How actors attempt to make sense of experience and information from various sources as a basis for decision
- Estimation of the likelihood, magnitude of event and vulnerability of physical infrastructure
- Social and behavioural factors leading to greater or lesser risk

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IRDR/WWRP WG SERA for Societal and Economic Research and Applications

- Joint WWRP (WMO) and IRDR project
- To advance the science of the social and economic applications of weather-related information and services
- Development, review and promotion of societal and economic-related demonstration projects focused on high-impact weather and information

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IRDR Legacy

An enhanced capacity around the world to address hazards and make informed decisions on actions to reduce their impacts.

Societies to shift focus from response-recovery towards prevention-mitigation, building resilience and reducing risks, learning from experience and avoiding past mistakes.

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Some reflections as conclusions

Avoid using « natural » disasters and use instead ‘natural hazards’ or ‘disasters’, or explain it …

Policy focus on risk reduction and management (prevention, mitigation, preparedness), essential requirement for business continuity and sustainable development

Compare to health prevention policies focusing on safe (“healthy”) homes, offices, schools and infrastructure rather than only on the hazards or the emergency

Common objective of DRR and CCA policies to urgently reduce risk and vulnerability to current climate variability as a first step or basis for adaptation to the longer-term effects of CC, no need to wait…

Most urgently!, teaming up in the scientific community to convey similar messages and understanding to governments, private sector, civil society organizations and the media by 2015

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Thank you

www.preventionweb.net

www.unisdr.org

www.irdrinternational.org

www.globalquakemodel.org

www.gfdrr.org

www.globalnetwork-dr.org

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International Forum on Research Institutes for Disaster Risk Reduction (DPRI International Forum) at Uji Capmus, Kyoto University on March 11-13, 2013.

IWRRI

International Water Resources Research Institute

Kwansue Jung
Chungnam National University, Korea

About IWRRI

1. Date of establishment : April 2011

2. Purpose

- As a specialized institution of water resources, not only solving water resource problems, but also of education, research, planning and community services.
- Using, developing, and conserving water resources for public and private purposes.
- Reeducating technical experts who work for governmental institutions or private enterprises.
- Training the public and those who participate in environmental organization of water resources
- Serving the role of a base center for exchanging of international research, scholarships, and human resources.
- Cooperating and accompanying international collaboration with water research institute in abroad.

3. Organization : 1 director, 1 vice director

4. Researchers : 18 permanent researchers, 30 nonpermanent researchers

5. Location : Room 131-2, Engineering building(E2), Chungnam National University, Daejeon, South Korea.

Background of Research and Development

- Dredging River Channel
- Installing new structures in river and floodplain
- Conjunctive operation of multifunctional weirs

- Alteration of river channel and headcutting
- Changes in peak flood and river regime coefficients
- Extension of targets in river operation and management

- Enhanced variability in hydrological variables
- Need natural disaster risk reduction
- Need to reflect future hydrological characteristics

Development of new technology for river and watershed management

A program that ties into the local community

Developing education programs and setting up river visits for citizen, civic groups and undergraduate/graduate students.

INTERNATIONAL RELATIONS

Research Networks

- Define IFNDR more clearly and establish relationships with the other similar forums, programs and organizations.
- Exchanging basic data research results is essential for boosting the cooperation (with minimum standard).
- Start with collaborative projects
- Try to be the Forum support by UN organizations such as UNESCO
- Exchanging students and researchers among institutes
- DPRI have to lead and organize research institutes for this international institutes alliance. (role of the center: annual meeting, collaborative research plan, homepage, etc)

Thank you!

International Forum on Research Institutes for Disaster Risk Reduction (DPRI International Forum), Uji Campus, Kyoto University March 11-13, 2013

RESEARCH NETWORKS ON RESEARCH AND DEVELOPMENT FOR REDUCING GEO-HAZARD DAMAGE IN MALAYSIA CAUSED BY LANDSLIDE & FLOOD

Associate Professor Ir Dr Lariyah Mohd Sidek
Director, Research Management Centre, Universiti Tenaga Nasional,
and Head of Sustainable Technology and Environment, UNITEN, Malaysia

Contents

- Introduction
- Disaster Issues and Management
- International Research Networks
- Current Research
- The Way Forward
- Conclusions

WHERE IS MALAYSIA??

Malaysia is a fortunate country

Less major disasters:

No Earth Quake

No Volcano

No Typhoon

Federation of Malaysia
Persekutuan Malaysia

Flag

Coat of Arms

Motto: *"Bersekutu Bertambah Mutu"*
"Unity Is Greatness"[1]

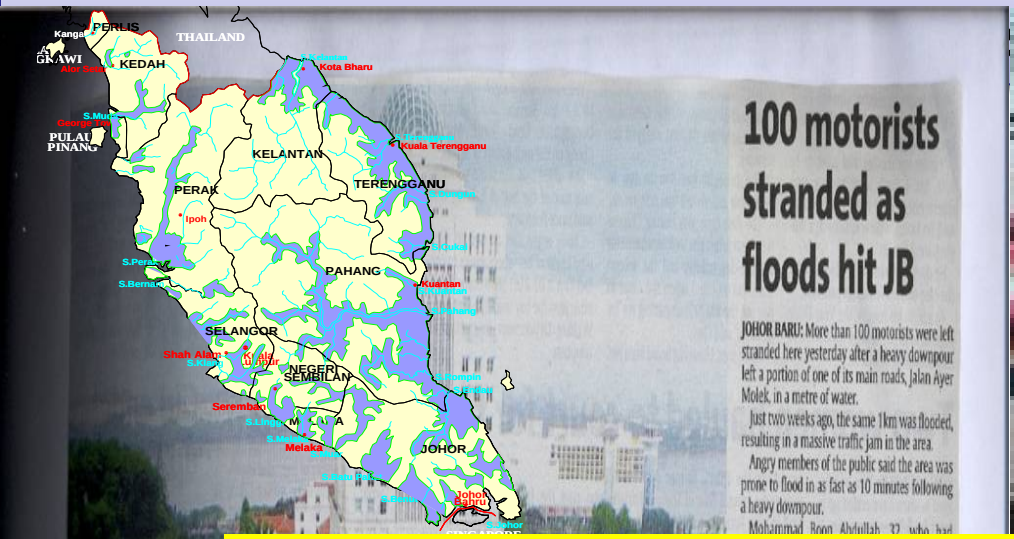
Area	
- Total	329,847 km² (66th) 127,355 sq mi
- Water (%)	0.3
Population	
- Sep 2008 estimate	27,730,000[1] (43rd)
- 2000 census	24,821,286
- Density	[5] 84/km² (114th) 218/sq mi
GDP (PPP)	2007 estimate
- Total	$359.271 billion[2]
- Per capita	$13,385[2]

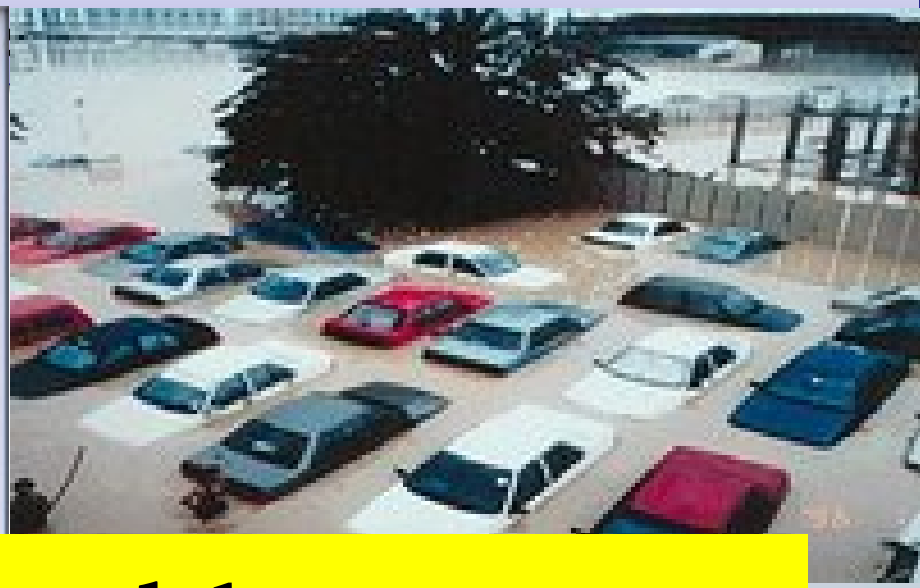
INTRODUCTION

- Although Malaysia is geographically located outside the **"Pacific Rim of Fire**" and is relatively free from any severe ravages destruction caused by **natural hazards** such as earthquake, typhoons and volcanic eruptions, nevertheless the country has experienced other types of natural hazards such as to monsoon floods, landslides and severe haze.

Current global warming phenomena have direct impact over unpredictable weather patterns that may lead to Geo-hazard incidents like landslide and flood.

Problem/Challenges Associated with Tropical Climate





100 motorists stranded as floods hit JB

JOHOR BARU: More than 100 motorists were left stranded here yesterday after a heavy downpour left a portion of one of its main roads, Jalan Ayer Molek, in a metre of water.

Just two weeks ago, the same 1km was flooded, resulting in a massive traffic jam in the area.

Angry members of the public said the area was prone to flood in as fast as 10 minutes following a heavy downpour.

Mohammad Roop Abdullah, 32, who had added that the floods were caused by rubble from the construction blocking the drains.

Meanwhile, a taxi was badly damaged when a tree crashed on it in Jalan Yahya Awal in front of the Hutan Bandar park.

The driver, Junaidi Mohamad Kusari, 38, narrowly escaped death as he had stopped his taxi for a break.

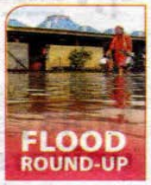
"I parked by the road when I saw the tree about to crash. It was lucky I managed to get out in time," he said.

Junaidi, who has been a taxi driver for 15 years, said the estimated cost of repairing his taxi would be about RM20,000.

Flood Problems

The flood prone areas in Malaysia are approximately 29,800 sq. km which is about 9% of total area of the country and approximately 4.9 million people live in these flood-prone areas (DID, 2012)

Three states hit, some schools delay start



KUANTAN: Conditions in Pahang continued to deteriorate yesterday as the steady downpour since Thursday raised water levels in rivers. A total of 246 people in Pekan and here have been evacuated.

Ten picnickers were stranded at the Berkelah waterfalls near Gambang as the heavy rain has raised the level of Sungai Berkelah, cutting off the only exit route.

As of 7pm, a Civil Defence Force team had yet to rescue them.

The lower areas of Sungai Lembing town are under two metres of water after Sungai Kuantan burst its banks at Bukit Kenau.

Rows of shophouses were

The Sun

KUANTAN, PAHAN
02 JANUARI 2

Stranded

a Lumpur submerged in muddy flood
D ASMADI

unawares
oods hit KL

Arau dilanda banjir kilat luar biasa

Oleh FAIZAL NAZARUDDIN
faizal.nazaruddin@kosmo.com.my

ANGGOTA polis dan orang ramai saling membantu menarik motosikal seorang penunggang yang terbabas ketika meredah banjir kilat di Lebuh Raya Changlun-Kuala Perlis dekat Ulu Pauh, Arau semalam.

AHLI Dewan Undangan Negeri (DUN) Pauh, Datuk Seri Syed Razlan Putra Jamalullail meninjau kejadian banjir kilat yang menenggelamkan Lebuh Raya Changlun-Kuala Perlis dan beberapa kampung di Arau semalam.

ARAU – Beberapa kawasan di Ulu Pauh, Arau dilanda banjir kilat luar biasa berikutan hujan lebat selama kira-kira setengah jam petang kelmarin.

Hujan sejak pukul 4.40 petang itu menyebabkan beberapa buah kampung terutama berdekatan Lebuh Raya Changlun-Kuala Perlis dinaiki air setinggi hampir dua meter.

Ekoran air naik dengan mendadak, ramai pengguna lebuh raya tersebut terjejas, tambah lagi cuma satu lorong sahaja dari kedua-dua arah boleh digunakan.

Pengarah Jabatan Pengairan dan Saliran (JPS) Perlis, Ir. Nishad Mohamed berkata, meskipun banjir kerap berlaku di sini setiap tahun terutama ketika musim hujan, namun banjir kilat kali ini lebih teruk apabila air melimpah dengan banyak ke rumah penduduk dan kawasan sawah.

Beliau menjelaskan, punca bencana alam itu akibat limpahan air dari kawasan tadahan air di Sungai Ulu Pauh ke sungai berhampiran.

"Sejak hujan tempoh hari kami telah mengesan air mula naik setinggi 99 milimeter (mm) di Sungai Ulu Arau kemudian Sungai Mentalun naik 100mm manakala Sungai Gial dan Sungai Tunjang mencatatkan paras 60mm.

"Akibatnya, air sungai itu kemudian melimpah ke kawasan kampung berdekatan dengan lebuh raya tersebut," katanya kepada pemberita.

Sementara itu, seramai 22 orang penduduk kampung terbabit telah dipindah ke pusat penempatan sementara yang disediakan Jabatan Kebajikan Masyarakat (JKM) di Dewan Sekolah Padang Siding, Arau setakat malam tadi.

Menurut Pengarah JKM Perlis, Abdullah Ali, jumlah penduduk berpindah itu kekal setingga semalam berikutan ada keluarga yang terjejas menumpang di rumah saudara-mara.

Jelasnya, kesemua mereka diberikan bantuan asas sepanjang ditempatkan di pusat tersebut dan kesemua mereka dalam keadaan selamat.

"Hari ini (semalam), semua yang ditempatkan di pusat penempatan sementara ini boleh pulang ke rumah masing-masing berikutan air sudah surut dan keadaan sudah pulih seperti biasa," katanya ketika dihubungi.

KELANTAN DAN
20 NOVE

Lebih 8,000 mangsa di T

Banjir

- Di **Terengganu** 5,641 mangsa daripada 1,288 keluarga dipindahkan ke pusat pemindahan banjir.
- 300 calon Sijil Pelajaran Malaysia (SPM) dan Sijil Tinggi Persekolahan Malaysia (STPM) 'berkampung' di tujuh sekolah menengah di Besut bagi

- Di **Kelantan** 2,668 mangsa daripada 480 keluarga dipindahkan ke 729 pusat pemindahan.
- Paras air Sungai Kelantan di Kusial, Kuala Krai, Sungai Golok dan Rantau Panjang melebihi paras bahaya.

Penggemar keropok lekor tidak perlu bimbang untuk menikmati makanan itu asalkan membelinya dari gerai yang bersih

– DR. NORDIYANAH HASSAN
Pengarah Jabatan Kesihatan Negeri Terengganu

PINDAH CALON SPM

GELOMBANG kedua banjir yang melanda Pantai Timur Semenanjung menyebabkan beribu penduduk terpaksa dipindahkan ke tempat yang selamat.

Berikutan bencana alam itu, pelajar-pelajar yang sedang menduduki peperiksaan SPM dan STPM turut dipindahkan.

Sementara itu, beberapa jalan ditutup manakala KTM Berhad menanggihkan empat perkhidmatan di sektor Pantai Timur semalam. [Lagi berita, gambar di muka 14, 15]

● LIMA calon SPM dari Sekolah Menengah Agama Mahmudiah menaiki sampan untuk dipindahkan setelah bangunan asrama mereka dinaiki air di Kuala Berang, Hulu Terengganu semalam. – UTUSAN/FAUZI BAHARUDDIN

Flood In Johor (Dec. 2006 – Feb. 2007)

Segamat, Johor, Jan 1
look at the impassable
at KM6 of Jalan Seg
Rahim

Kota Tinggi, Johor, Jan 14: Residents of Taman Muhibbah surveying the situation in their area using a raft made of pieces of planks and empty containers. NST pix by Shahrul M. Zain.

Newly weds Rita Paikuni and
a boat for their bersanding
e flood relief centre at SK
ix by Amran Hamid.

Due to abnormally heavy rainfall event (more than 100 years ARI)
Estimated total cost of these flood disasters is RM 1.5 billion.
110,000 people evacuated, 18 death toll.

Kota Tinggi, Johor, Jan 14: Evacuees at the Sekolah Agama Taman Kota Jaya flood relief centre had to be relocated to another centre as floodwaters begin to rise at the school. NST pix by Zain Ahmed.

Kota Tinggi, Johor, Jan 14: The half-visible bridge over Sungai Johor in the middle of the town leads to the Kota Tinggi Hospital. NST pix Ahmad Bahri Mardi.

Batu Pahat, Johor, Jan 14: Wardina Shamin Miswan seems to be having fun playing in the floodwaters near her home in Kampung Parit Bingan. NST pix by Amran Hamid.

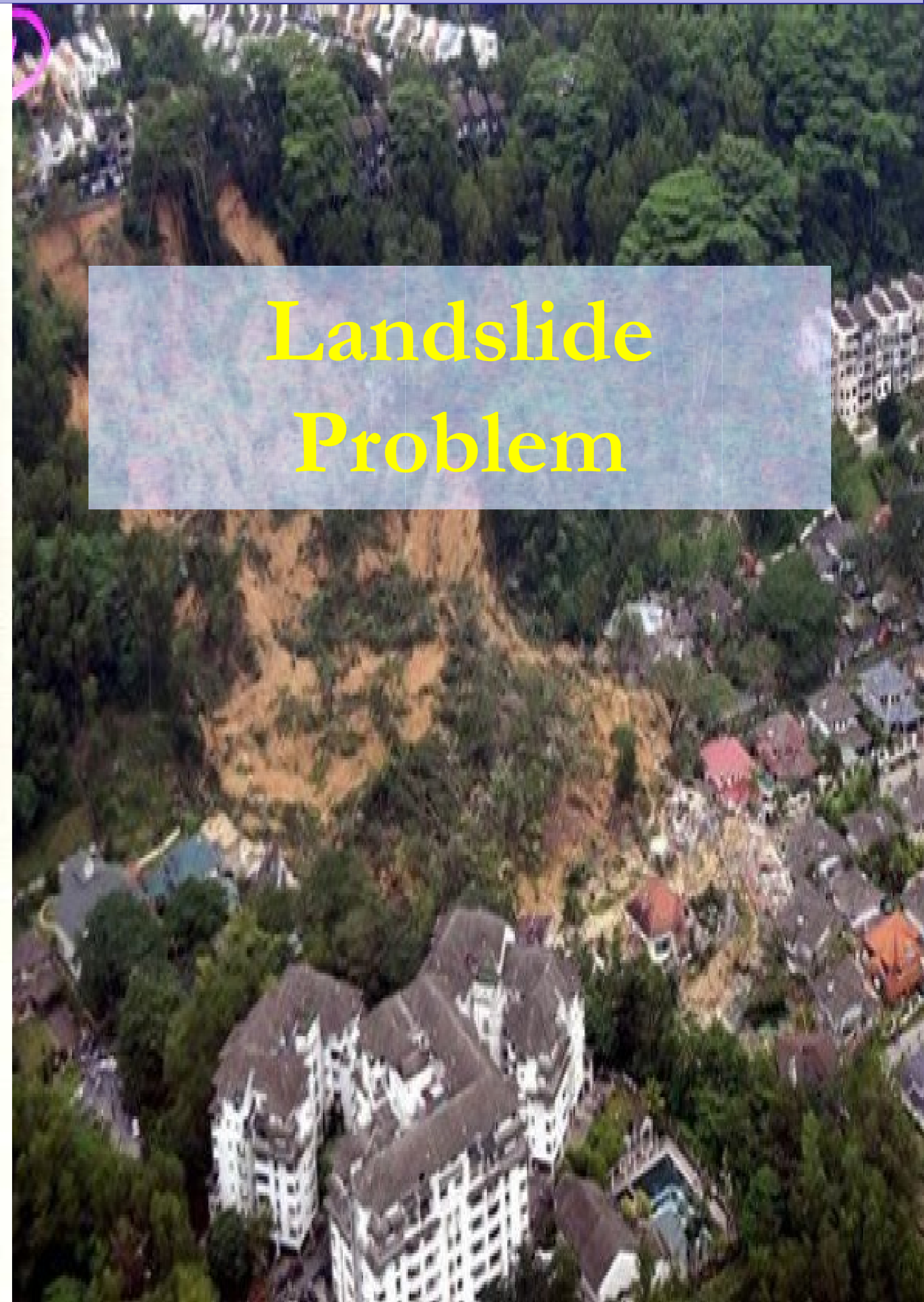
Problem/Challenges Associated with Tropical Climate in Malaysia


HomeNews

Flash floods in city claim two lives

Hundreds of cars damaged and traffic disrupted in three-hour downpour

Brisk business washed out by floodwaters



Slope Failure and Mud Flow

Pos Dipang, Pera

Karak Highway, KL (1995)

Bukit Antarabangsa, Ampang (2002)

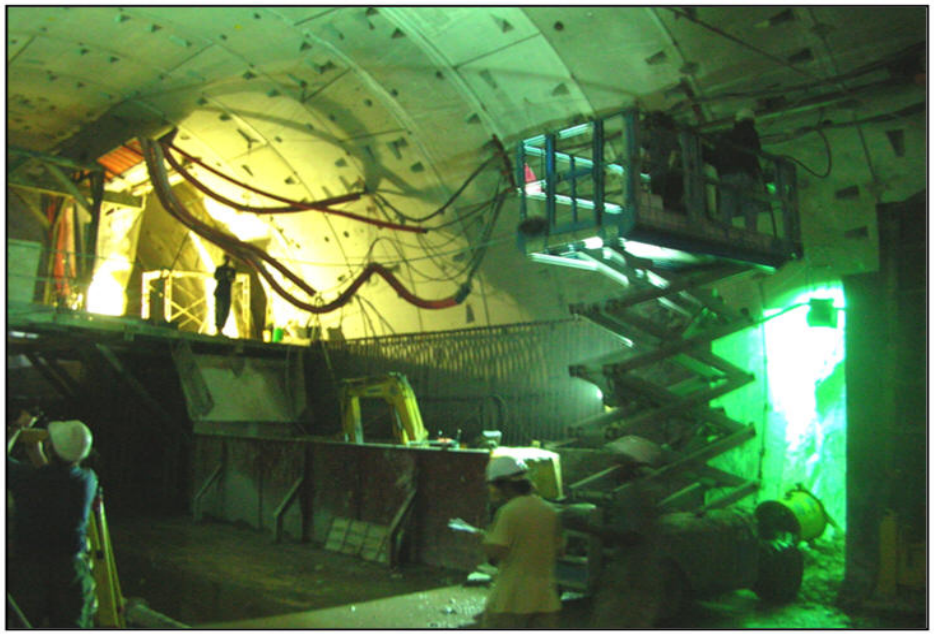
Gua Tempurung, Perak (2004)

Bukit Antarabangsa, Ampang (2008)

Flood Mitigation Structure i.e. The Stormwater Management and Road Tunnel (SMART)

- Developed by Malaysian Drainage and Irrigation Department
- The Stormwater Management and Road Tunnel also known as SMART Project is being developed to alleviate flash flood problems Kuala Lumpur. The 9.7 kilometers and 11.83 meters' in diameter tunnel integrates both stormwater management and motorway in the same tunnel.

TBM TUNNEL – SOUTH DRIVE



Excavation of Cross Passage 5 in progress

NORTH JUNCTION BOX AT COCHRANE

Vent shaft structural works in progress

MOTORWAY RAMPS AT KG. PANDAN

Rock excavation at Jalan Tun Razak MN03 in progress

TBM TUNNEL – SOUTH DRIVE

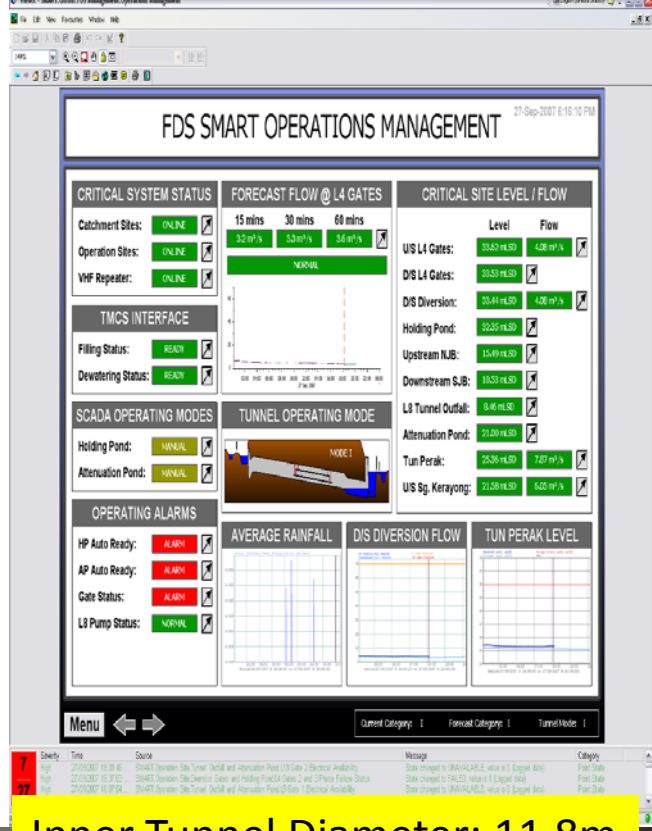
Tunnel Boring Machine broke through at South Junction Box on 04/06/05

Construction of SMART Tunnel to alleviate flooding in Kuala Lumpur

Stormwater Management And Road Tunnel

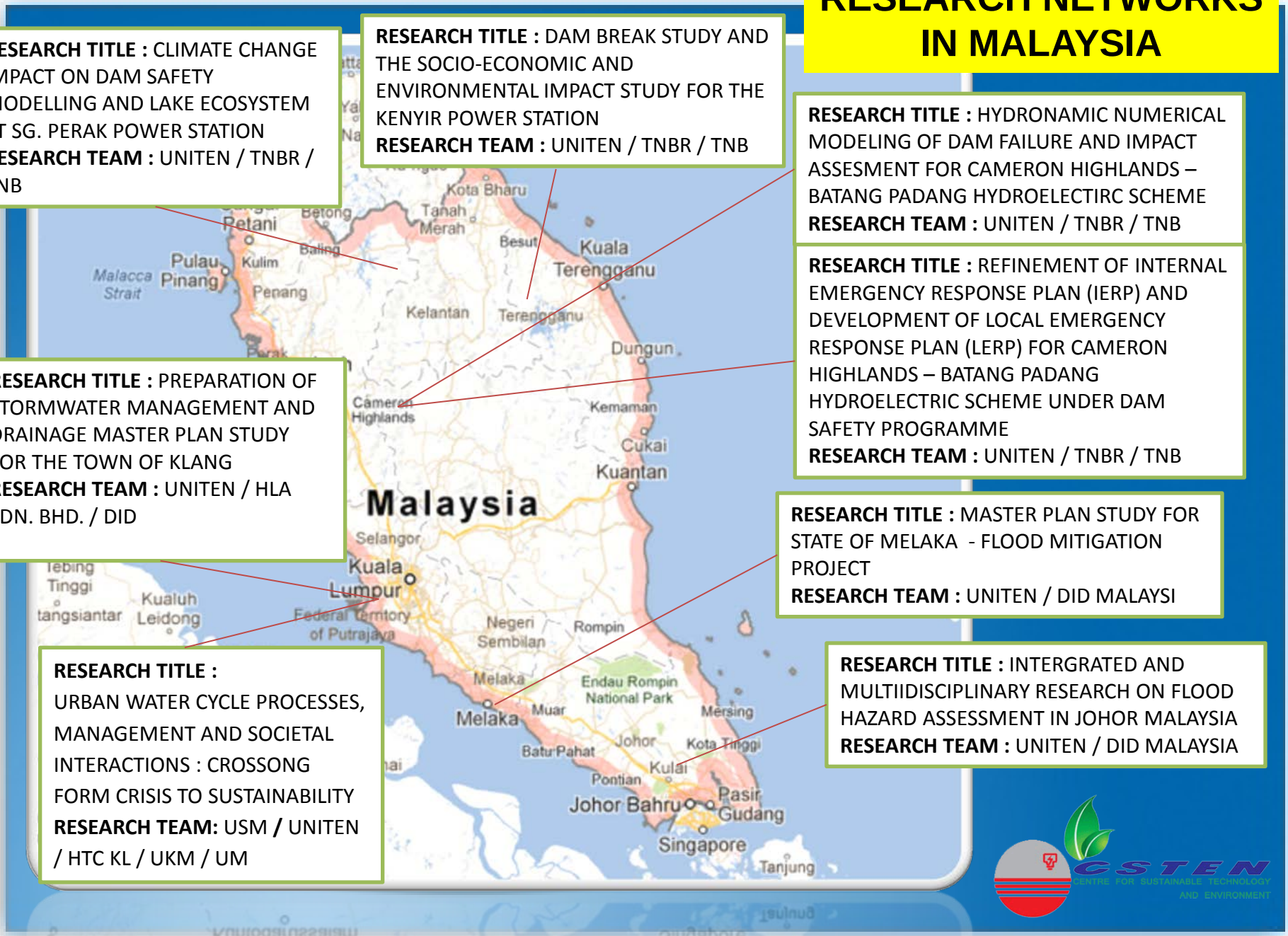
SMART

ALIGNMENT OF SMART



Inner Tunnel Diameter: 11.8m
Stormwater Tunnel : 9.7 km

RESEARCH NETWORKS IN MALAYSIA



RESEARCH TITLE : CLIMATE CHANGE IMPACT ON DAM SAFETY MODELLING AND LAKE ECOSYSTEM AT SG. PERAK POWER STATION
RESEARCH TEAM : UNITEN / TNBR / TNB

RESEARCH TITLE : DAM BREAK STUDY AND THE SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACT STUDY FOR THE KENYIR POWER STATION
RESEARCH TEAM : UNITEN / TNBR / TNB

RESEARCH TITLE : HYDRONAMIC NUMERICAL MODELING OF DAM FAILURE AND IMPACT ASSESMENT FOR CAMERON HIGHLANDS – BATANG PADANG HYDROELECTIRC SCHEME
RESEARCH TEAM : UNITEN / TNBR / TNB

RESEARCH TITLE : REFINEMENT OF INTERNAL EMERGENCY RESPONSE PLAN (IERP) AND DEVELOPMENT OF LOCAL EMERGENCY RESPONSE PLAN (LERP) FOR CAMERON HIGHLANDS – BATANG PADANG HYDROELECTRIC SCHEME UNDER DAM SAFETY PROGRAMME
RESEARCH TEAM : UNITEN / TNBR / TNB

RESEARCH TITLE : PREPARATION OF STORMWATER MANAGEMENT AND DRAINAGE MASTER PLAN STUDY FOR THE TOWN OF KLANG
RESEARCH TEAM : UNITEN / HLA SDN. BHD. / DID

RESEARCH TITLE : MASTER PLAN STUDY FOR STATE OF MELAKA - FLOOD MITIGATION PROJECT
RESEARCH TEAM : UNITEN / DID MALAYSI

RESEARCH TITLE :
URBAN WATER CYCLE PROCESSES, MANAGEMENT AND SOCIETAL INTERACTIONS : CROSSONG FORM CRISIS TO SUSTAINABILITY
RESEARCH TEAM: USM / UNITEN / HTC KL / UKM / UM

RESEARCH TITLE : INTERGRATED AND MULTIIDISCIPLINARY RESEARCH ON FLOOD HAZARD ASSESSMENT IN JOHOR MALAYSIA
RESEARCH TEAM : UNITEN / DID MALAYSIA

CSTEN
CENTRE FOR SUSTAINABLE TECHNOLOGY AND ENVIRONMENT

RESEARCH NETWORKS IN MALAYSIA

RESEARCH TITLE : KAJIAN PELAN INDUK SALIRAN MESRA ALAM (MSMA) BANDAR MENGGATAL, TELIPOK DAN TUARAN SABAH

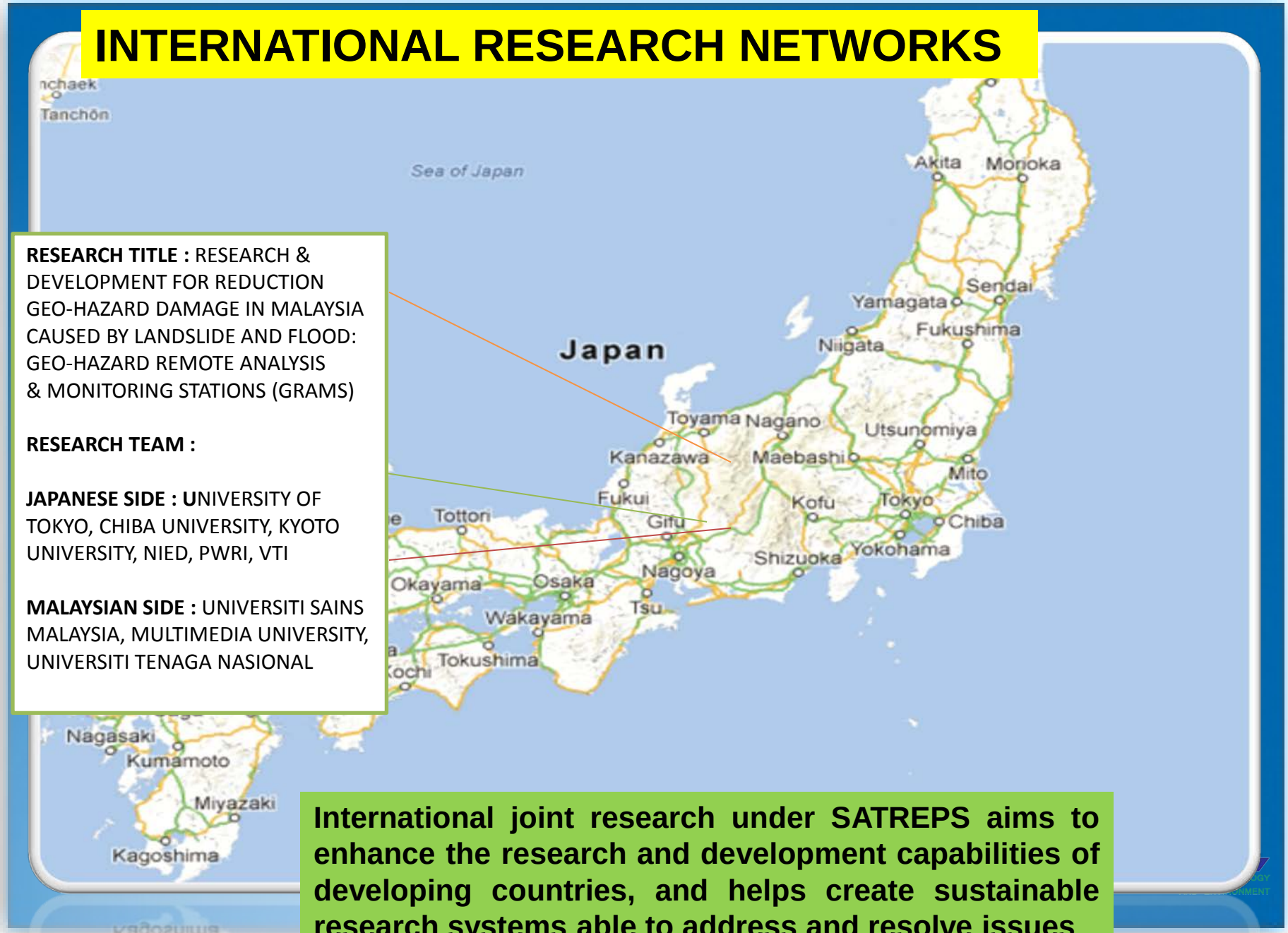
CSTEN
CENTRE FOR SUSTAINABLE TECHNOLOGY AND ENVIRONMENT

INTERNATIONAL RESEARCH NETWORKS

- **Fundamental and multi-disciplinary research leading to a Geo-hazard disaster risk management system with integrated data system.**
- **Results from SATREPS project can be potentially utilized by relevant government agencies for their operations on disaster management programs relating to landslide and flood.**

CSTEN
CENTRE FOR SUSTAINABLE TECHNOLOGY AND ENVIRONMENT

INTERNATIONAL RESEARCH NETWORKS



RESEARCH TITLE : RESEARCH & DEVELOPMENT FOR REDUCTION GEO-HAZARD DAMAGE IN MALAYSIA CAUSED BY LANDSLIDE AND FLOOD: GEO-HAZARD REMOTE ANALYSIS & MONITORING STATIONS (GRAMS)

RESEARCH TEAM :

JAPANESE SIDE : UNIVERSITY OF TOKYO, CHIBA UNIVERSITY, KYOTO UNIVERSITY, NIED, PWRI, VTI

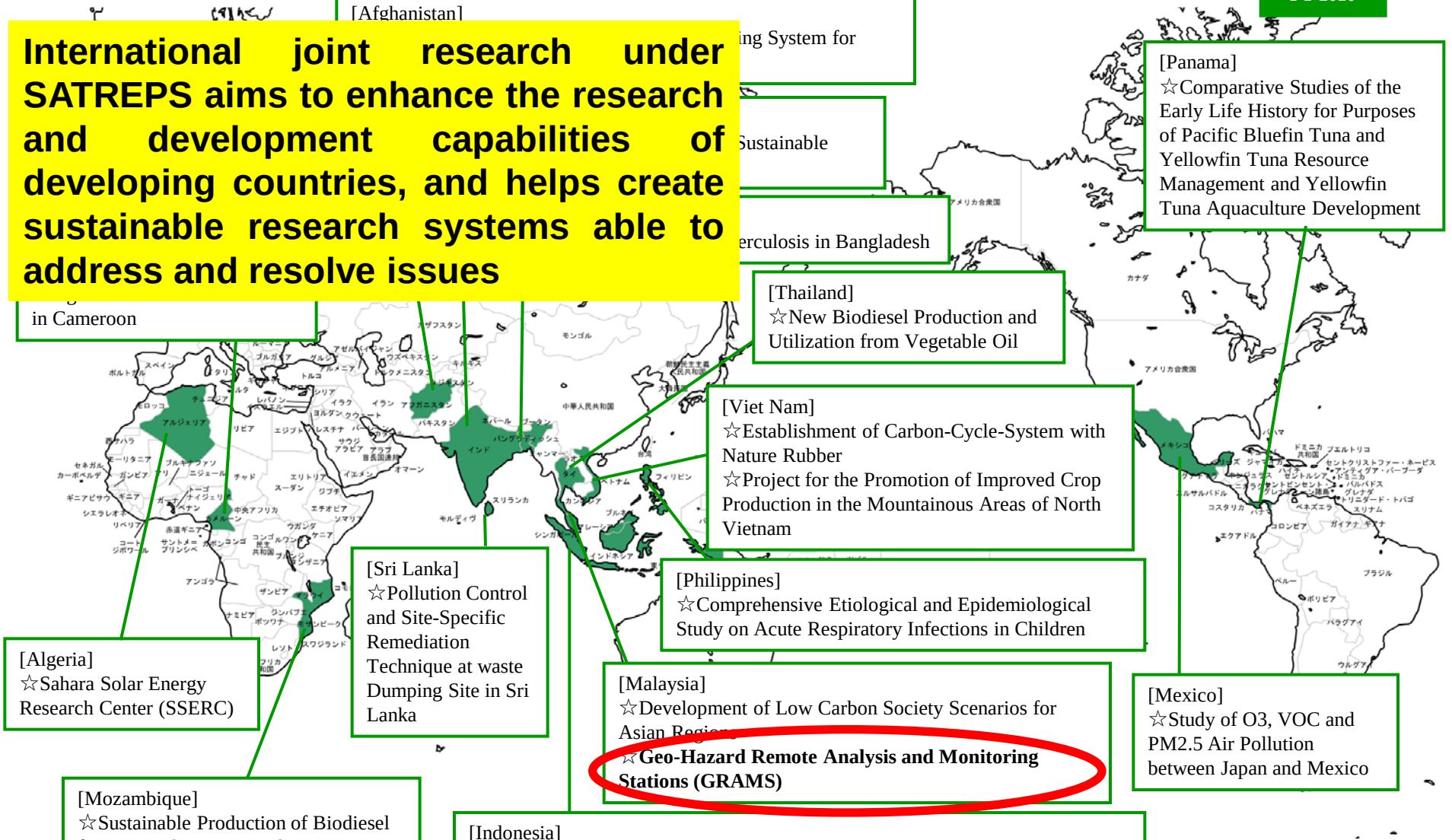
MALAYSIAN SIDE : UNIVERSITI SAINS MALAYSIA, MULTIMEDIA UNIVERSITY, UNIVERSITI TENAGA NASIONAL

International joint research under SATREPS aims to enhance the research and development capabilities of developing countries, and helps create sustainable research systems able to address and resolve issues

Selected Projects for FY2010

International joint research under SATREPS aims to enhance the research and development capabilities of developing countries, and helps create sustainable research systems able to address and resolve issues

FY 2010



[Afghanistan]
ing System for

Sustainable

erculosis in Bangladesh

in Cameroon

[Panama]
☆Comparative Studies of the Early Life History for Purposes of Pacific Bluefin Tuna and Yellowfin Tuna Resource Management and Yellowfin Tuna Aquaculture Development

[Thailand]
☆New Biodiesel Production and Utilization from Vegetable Oil

[Viet Nam]
☆Establishment of Carbon-Cycle-System with Nature Rubber
☆Project for the Promotion of Improved Crop Production in the Mountainous Areas of North Vietnam

[Philippines]
☆Comprehensive Etiological and Epidemiological Study on Acute Respiratory Infections in Children

[Sri Lanka]
☆Pollution Control and Site-Specific Remediation Technique at waste Dumping Site in Sri Lanka

[Algeria]
☆Sahara Solar Energy Research Center (SSERC)

[Malaysia]
☆Development of Low Carbon Society Scenarios for Asian Regions
☆**Geo-Hazard Remote Analysis and Monitoring Stations (GRAMS)**

[Mexico]
☆Study of O3, VOC and PM2.5 Air Pollution between Japan and Mexico

[Mozambique]
☆Sustainable Production of Biodiesel from Jatropha in Mozambique

[Indonesia]
☆Development of Internationally Standardized Microbial Resources Centers as a Core of Biological Resources Center to Promote Life Science Research and Biotechnology

WHY SATREPS PROJECT IN MALAYSIA?

- Reducing serious damages caused by floods/landslides is one of the biggest issues for administrations in Malaysia.
- Establish "flood/landslide prediction models" in the objective watershed in Malaysia, by combining various field information with the latest numerical technology.
- The established models will contribute for improving risk analyses, hazard mapping, planning countermeasures and constructing the EWS of the study area.
- Through the course of the study, close co-operational work will be implemented with Malaysian Universities , Japanese Universities and government organizations.
- The results of the study such as additional monitoring stations, database, established models will be transferred to Malaysia at the end of the project.

SATREPS Projects

Natural Disaster Prevention / Malaysia : ***Research and Development for Reducing Geo-Hazard Damage in Malaysia caused by Landslide & Flood"***

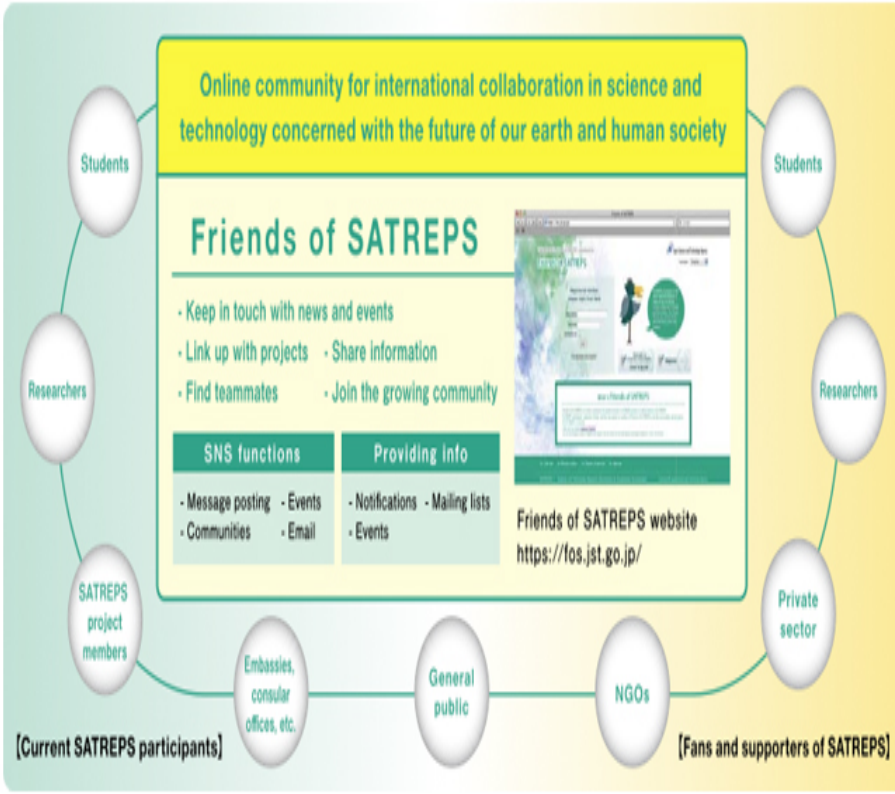
PROJECT PURPOSE

A trial system of an advanced disaster risk management system with an integrated data system of landslide and flood is proposed to the relevant government agencies in Malaysia for supporting to their consideration of disaster management programs implementation.

(*) Abbreviation: NSC: National Security Council, Prime Minister's Department
PWD: Public Works Department, Ministry of Public Works
DID: Department of Irrigation and Drainage, Ministry of Natural Resources and Environment

Emerging Challenges within SATREPS program

- Finding and involving stakeholders who can use the research results (Baton Passing)
- Involving more from non-academic community (R&D Project still regarded Academic Activity..)
- Encouraging new idea, new matching of researchers and stakeholders to foster new application for SATREPS that would address new global challenges



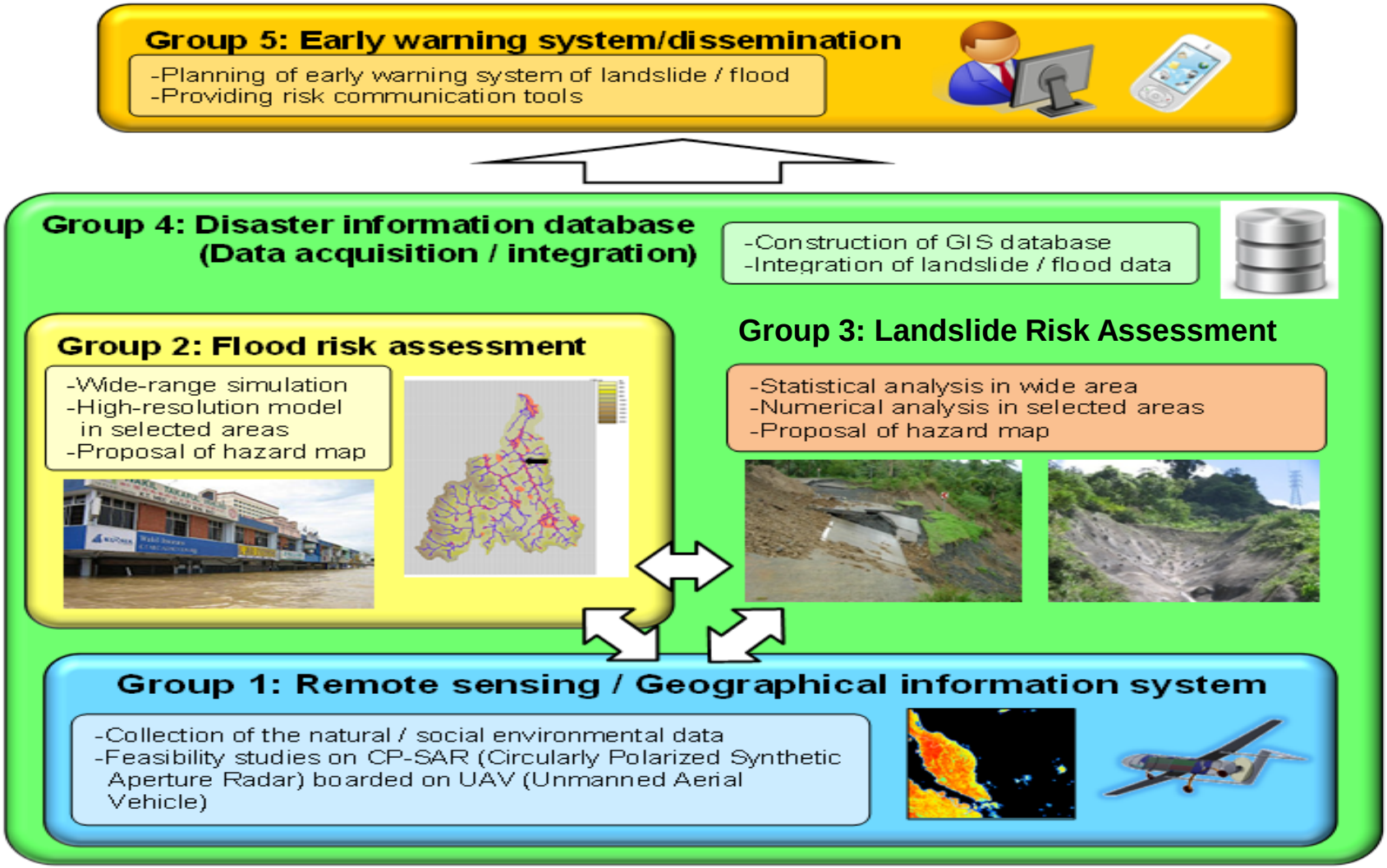
Friends of SATREPS

web-based

Social Network Service

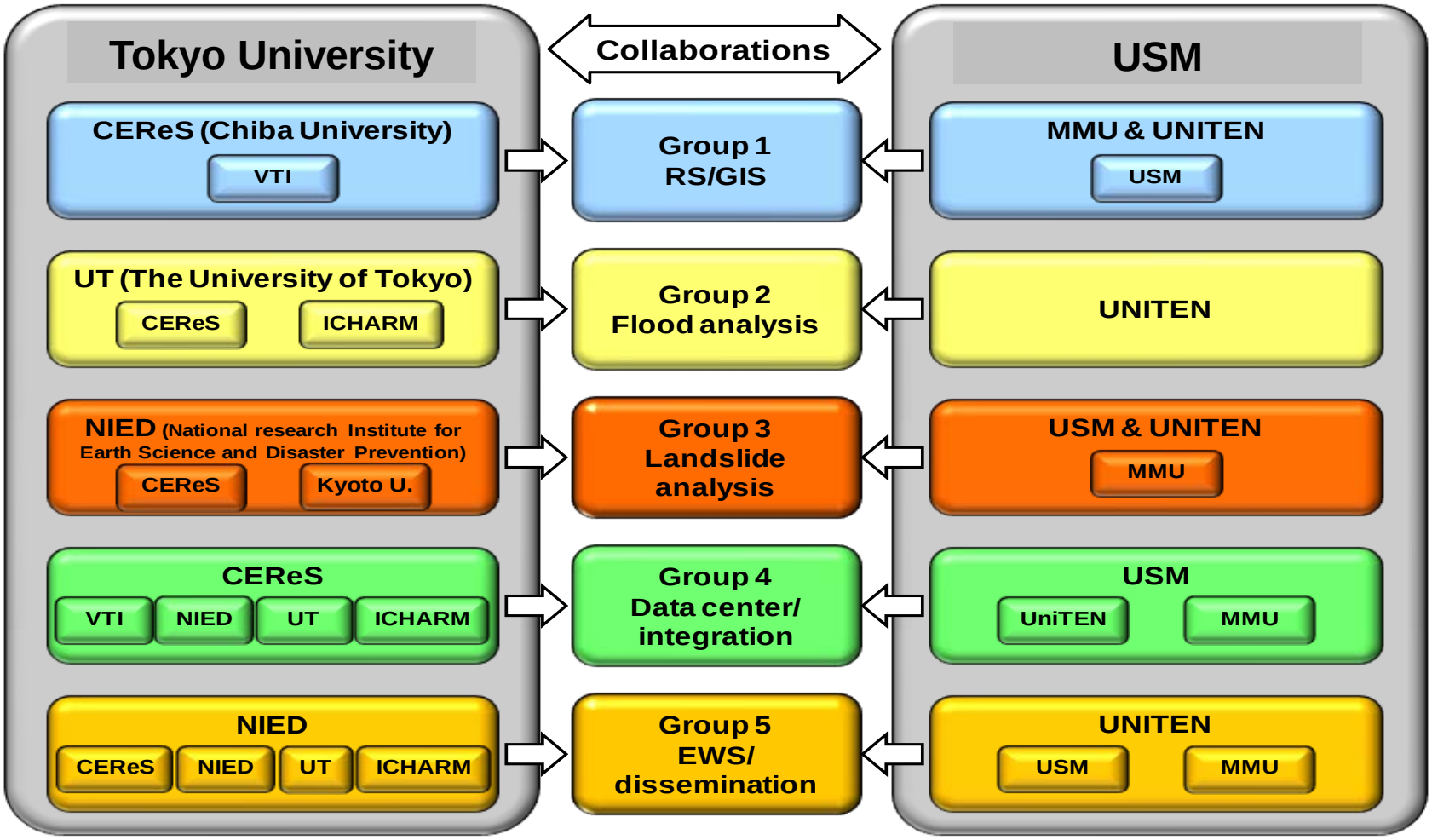
Framework of SATREPS Projects

Natural Disaster Prevention / Malaysia : ***Research and Development for Reducing Geo-Hazard Damage in Malaysia caused by Landslide & Flood***



The project was initiated in 2011 as a 5-year SATREPS (Science and Technology Research Partnership for Sustainable Development) PROJECT in association with Malaysia and Japan. The target of the project is to reduce the casualties and socio-economic damages by landslides and flood inundations in Malaysia, with the use of recent technologies. The Malaysian team consists of Universiti Sains Malaysia (USM), Multimedia University (MMU), Universiti Tenaga Nasional (UNITEN), and related national research institutes. The Japanese side consists of The University of Tokyo (UT), the Center for Environmental Remote Sensing, Chiba University (CEReS), National Institute of Earth Science and Disaster Prevention (NIED), International Centre for Water Hazard and Risk Management (ICHARM), Vision Tech Inc. (VTI), and other universities in Japan.

JAPANESE COUNTERPARTS VS MALAYSIAN COUNTERPARTS



Group 1: Surface data collection and geomorphological/environmental studies using remote sensing technology
Group 2: Studies on establishing river runoff/inundation numerical models for the target areas through historical data collection and additional monitoring
Group 3: Landslide analysis and risk assessment through field monitoring, statistical analysis, and numerical simulation
Group 4: Construction of integrated disaster information database for landslide and flood
Group 5: Planning and dissemination of Early Warning System (EWS) as a risk communication tool for local administration and residents

RESEARCH NETWORKING WITH OTHER ORGANISATIONs

Japanese — JICA / JST / TOKYO UNIV/ CHIBA UNI. — RD signed

Malaysian — UNITEN / USM / MMU / DID / PWD — MoU & MoA has been signed

ICHARM

International Centre for Water Hazard and Risk Management under the auspices of UNESCO & **Humid Tropics Centre Kuala Lumpur (HTC)**, UNESCO Water Centre

Scope:
-Development of Water Related Application.
- Stormwater management

NIED / Kyoto University

National Research Institute for Earth Sciences and Disaster Prevention (Flood Project)

Scope:
-Disaster Reduction Hyperbase (DRH).

UNESCO

United Nations Educational, Scientific and Cultural Organization (Flood Project)

Scope:
-Flood Forecasting, Warning Assessment for Tropical Region.

CORFU – FP7 Europe

Collaborative Research on Flood Resilience in Urban Areas

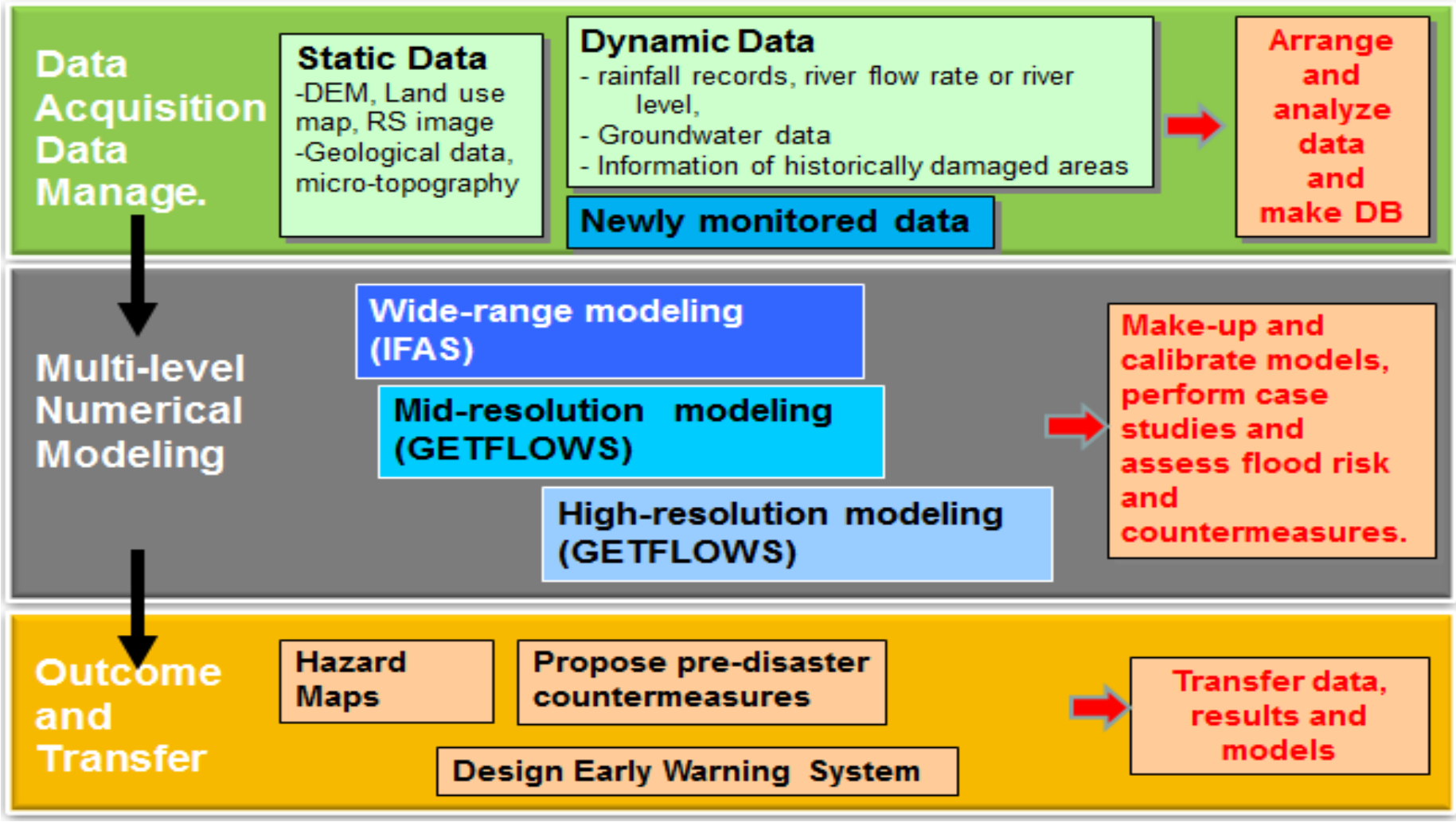
Scope:
-Involved Six Work Packages (WPs) to establish methodologies and models for urban flood risk assessment and resilience strategy development.

- Project Scientific Committee includes experts from the Willis Research Network, UNITEN University & SOGREAH Consultants.

Collaboration:
-EXETER University & 16 institutions from Denmark, United Kingdom, France, Germany, India, China, Bangladesh, Spain, the Netherlands, Taiwan and Korea.

Japan International Cooperation Agency (JICA); Japan Science and Technology Agency (JST) ; University Tenaga Nasional (UNITEN); University Science Malaysia (USM); Multimedia University (MMU); Drainage and Irrigation Department (DID); Public Works Department (PWD).

THE STUDY FLOW



INDICATORS

1. The landslide/flood models are reviewed by the government agencies for incorporating in their research or actual hazard risk management.
2. The EWS is reviewed by the government agencies for full or partial adoption to improve their existing warning system.
3. The disaster reduction online database is reviewed by the government agencies for update and improvement of their existing database.

FLOOD GROUP – RESEARCH ACTIVITIES

2.1 Field data acquisition and processing/arrangement for database in Kelantan river basin

2.2 Construction of a wide geographical coverage flood model based on IFAS system in the Kelantan river basin

2.3 Construction of a Mid-resolution 3D hydro-geological model (M3DM) and extraction of risky locations for flood and landslide by judging from the condition of water, topography and geology in selected area

2.4 Construction of a high-resolution 3D hydro-geological model (H3DM) based on the M3DM

2.5 Comparison of IFAS and GETFLOWS model with atmospheric based model currently developed in Kelantan river basin

SITE VISIT TO LOCATE FLOOD GAUGE LOCATIONS

Proposed Water Level Station 2 : Sg. Pergau

Proposed Water Level Station 1 : Olak Jeram

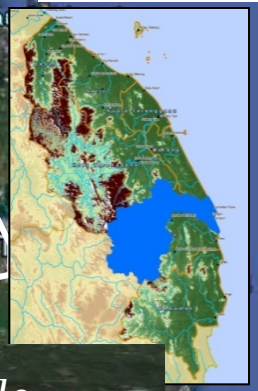
Proposed Rainfall Station 2 : Kg. Calil

Proposed Rainfall Station 1 : Kg. Kuala Betis

Study Area

The catchment of the Kelantan River

Areal extent:
NS:approx.150km
EW:approx.100km
=approx. over 13000km^2



Dungun river
Total Length = 110km
Catchment Area= 1858km^2

Survey of small-scale topography and other conditions in risky places along the main streams.

Kuara Krai

Land slide area

Dungun experienced two major floods during 2003: 30th of November and 8th of December until 16th of December (DID, 2004).
During 2003 flood, 10,515 people are evacuated with 4 death toll.

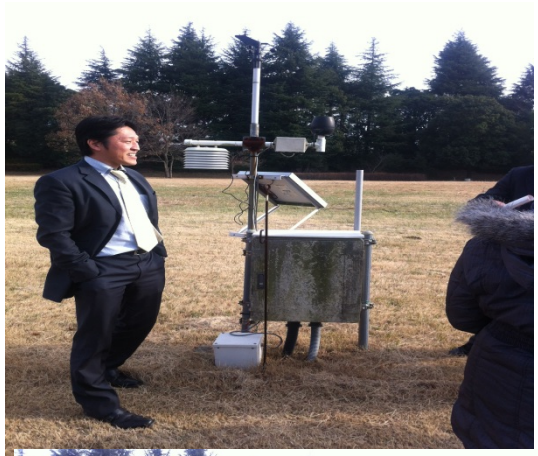
TRAINING

Department of System Innovation, University of Tokyo, GET Corporation, ICHARM and NIED

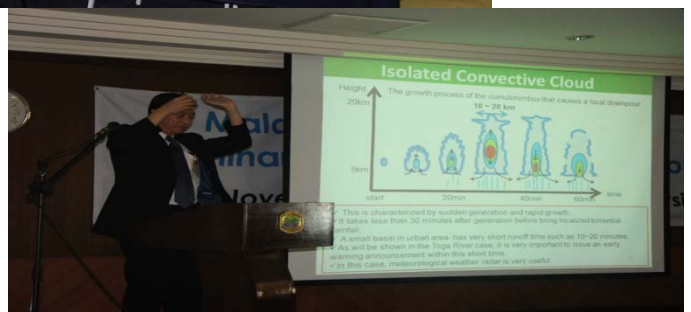
21 – 28 April 2012

TRAINING

VTI, Nippon Koei Co. Ltd. Research and Development Center,
CeRES, Chiba University, CSIS, University of Tokyo and OYO Corporation
2 – 15 December 2012



MALAYSIA-JAPAN COLLABORATION: SEMINAR ON FLOOD DISASTER 20TH NOVEMBER 2012



EXPECTED DELIVERABLES

GROUP 2 – FLOOD STUDY

Construction of comprehensive advanced numerical flood-runoff analytical models of wide geographical coverage and mid & high resolutions models in the Kelantan and Dungun river basin.

2nd JCC Meeting at UNITEN
22 November 2012

Indicators

2-1. IFAS system adapted to the Dungun and Kelantan river is built.

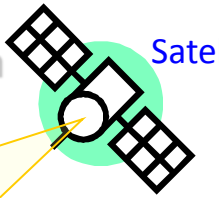
2-2. M3DM and H3DM adapted to the Dungun and Kelantan is built.

APPLICATION OF WIDE GEOGRAPHICAL COVERAGE FLOOD MODEL

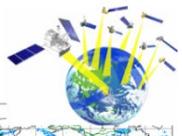
Integrated Flood Analysis System (IFAS)

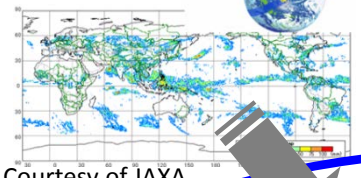
Flood runoff analysis and forecasting coupled with ground- & satellite-based rainfall and global GIS information

Rainfall observation with satellites



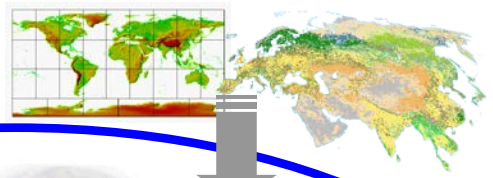
Satellite-based rainfall data
(JAXA-GSMaP)
(Quasi-real-time)





Courtesy of JAXA

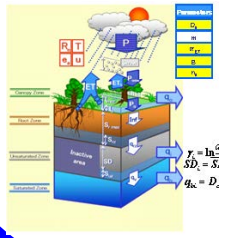
GIS information on basin characteristics
(Elevation, Land use, Geology)
Available on internet



Rainfall observation with ground-based raingauges

IFAS
Integrated Flood Analysis System

User friendly display



Input of ground-based and satellite-based rainfall with the original self-correction algorithm
Easy creation of distributed-parameter runoff model with global/local GIS
Implementation of necessary GIS tools and GUI interfaces on IFAS

Flood runoff (flow & water level) analysis

Flood forecasting / warning
→ Safe evacuation

Towards reduction/prevention of flood disasters

Structure of IFAS

Rainfall data

- Satellite-based rainfall: download from the Internet
  GSMaP_NRT (JAXA), 3B42RT(NASA), QMORPH/CMORPH (NOAA)
- Ground rainfall: *CSV format*
- Rainfall forecast: *Global GPV (60km, Japan Meteorological Agency)*
- Climatic change scenario or reanalysis data: *Net CDF format*

Model building with GIS tool

- Basin boundary & river channel network delineation: based on DEMs such as
  GTOPO30(USGS), Hydro1K (USGS), Global Map (ISCGM) and other CSV/shp data
- Parameter setting: first-approximated setting based on global GIS data as follows, or any other local GIS data
  - landuse (cover) and vegetation cover: *GLCC(USGS), Global Map (IGCGM)*
  - Soil : *texture(UNEP), depth(NASA), moisture holding capacity(UNEP)*
  - Geology : *CGWM*

(Parameter setting can be made on GIS categories and/or sub basins.)

Runoff analysis

- PDHM Ver.1(3-layer model) & Ver.2(2-layer model): for small- to medium-scale rivers
- BTOP model: for medium- to continental-scale rivers including seasonal floods

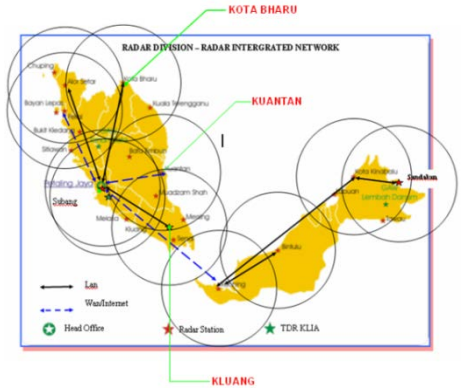
Visual Presentation

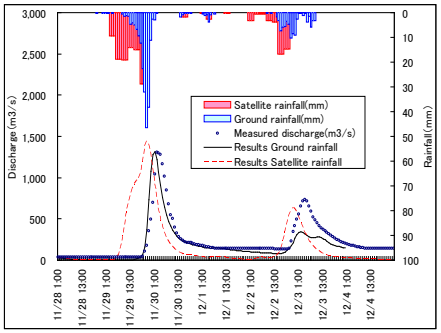
- Graph outputs: time series (ex. hydrograph), plan- or layer-view, tables, animation
- Output to general GIS including Google Earth

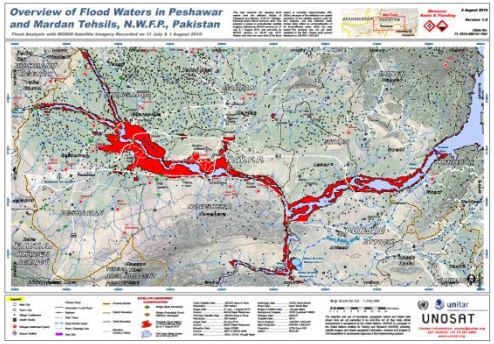
Wide-range flood modeling of wide area

(ICHARM, UNITEN)

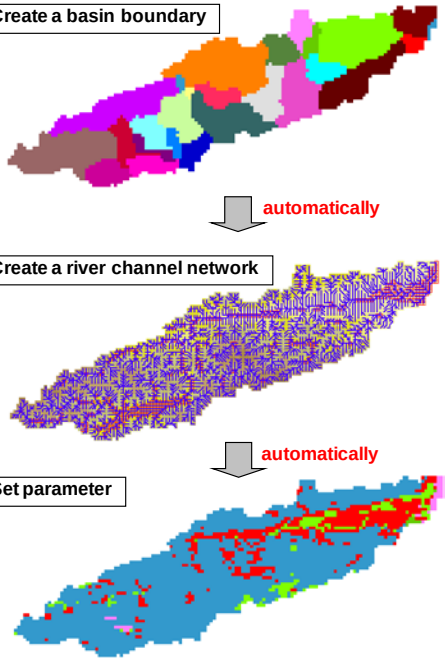
- Selection of “wide-range” demonstration basin(s) in Malaysia, including high- & middle-resolution modeling area (Kelantan and Dungun River Basin)
- Collection of hydrologic & GIS data and flood inundation data including satellite-based images and disaster damages
- To implement extra sub-modules in IFAS required for its application to Malaysian conditions, such as a module to input radar data, to combine them with ground-based rainfall data, to input rainfall forecasting data in Malaysia, and so forth.
- To construct a demonstration system for IFAS-based wide-range flood runoff model and Rainfall-Runoff-Inundation model for the demonstration basin(s)
- To find optimal parameters of the model in Malaysia
- To evaluate the performance of the models and to upgrade IFAS for easy implementations in wider-range areas in Malaysia
- Setting flood warning level for the demonstration rivers, IFAS modifications and flood hazard mapping based on the hydrological & frequency analysis, considering local needs for warning
- Flood risk mapping combined with social data (vulnerable population, property, etc.) on GIS
- To upgrade IFAS-based flood runoff analysis system for real-time flood forecasting and warning system with in-situ real-time hydrologic monitoring data





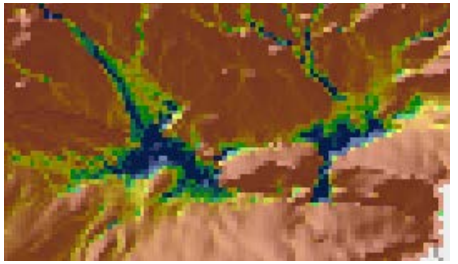


Comparison between satellite-based inundation extent and inundation simulations with a ICHARM’s rainfall-runoff-inundation model for Pakistan flood, August 2010

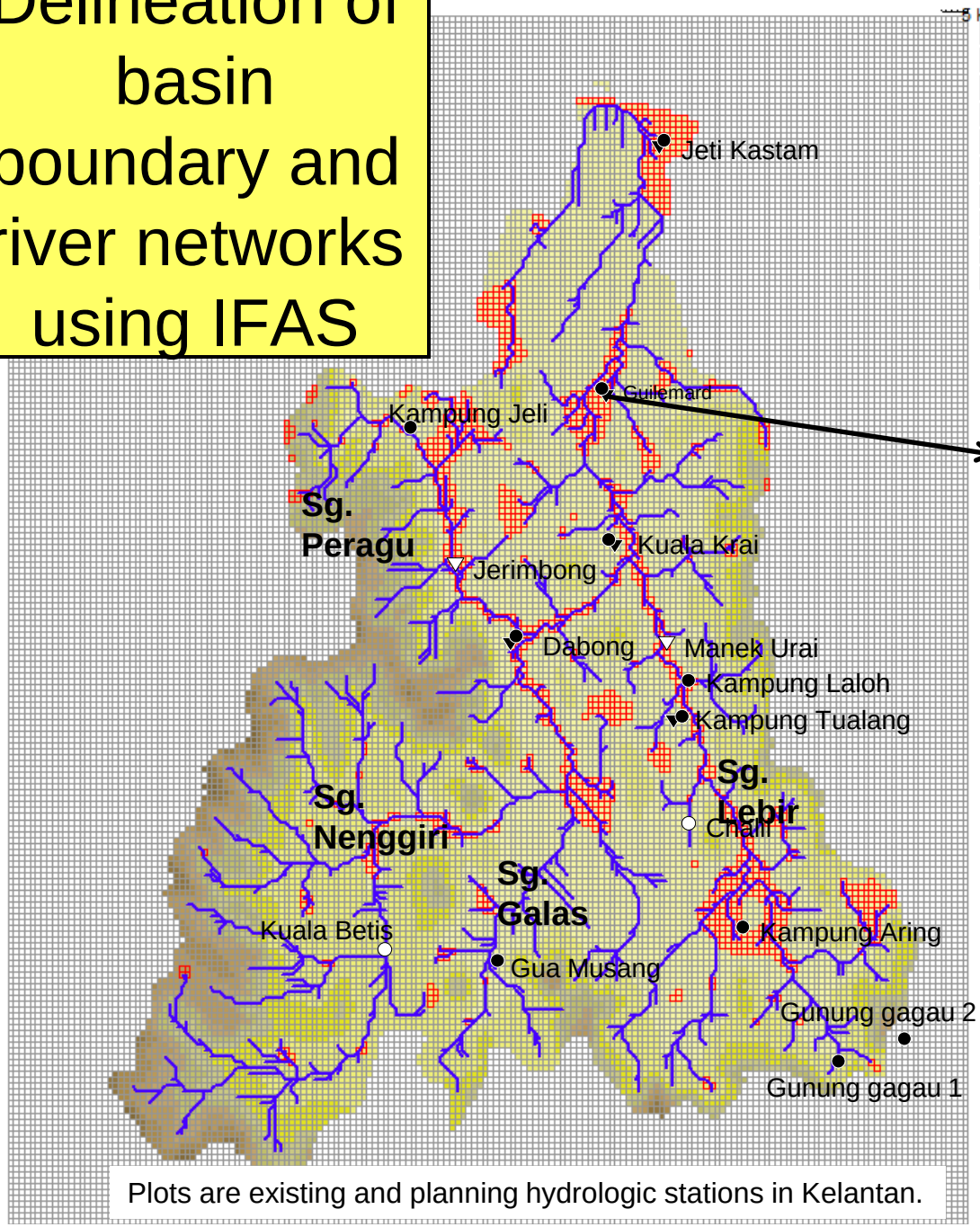


Example of flood runoff model construction

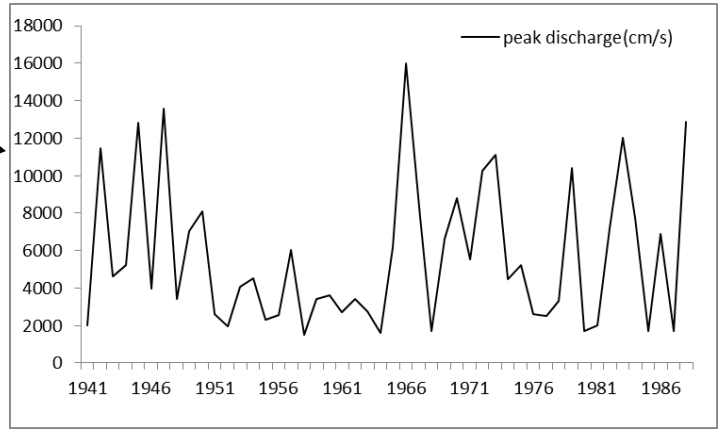
& simulations with IFAS



Delineation of basin boundary and river networks using IFAS



Plots are existing and planning hydrologic stations in Kelantan.

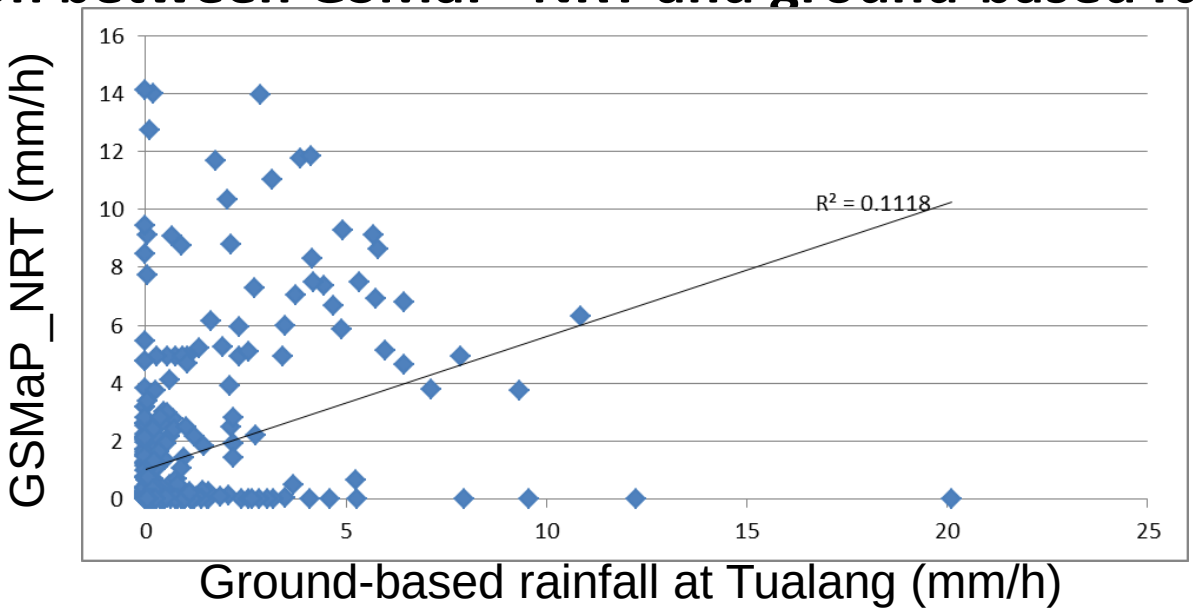


Peak discharge at Guillemard from 1941 to 1988.

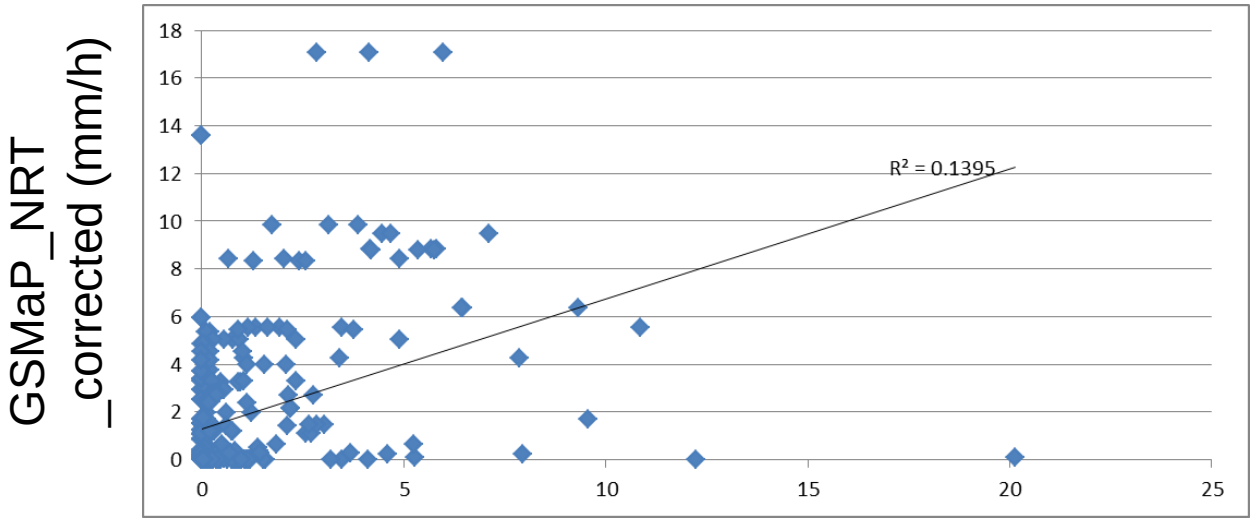
▼● Jeti Kastam
● Kampung Jeli
▼● Guilemard
● Gua Musang
● Gunung gagau 1
● Gunung gagau 2
▼● Kuala Krai
▼● Dabong
● Kampung Laloh
● Kampung Aring
▼● Kampung Tualang
▽ Manek Urai
○ Chalil
▽ Jerimbong
○ Kuala Betis

Black mark is the existing station and white one is the proposed station. Upside down triangle is the water level station and circle is the rainfall station.

Correlation between GSMaP_NRT and ground-based rainfall data

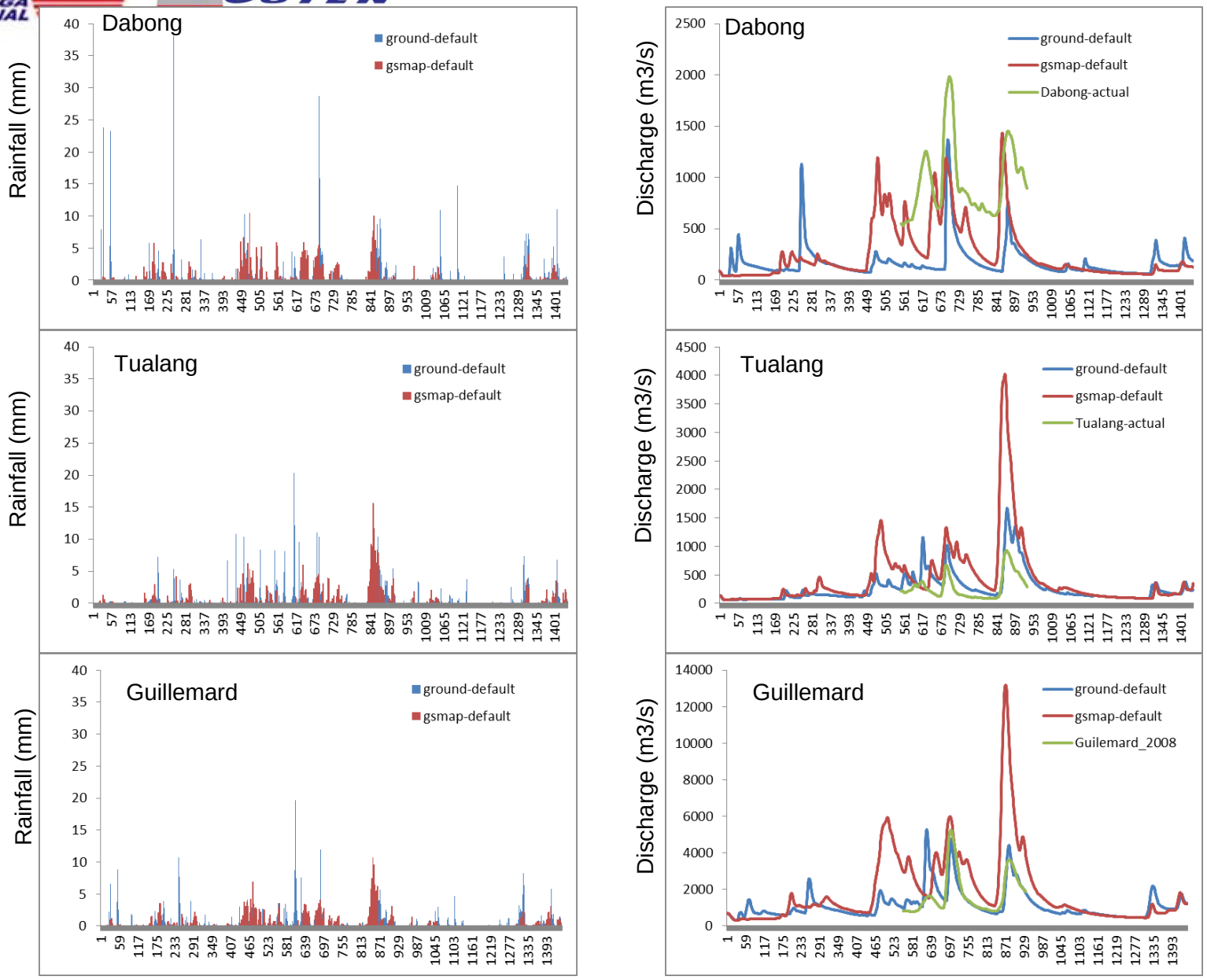


After the application of ICHARM's Self-Correction Method



a) Rainfall

b) Discharge



Hourly rainfall and discharge at three points in Kelantan river from Nov.1 to Dec.31, 2008

Online Flood Monitoring

INFOBANJIR '*ONLINE*'

Web site http://infobanjir.water.gov.my

PUBLIC INFOBANJIR

http://publicinfobanjir.water.gov.my/

Amaran Hujan Lebat

Makluman: Tiada amaran hujan lebat yang terkini!
Masa: 03-01-2013 - 18:46

Papar Peta: Keamatan hujan 24 jam terakhir

Rainfall (mm)

0	40: Moderate
10: Light	60: Heavy
25: Normal	100: Very Heavy

KEMUDAHAN LAIN

PAUTAN LAIN

Telemetri Negeri e-Bencana Meteorologi

Pilih Negeri

Ramalan Cuaca

Portal banjir

myGovernment NRE 1Malaysia MSC MKN Majlis Keselamatan Negara

PublicInfoBanjir on Facebook

Like 1,994

Kawasan banjir

Laluan lalulintas

DAFTAR MASUK

Kakitangan JPS

ID Pengguna:

Kata Laluan:

Daftar Masuk Reset

KAMERA BANJIR

Pautan Kamera

Kamera Banjir: Terdapat sejumlah 22 buah kamera yang sedang beroperasi di beberapa lokasi penting di sekitar Malaysia.

Dengan adanya sistem kamera ini maklumat aras air sungai bagi kawasan yang terlibat dapat

TALIAN ADUAN

JPS Careline

Talian Aduan Awam: 1300 80 1010

Kami melayani segala aduan yang dibuat yang berkaitan dengan perkhidmatan JPS

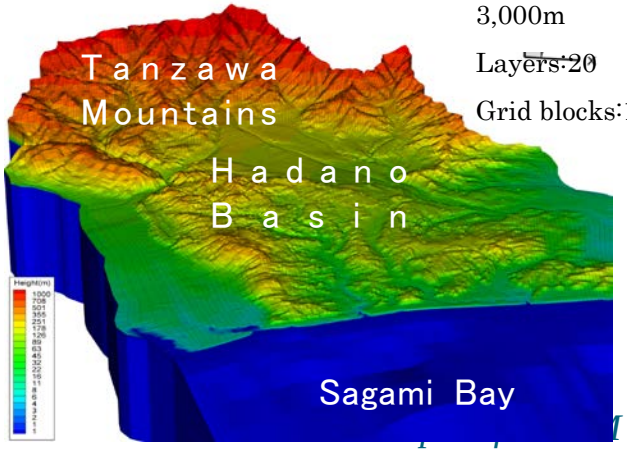
RESEARCH COLLABORATION WITH TOKYO UNIVERSITY - PROF TOSAKA
APPLICATION OF MID-RESOLUTION (M3DM) AND HIGH-RESOLUTION (H3DM) HYDRO-GEOLOGICAL MODELING (UT – GETFLOWS)

M3DM is the model that covers a wide watershed with proper resolution of topography, land use, and geology. It is consisted with grid blocks ranging from several meters to several kms depending upon the local conditions.

- can include most of the hydrological processes relating to river runoff and groundwater flow of the region.

- gives useful information for both landslides and floods. (regional distribution of water pressure and water saturation)

- can be used as the basic model of the high-resolution model with locally refined grid blocks.

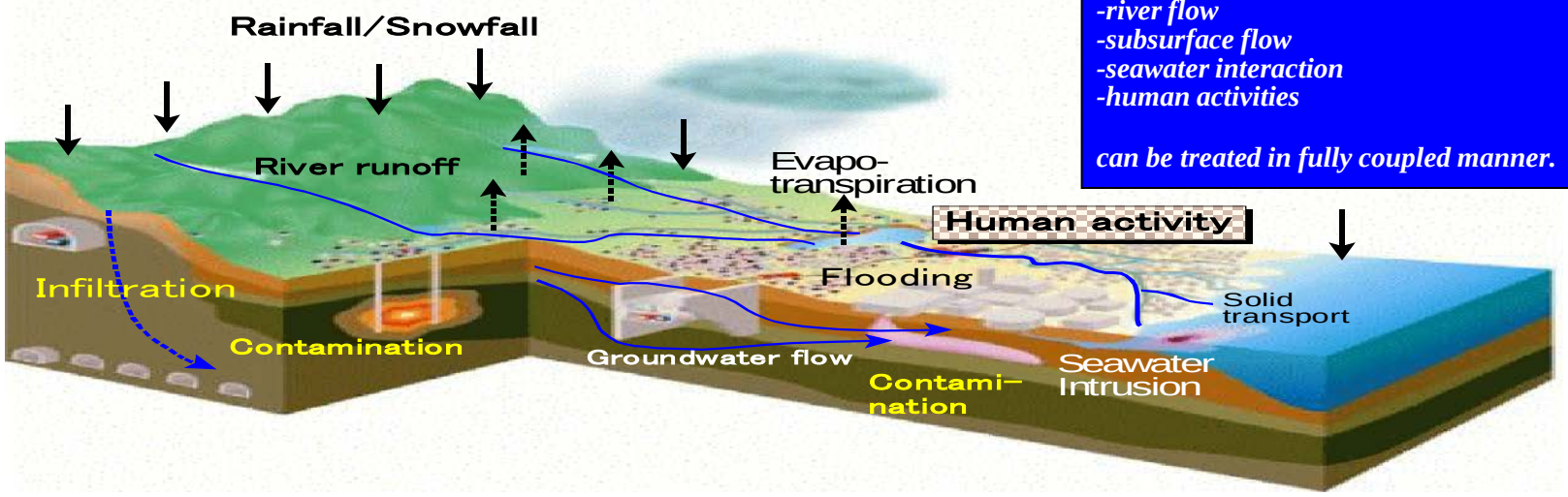


Vertical:2000 to -3,000m
Layers:~~20~~
Grid blocks:1,281,480

In "GETFLOWS",

-evapo-transpiration
-river flow
-subsurface flow
-seawater interaction
-human activities

can be treated in fully coupled manner.



A CONCEPTUAL VIEW OF LANDSCAPE AND HUMAN ACTIVITIES

DELIVERABLES FOR OVERALL SATREPS PROJECT

1. Construction of analysis system for temporal change and real-time condition of surface environment by using RS/GIS technologies.

Indicators

1-1. Sets of high-quality DEM covering target research sites are prepared.

1-2. The method using multi-temporal spatial datasets is developed.

2. Construction of comprehensive advanced numerical flood-runoff models of wide geographical coverage and ones with high resolutions in the Kelantan and Dungun river basin.

Indicators

2-1. The flood analysis model for the Kelantan and Dungun River basin is built based on IFAS.

2-2. The flood-inundation 3-D models with mid- and high-resolutions for the Kelantan and Dungun River basin are built based on GETFLOWS.

3. Construction of landslide hazard assessment system with considering the impacts of precipitation condition and infrastructure development in Malaysian locality.

Indicators

3-1. Site-adapted 2D/3D physical models are developed.

3-2. Warning information is provided based on observations by landslide monitoring stations.

4. Construction of comprehensive disaster information database including satellite observation data, flood/ landslide hazard data and disaster mitigation information.

Indicators

4-1. Landslide/flood hazard information system is built.

4-2. Disaster reduction online database is built.

5. Trial proposal of risk management system of flood/landslide disaster aiming at effective utilization of risk information in local government and community.

Indicators

5-1. Web-based EWS for landslide/flood hazard is operated in trial basis for selected monitoring area.

5-2. Web-based risk communication tools to improve the interface between local government and community are provided.

CONCLUSIONS

1. Strengthen the international science and technology (S&T) cooperation between Malaysian and Japanese researchers.
2. Advance scientific knowledge and technology for reducing the geohazard such as flood and landslides
3. Develop sustainable research capacity at research institutes in Malaysian counterparts (UNITEN/USM/MMU)
4. Capacity building especially young human resources who will manage and extend the flood and landslide prevention system in Malaysia.


THANK YOU

Real-Time Satellite Rainfall

- There is no necessity for installation and maintenance of a rain gauge or transmission equipment.
- The data almost whole world with the same accuracy is obtained.

Product name	3B42RT	CMORPH	QMORPH	GSMaP
Builder	NASA/GSFC	NOAA/CPC	NOAA/CPC	JAXA/EORC
Coverage	50N～50S	60N～60S	60N～60S	60N～60S
Spatial resolution	0.25°	0.073°	0.073°	0.1°
Time resolution	3 hours	30 minutes	30 minutes	1 hour
Delay of delivery	6 hours	18 hours	3 hours	4 hours
Coordinate system	WGS			
Data archive	Dec. 1997～	Recent 1week	Recent 1week	Dec.2007～
Data source (sensor)	Aqua/AMSR-E, AMSU-B, DMSP/SSM/I and TRMM/TMI and IR	TRMM/TMI, Aqua/AMSR-E, AMSU-B, DMSP/SSM/I and IR		TRMM/TMI, Aqua/AMSR-E, DMSP-F13-15/SSM/I, DMSP-F16-17/SSMIS, IR data

(Fukami and Herath, 2009)

SCEC as a Virtual Organization

Greg Beroza
(Deputy Director)

SCEC

an NSF + USGS center

SCEC

an NSF + USGS center

Southern California Earthquake Center

- ***Large consortium of institutions*** **that coordinates earthquake research**
- ***Collaboratory*** **that uses advanced IT to synthesize and validate system-level models of earthquake processes**
- ***Open community of trust*** **that shares data, models, knowledge, and ideas**
- ***Reliable partner*** **that works with other organizations to promote earthquake resilience**
- ***International leader*** **that involves scientists from many countries**

SCEC Mission:

Gather data on earthquakes in Southern California and elsewhere

→

Integrate this information into a comprehensive, physics-based understanding of earthquake phenomena

→

Communicate this understanding to end-users and society at large as useful knowledge for reducing earthquake risk

SCEC is a Consortium of Institutions

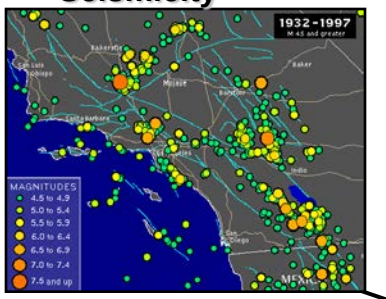
Core Institutions (17)	Participating Institutions (48)
California Institute of Technology California Geological Survey Columbia University Harvard University Massachusetts Institute of Technology San Diego State University Stanford University U.S. Geological Survey, Golden U.S. Geological Survey, Menlo Park U.S. Geological Survey, Pasadena University of California, Los Angeles University of California, Riverside University of California, San Diego University of California, Santa Barbara University of California, Santa Cruz University of Nevada, Reno University of Southern California (lead)	Appalachian State University; Arizona State University; Brown University; Cal-Poly, Pomona; Cal-State, Fullerton; Cal-State, Long Beach; Cal-State, Northridge; Cal-State, San Bernardino; Carnegie Mellon University; CICESE (Mexico); Colorado School of Mines; Cornell University; Disaster Prevention Research Institute, Kyoto University (Japan); ETH Zurich (Switzerland); Georgia Tech; Institute of Earth Sciences of Academia Sinica (Taiwan); Earthquake Research Institute, University of Tokyo (Japan); Indiana University; Institute of Geological and Nuclear Sciences (New Zealand); Jet Propulsion Laboratory; National Taiwan University (Taiwan); National Central University (Taiwan); National Chung Cheng University (Taiwan); Oregon State University; Pennsylvania State University; Purdue University; Smith College; SUNY at Stony Brook; Texas A&M University; University of Alaska, Fairbanks; UC, Berkeley; UC, Davis; UC, Irvine; University of Cincinnati; University of Illinois; University of Kentucky; University of Massachusetts; University of Michigan; University of New Hampshire; University of Oregon; University of Texas-El Paso; University of Texas-Austin; University of Western Ontario (Canada); University of Wisconsin; URS Corporation; Utah State University; Utah Valley University; Woods Hole Oceanographic Institution

Rationale for the SCEC Collaboratory

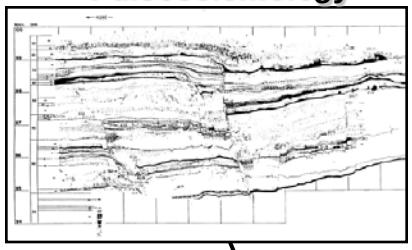
- **SCEC is a virtual organization of over 60 institutions with the structure**
  - **to coordinate an interdisciplinary, multi-institutional research program in earthquake system science**
  - **to sustain the web of organizational partnerships needed to translate basic research into useful knowledge**
- **The SCEC collaboration achieves a deeper understanding of earthquake behavior more rapidly than would be feasible by individual researchers or institutions working alone**
  - **Southern California serves as a well-equipped natural laboratory for gaining new knowledge**

Characterizing Seismic Hazard is an Earthquake System Science Problem

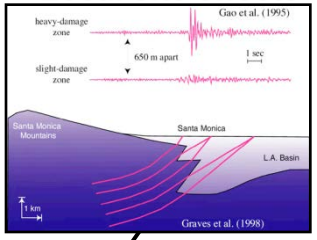
Seismicity



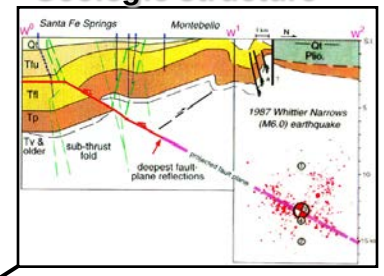
Paleoseismology



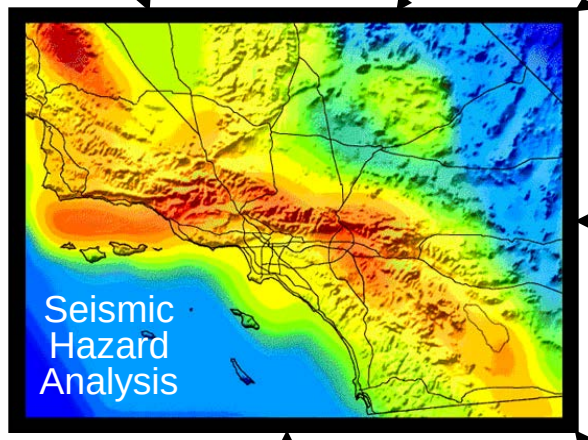
Local site effects

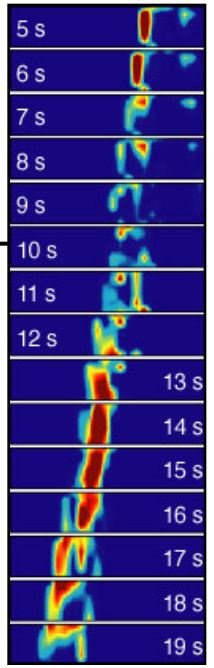


Geologic structure

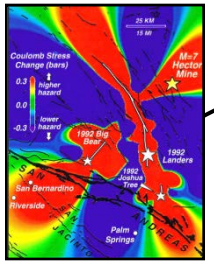


Fault systems

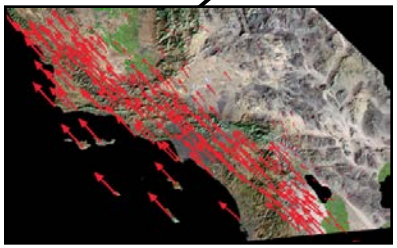




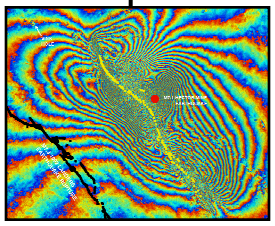
Rupture Dynamics



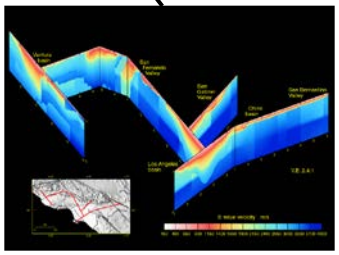
Stress Transfer



Crustal motion



Crustal deformation



Seismic velocity Structure

Virtual Institute for the Study of Earthquake Systems (VISES)

- **<u>Premise</u>: research on fault systems in different tectonic regions can be synthesized into a physics-based understanding of earthquake phenomena**
  - VISES will work towards this synthesis through the co-development and comparison of well-calibrated regional models in the complementary tectonic settings of Japan and California.
  - VISES will provide the organizational structure for a coordinated U.S.-Japan effort to integrate a spectrum of physics-based models into seismic hazard analysis.
- **<u>Program</u>: fundamental research to address basic questions of earthquake system science:**
  - *Fault system dynamics*: How do forces evolve within a fault network on a time scale of hours to centuries to generate earthquakes?
  - *Fault rupture dynamics*: How do forces evolve on a time scale of seconds to minutes when a fault breaks during an earthquake?
  - *Ground motion dynamics*: How do seismic waves propagate from the rupture to produce strong shaking at Earth's surface?