JAPANESE-MALAYSIAN COLLABORATION PROJECT FOR BUILDING COMMUNITY RESILIENCE

Khamarrul Azahari Razak
Universiti Teknologi Malaysia (UTM) Kuala Lumpur

[1] Co-Chair, Working Group on Climate Change & Disaster Risk Reduction,
Global Young Academy @ https://globalyoungacademy.net
[2] Member of the Academy of Sciences Malaysia, Disaster Risk Reduction Alliance Committee
[3] Geohazard Lab, UTM RAZAK Faculty of Technology and Informatics
[4] Multi-Geohazard and Disaster Risk Lab, Disaster Preparedness and Prevention Center
Malaysia-Japan International Institute of Technology

khamarrul.kl@utm.my I 019 3649495

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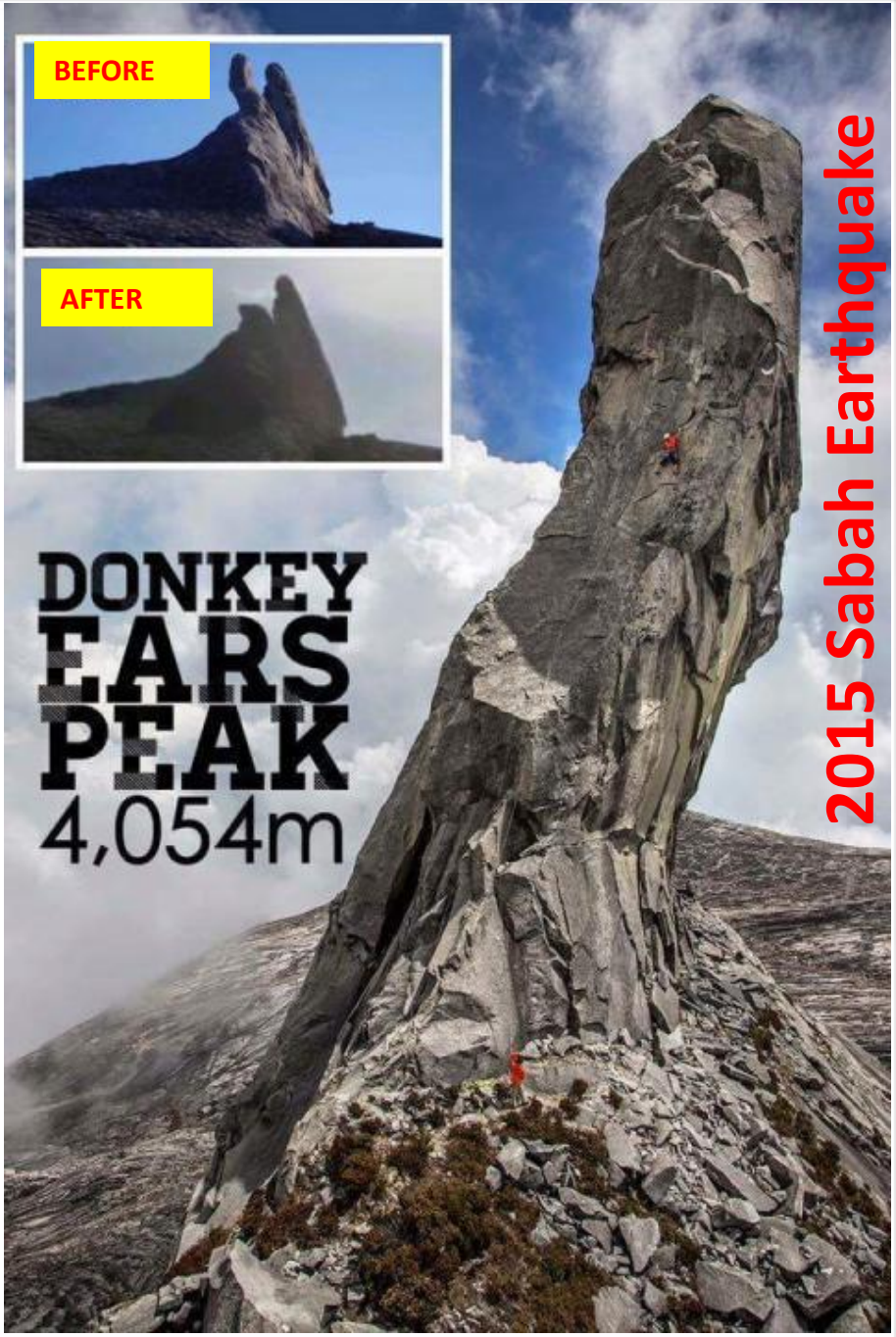

UTM UNIVERSITI TEKNOLOGI MALAYSIA
Razak Faculty of Technology and Informatics

- Mapping Analysis & Assessment (MAA)
- Modelling Simulation & Prediction (MSP)
- Monitoring Surveillance & Warning (MSW)

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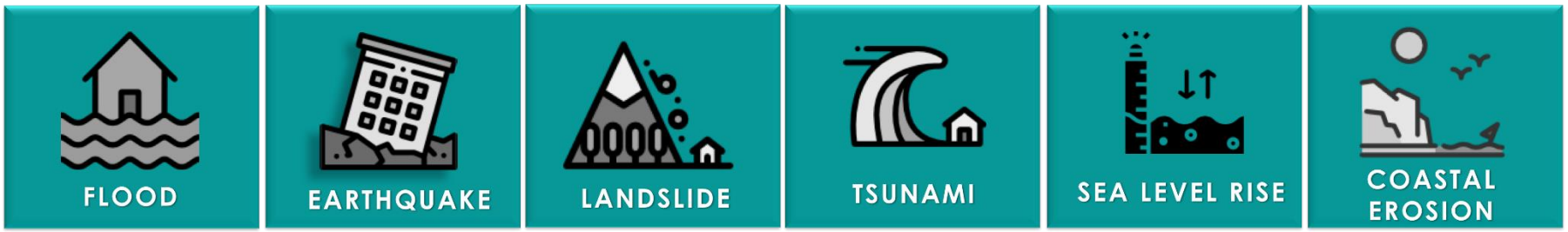
MULTI-GEOHAZARD & DISASTER RISK

A TRANSDISCIPLINARY DISASTER RESEARCH

Advancing disaster risk reduction in a changing environment



"Knowing Our Current Risk, Preventing Our Future Risk"

http://razakschool.utm.my/khamarrul/,

@ khamarrul.kl@utm.my

Khamarrul Azahari Razak, PhD [1,2]
[1] Senior Lecturer,
UTM RAZAK Faculty of Technology and Informatics
[2] Research Member, Disaster Preparedness and Prevention Center
Malaysia-Japan International Institute of Technology
Universiti Teknologi Malaysia (UTM) Kuala Lumpur

Ph.D (Geosciences, Landslides, Remote Sensing)
Faculty of Geosciences, Utrecht University, Utrecht
with cooperation of ITC-University of Twente, United Nation University UNU-DRM Center for Spatial and Risk Management, The Netherlands

National Involvement: Technical expert in the National Project (Slope Hazard and Risk Mapping) (2014-2015) appointed by Minerals and Geoscience Department Malaysia, Ministry of Natural Resources and Environment Malaysia; Consultants in Revision of National Slope Master Plan 2009-2023 Public Work Department; National Guidelines for Disaster Resilient Cities by PLANMalaysia; Resilience of Critical Infrastructure by CREAM CIDB

Membership: European Geosciences Union; Asia Oceania Geoscience Society; IEEE Geoscience and Remote Sensing Society; Asia-Pacific Network on Climate Science and Technology; Asia-Pacific Network for Global Change Research; Royal Institution of Surveyors Malaysia, Institution of Geospatial and Remote Sensing Malaysia, Malaysia Nature Society; Member of the Academy of Sciences Malaysia Disaster Risk Reduction Alliance Committee (DRR Alliance); Society for Engineering Geology and Rock Mechanics Malaysia (SEGRM)

Awards: Top 11 Young World Geomorphologists, awarded by the International Association of Geomorphology in Paris 2013 & Merdeka Awards Recipient Grant (Petronas, Shell, Exxon) 2016; Global Young Academy (GYA)

2016-2020

Multi-hazard & Disaster Risk (Kyoto University, Japan); **Earthquake and Cascading Geohazard** (Taiwan), **Co-seismic landslides** (National Center of Excellence in Geology, Pakistan); **Disaster Informatics** (National Information Society Agency, Korea); **Geospatial Business Continuity Planning** (JICA); **Risk Cities Initiative** (RiskCities-i) TU Berlin, HFT Stuttgart, UFZ Helmholtz Germany; **Disaster Resilient** Community (IRIDeS, Tohoku University, Japan)

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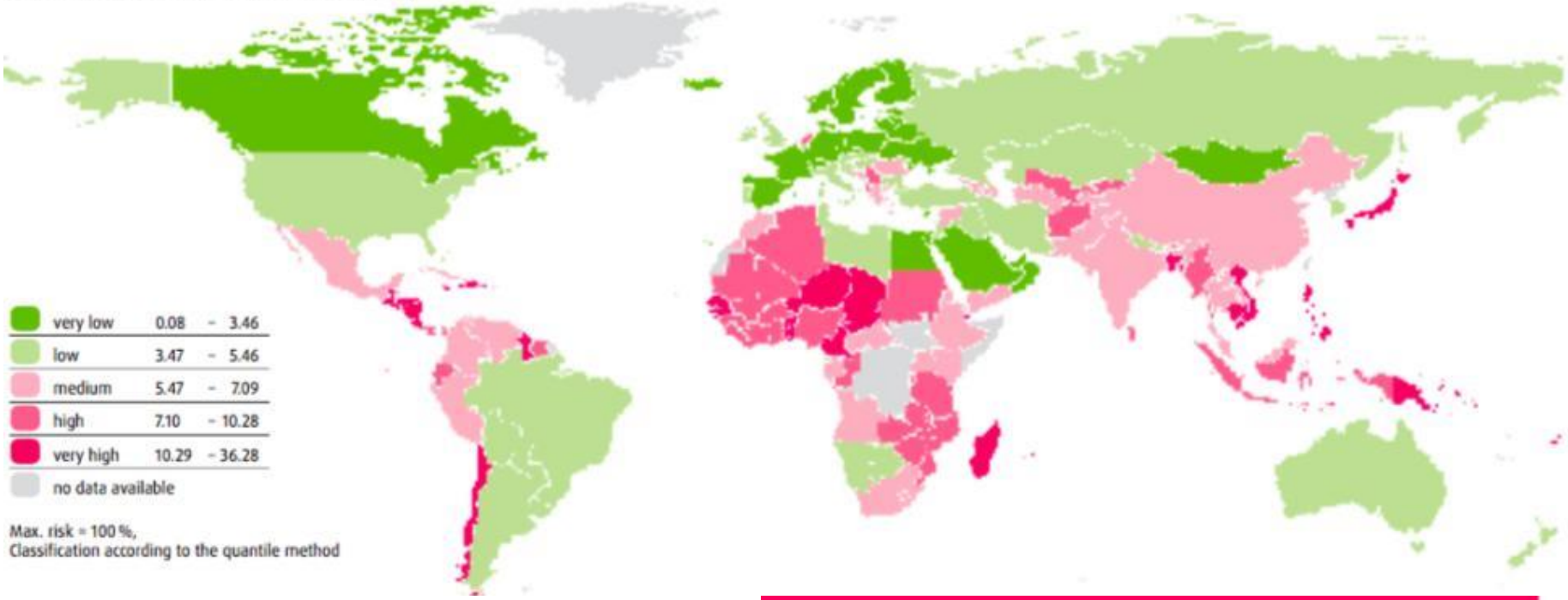
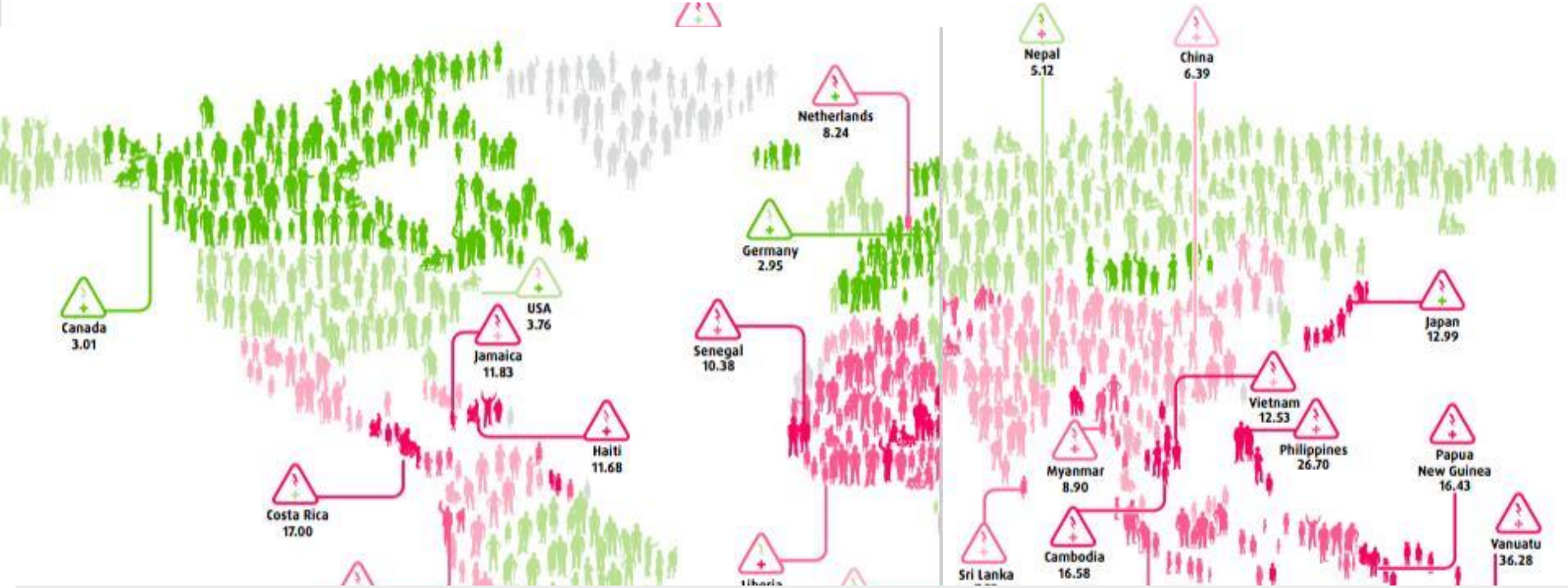
WorldRiskIndex

WorldRiskIndex as the result of exposure and vulnerability



WorldRiskReport 2016

In cooperation with Universität Stuttgart



WorldRiskIndex (WRI) in %		Exposure in %		Vulnerability in %	
very low	0.08 – 3.46	very low	0.28 – 9.25	very low	24.79 – 34.40
low	3.47 – 5.46	low	9.26 – 11.53	low	34.41 – 43.11
medium	5.47 – 7.09	medium	11.54 – 13.85	medium	43.12 – 49.72
high	7.10 – 10.28	high	13.86 – 17.45	high	49.73 – 62.58
very high	10.29 – 36.28	very high	17.46 – 63.66	very high	62.59 – 74.80
no data available		no data available		no data available	

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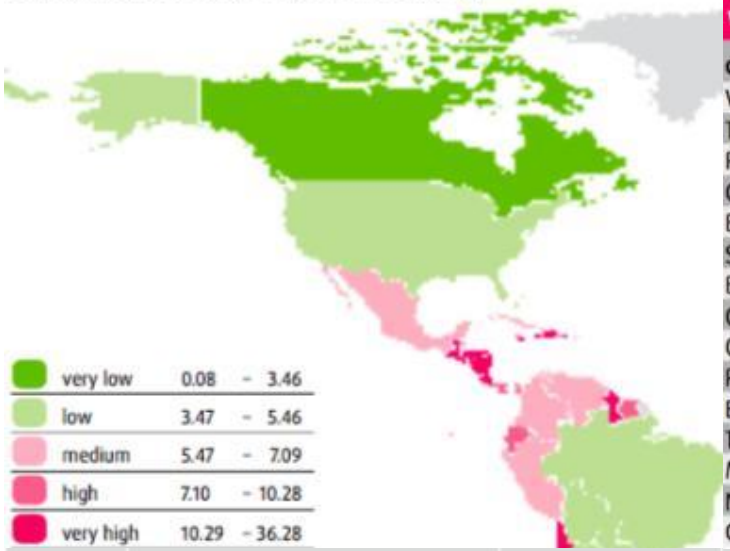
WorldRiskIndex

WorldRiskIndex as the result of exposure and vulnerability



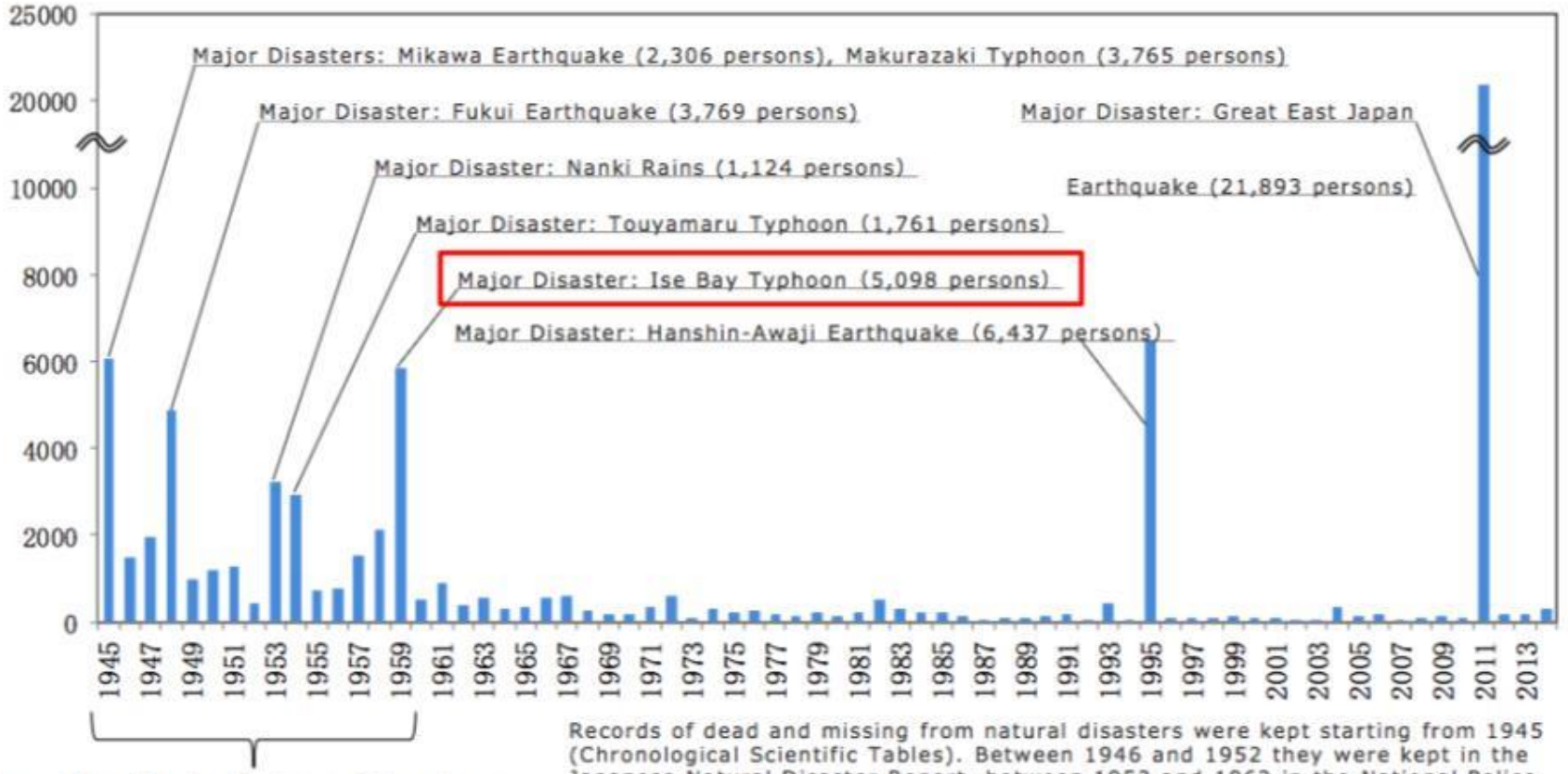
The 15 countries that are most at **risk** worldwide

Country	Risk (%)	Rank
Vanuatu	36.28	1.
Tonga	29.33	2.
Philippines	26.70	3.
Guatemala	19.88	4.
Bangladesh	19.17	5.
Solomon Islands	19.14	6.
Brunei Darussalam	17.00	7.
Costa Rica	17.00	8.
Cambodia	16.58	9.
Papua New Guinea	16.43	10.
El Salvador	16.05	11.
Timor-Leste	15.69	12.
Mauritius	15.53	13.
Nicaragua	14.62	14.
Guinea-Bissau	13.56	15.

The 15 most **exposed** countries worldwide

Country	Exp. (%)	Rank
Vanuatu	63.66	1.
Tonga	55.27	2.
Philippines	52.46	3.
Japan	45.91	4.
Costa Rica	42.61	5.
Brunei Darussalam	41.10	6.
Mauritius	37.35	7.
Guatemala	36.30	8.
El Salvador	32.60	9.
Bangladesh	31.70	10.
Chile	30.95	11.
Netherlands	30.57	12.
Solomon Islands	29.98	13.
Fiji	27.71	14.
Cambodia	27.65	15.

Rank	Country	WorldRiskIndex	Exposure	Vulnerability	Susceptibility	Lack of coping capacities	Lack of adaptive capacities
83.	Colombia	6.45 %	13.84 %	46.62 %	26.35 %	74.65 %	38.85 %
84.	Turkmenistan	6.44 %	13.19 %	48.82 %	24.76 %	75.61 %	46.11 %
85.	China	6.39 %	14.43 %	44.29 %	22.81 %	69.86 %	40.18 %
86.	Malaysia	6.39 %	14.60 %	43.76 %	19.02 %	67.52 %	44.73 %
87.	Eritrea	6.35 %	8.55 %	74.23 %	60.97 %	89.47 %	72.24 %
88.	Georgia	6.27 %	14.69 %	42.67 %	24.60 %	63.13 %	40.28 %
89.	Thailand	6.19 %	13.70 %	45.22 %	19.34 %	75.53 %	40.79 %
90.	Cuba	6.13 %	17.45 %	35.10 %	17.46 %	55.97 %	31.87 %

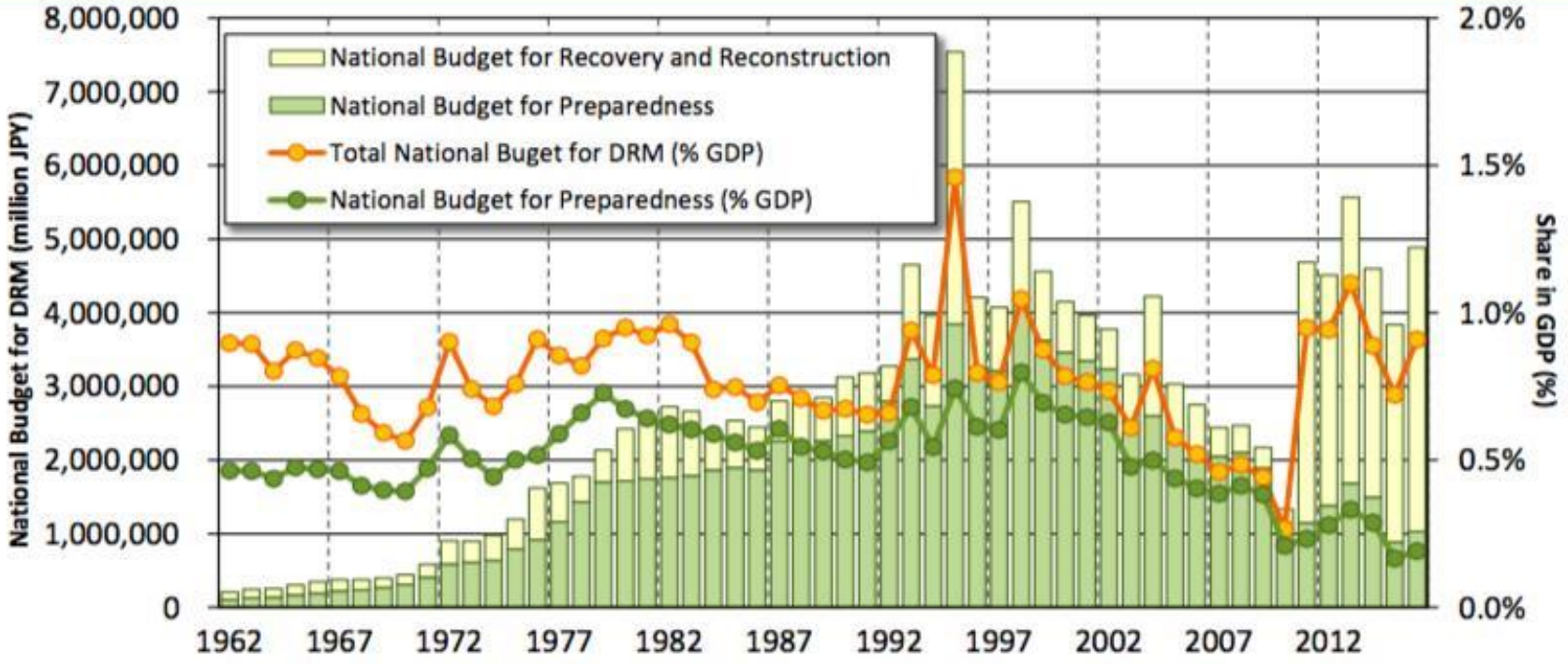


Before the Basic Act on Disaster Control Measures was established, a number of disasters occurred in which more than a thousand lives were lost.

Records of dead and missing from natural disasters were kept starting from 1945 (Chronological Scientific Tables). Between 1946 and 1952 they were kept in the Japanese Natural Disaster Report, between 1953 and 1962 in the National Police Agency records, and from 1963 onward they were created in the Cabinet Office based on Fire and Disaster Management Agency documents. Deaths in 1995 included 919 additional deaths considered to be linked to the Hanshin-Awaji Earthquake (Hyogo Prefecture data). Dead and missing in 2011 were collected by the Cabinet Office as preliminary figures. Data on dead and missing from the Great East Japan Earthquake in 2011 came from the Fire and Disaster Prevention Agency records (2011) "Damage Status from the Tohoku Region Pacific Coast Earthquake (Great East Japan Earthquake) (as of March 1st, 2015). The figure includes related deaths.

(Source: FY 2015 Disaster Control White Paper)

DRM investment in Japan



Note: National budget for Preparedness is total of "Science and Technology", "Disaster Preparedness" and "Disaster Management".
National budget for Recovery and Reconstruction is total of "Disaseter Response".

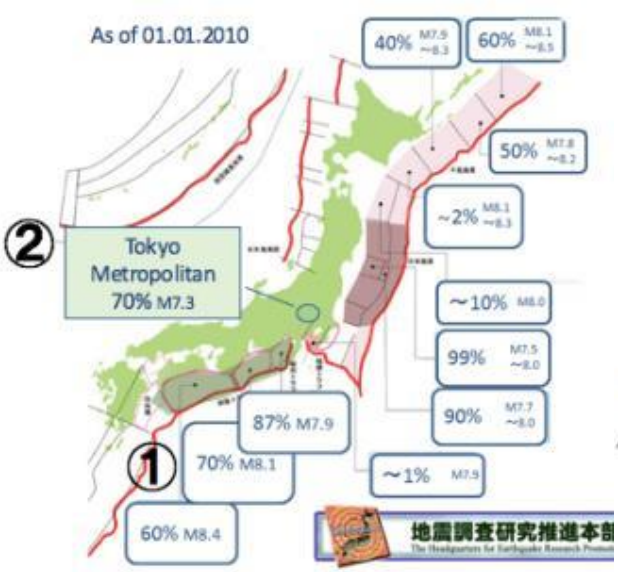
Source:
Budget for DRM: White Paper on Disaster Risk Management 2017 (http://www.bousai.go.jp/kaigirep/hakusho/h29/honbun/3b_6s_35_00.html)
GDP: White Paper on Economics 2017 (http://www5.cao.go.jp/j-j/wp/wp-je17/h11_data01.html)

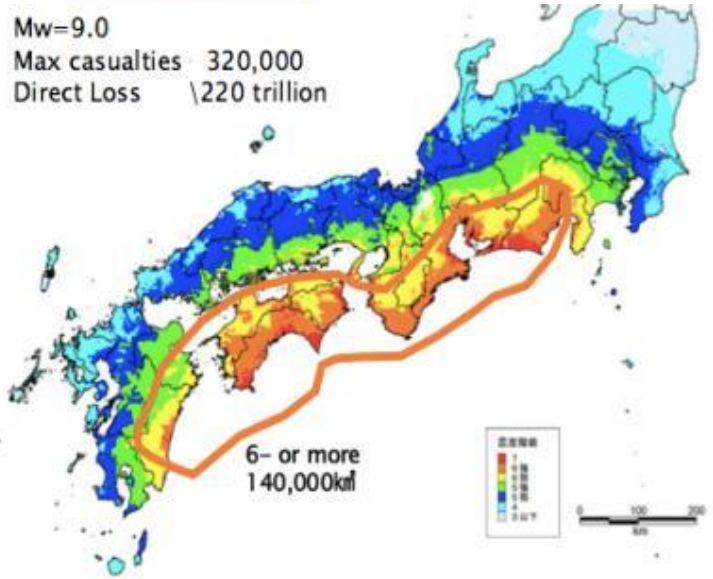
地震調査研究推進本部
The Headquarters for Earthquake Research Promotion

https://www.jishin.go.jp/

Two major earthquakes risks in Japan for the next 30 years produced by the Headquarter of Earthquake research promotion of the Japan Government.

First one is located in the Kochi Prefecture, Shikoku Island, Japan.





Nankai Trough (Tokai, Tonankai, Nankai) based on 2012 Scenario predicted up to a magnitude of 9.0 will be causing a direct damage of 220 trillion with 320,000 people killed/missing and up to 1.3 million collapsed buildings.

Expected Severe Earthquakes in Japan

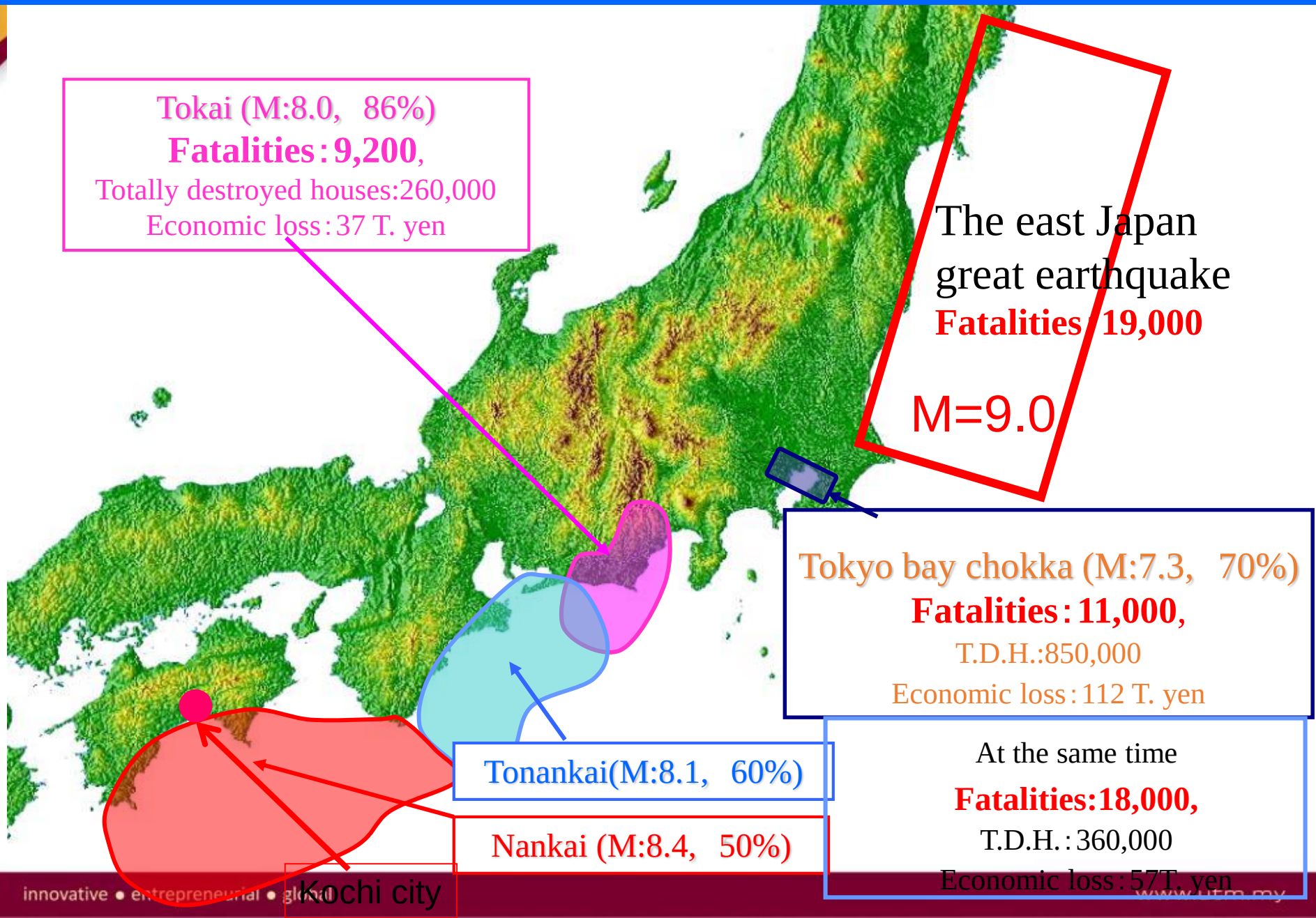
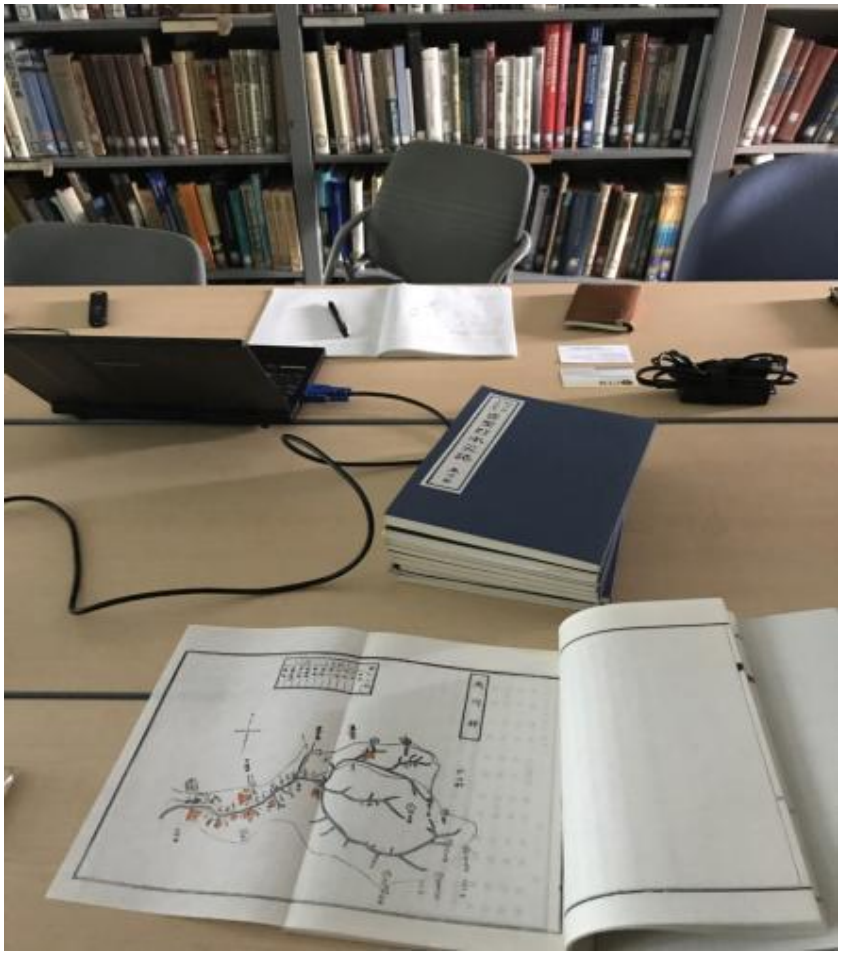


Photo shows the landmark constructed to memorize the landslide dam induced by Hoei-Nankai earthquake in 1707 resulting the flooding in the vicinity township (small photo)

@ khamarrul.kl@utm.my



Landslide record compiled in 1889

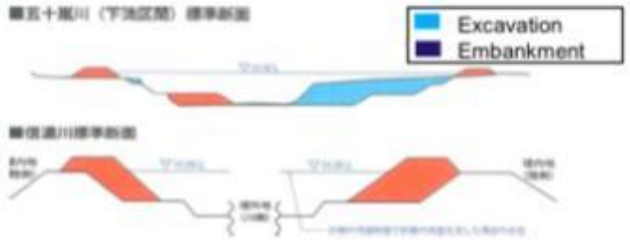
Record is not only about the location with such illustrative map, but also detailed information about the conditioning and triggering factors causing the landslides. **This is an important lesson learned for us to compile and record all disaster events - persistent policy for landslide inventory mapping in Malaysia**

@ khamarrul.kl@utm.my

Slides by Yusuke Amano, Director of International Cooperation and Engineering for Infrastructure Policy Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
Promote Public Investment in DRR @ Global Forum on Science and Technology for Disaster Resilience

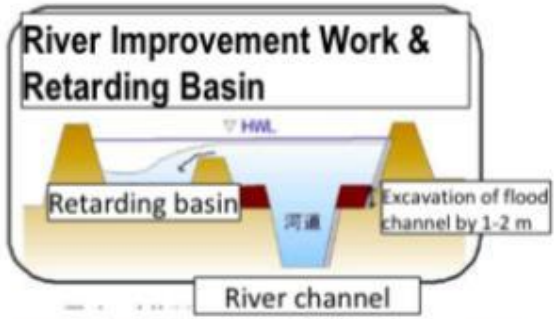
River improvements were implemented based on the July 2004 flood experience.

Total cost : about 118.2 billion JPY



(September 2008)

(August 2005)

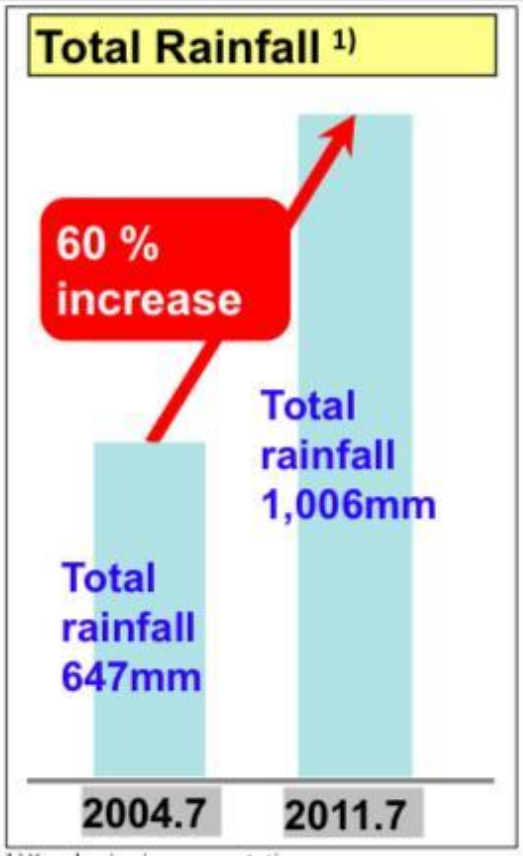


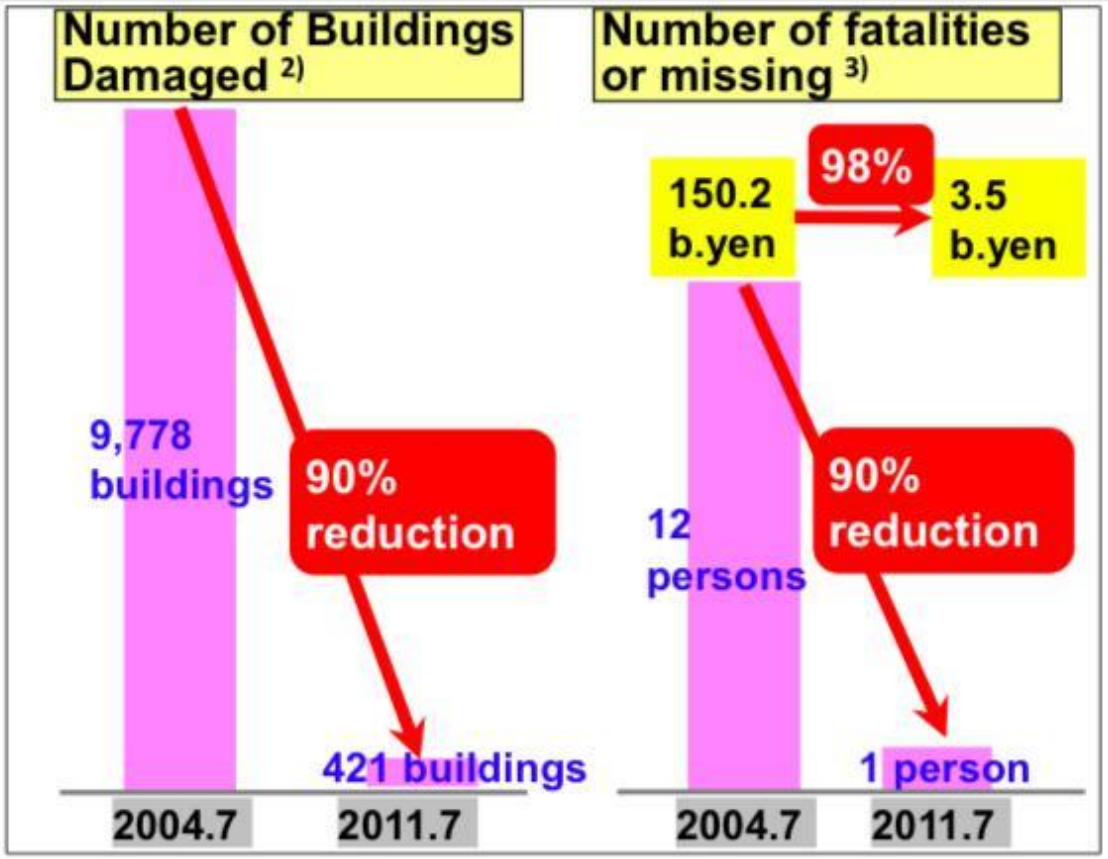
(March 2009)

(December 2010)

(September 2010)

In July 2011 the Shinano River Basin experienced a total rainfall of approx. 1,000mm, which was the largest rainfall on record and 1.6 times more than that of July 2004, but both damages to buildings and human casualties were reduced dramatically. **The investments were successfully justified in the end!**





1) Kasabori rain gauge station
2) 2004.7:「7.13新潟豪雨 水害記録誌(March 2006 Niigata Prefecture)
2011.7: Produced by Niigata Prefecture based on「第1回平成23年7月新潟・福島豪雨対策検討委員会」
3) Shinano River Downstream, Ikarashi River, Kariyata River Disaster Rehabilitation Emergency Project Pamphlet (Shinano Karyu River Office, Niigata Prefecture)

Slides by Yusuke Amano, Director of International Cooperation and Engineering for Infrastructure Policy Bureau, Ministry of Land, Infrastructure, Transport and Tourism
Promote Public Investment in DRR @ Global Forum on Science and Technology for Disaster Resilience 2017, 23—25 Nov 2017, Science Council of Japan

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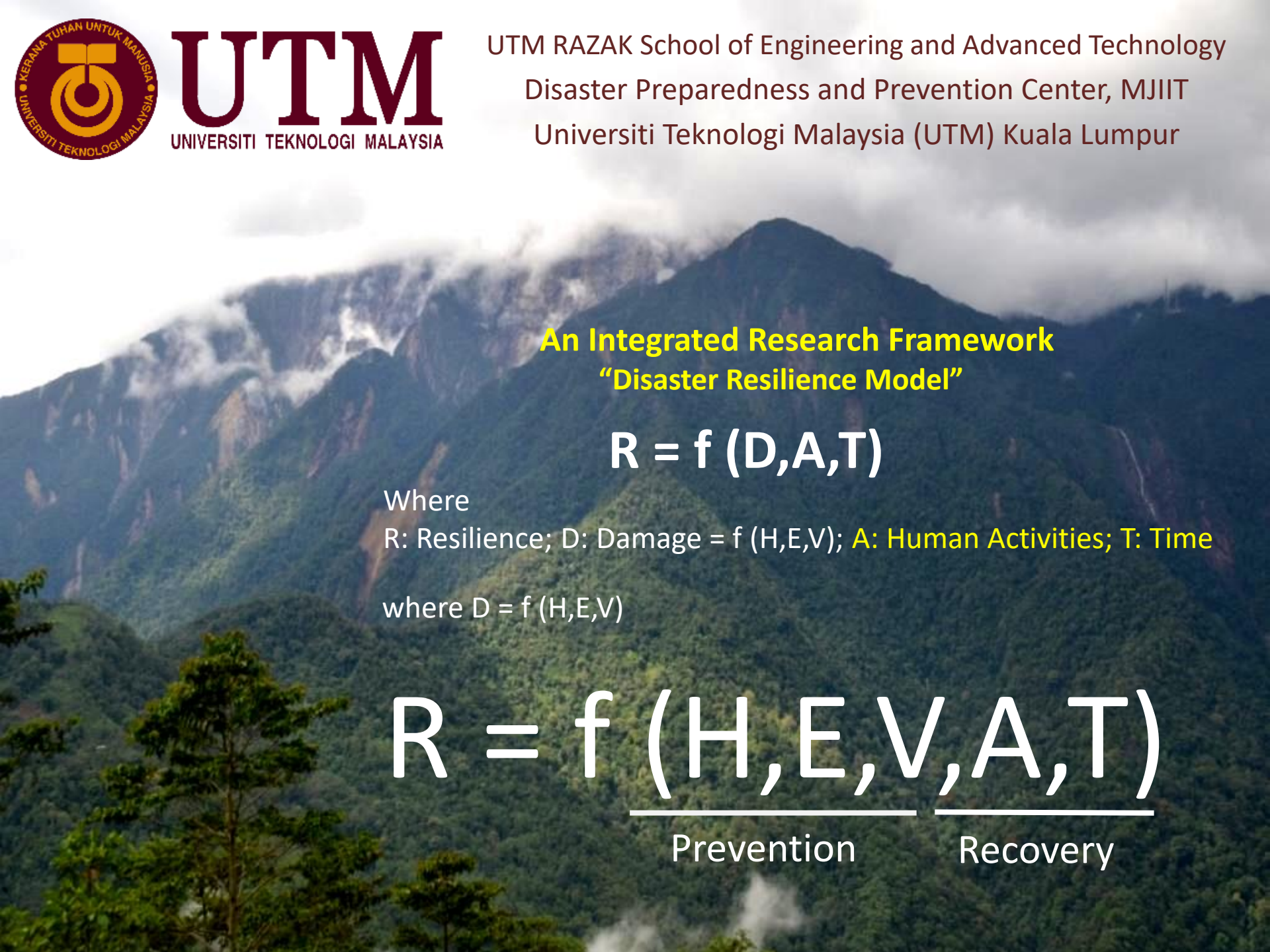
UTM RAZAK School of Engineering and Advanced Technology
Disaster Preparedness and Prevention Center, MJIIT
Universiti Teknologi Malaysia (UTM) Kuala Lumpur



An Integrated Research Framework
"Disaster Resilience Model"

$$R = f(D,A,T)$$

Where
R: Resilience; D: Damage = f (H,E,V); A: Human Activities; T: Time

where D = f (H,E,V)

$$R = f\underbrace{(H,E,V}_{\text{Prevention}},\underbrace{A,T)}_{\text{Recovery}}$$


PUBLIC HELP
MUTUAL HELP
SELF HELP

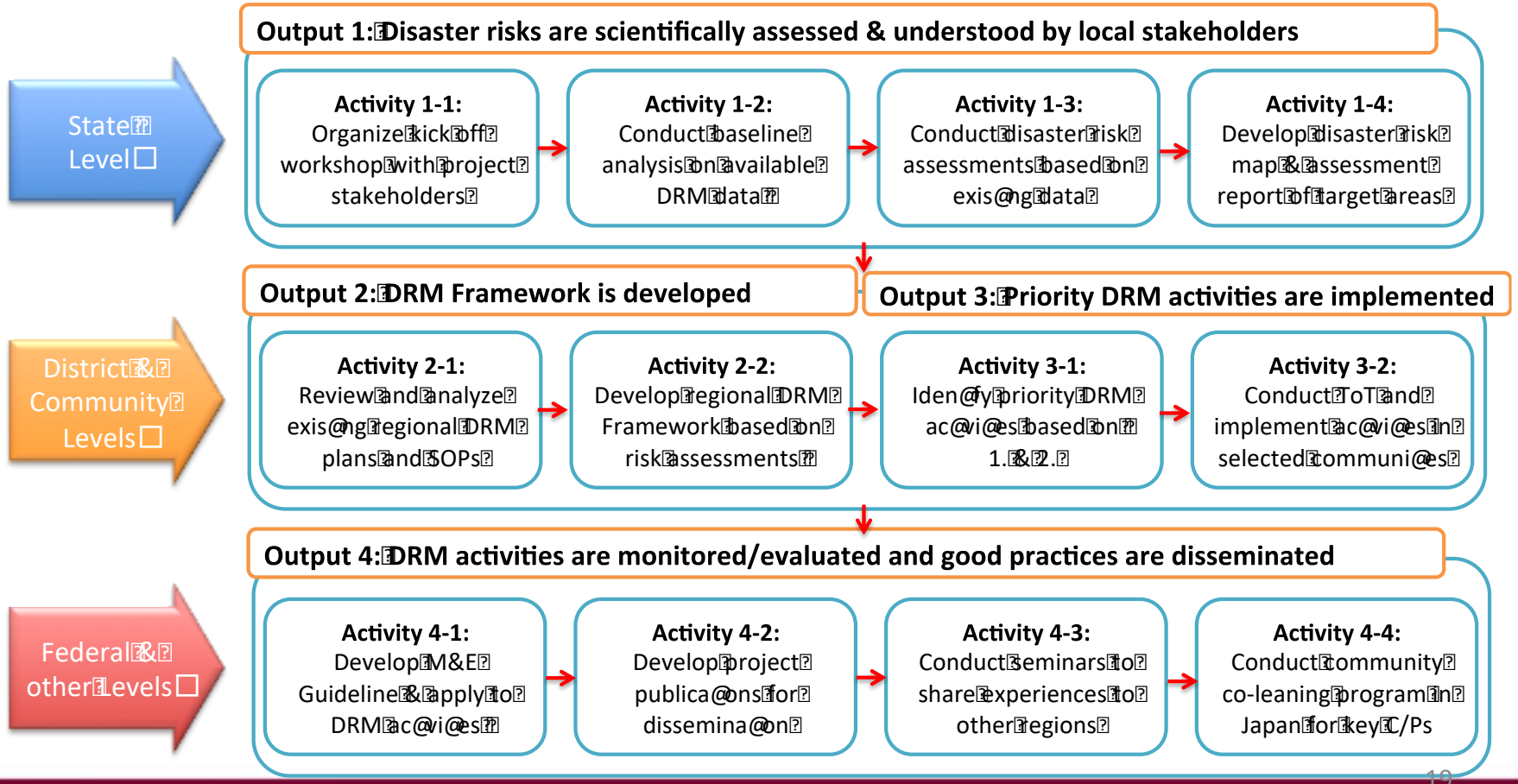
JICA PARTNERSHIP PROGRAM (JPP) 2018-2022

Strengthening the Disaster Risk Reduction Capacity to Improve the Safety and Security of Communities by Understanding Disaster Risk (SeDAR)

JICA PARTNERSHIP PROGRAM (JPP) 2018-2022

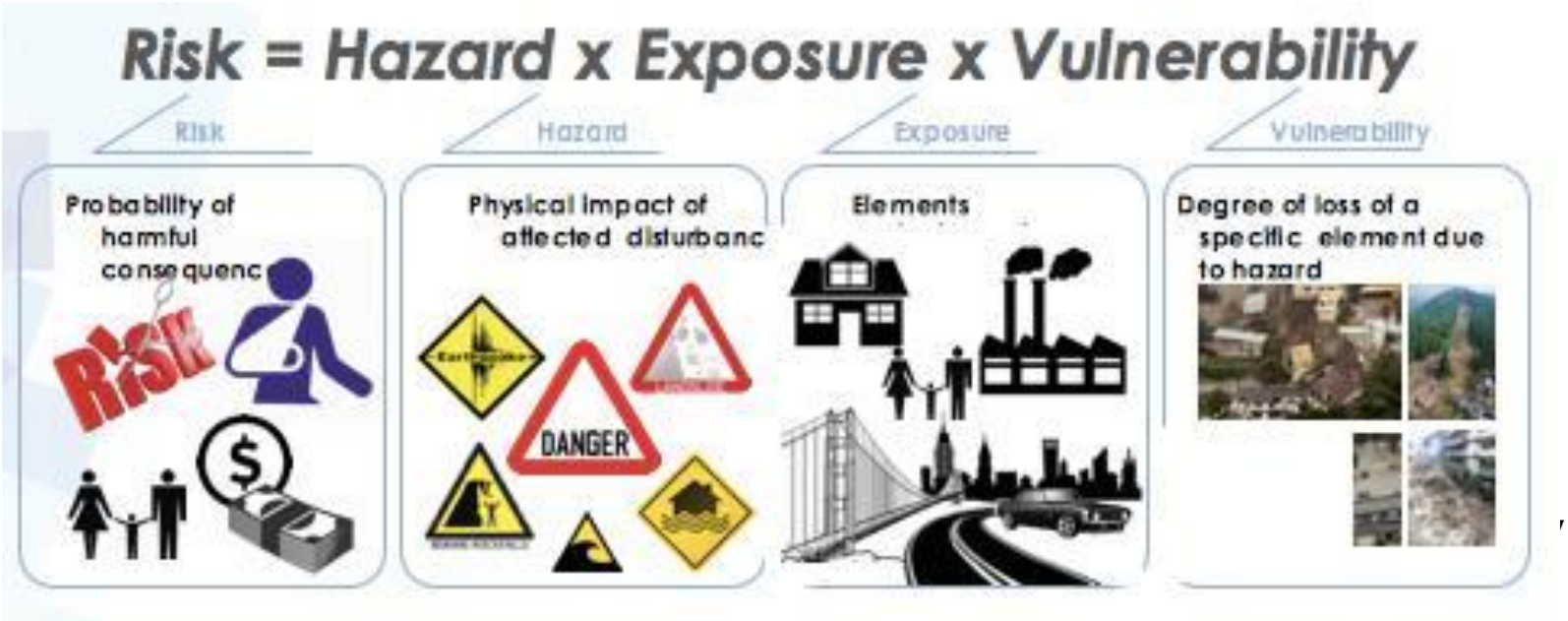
Strengthening the Disaster Risk Reduction Capacity to Improve the Safety and Security of Communities by Understanding Disaster Risk (SeDAR)

Overall Project Goal:
Local government together with community stakeholders in the State of Selangor are able to develop and implement DRM plans based on disaster risk assessments to strengthen their resilience to natural disasters

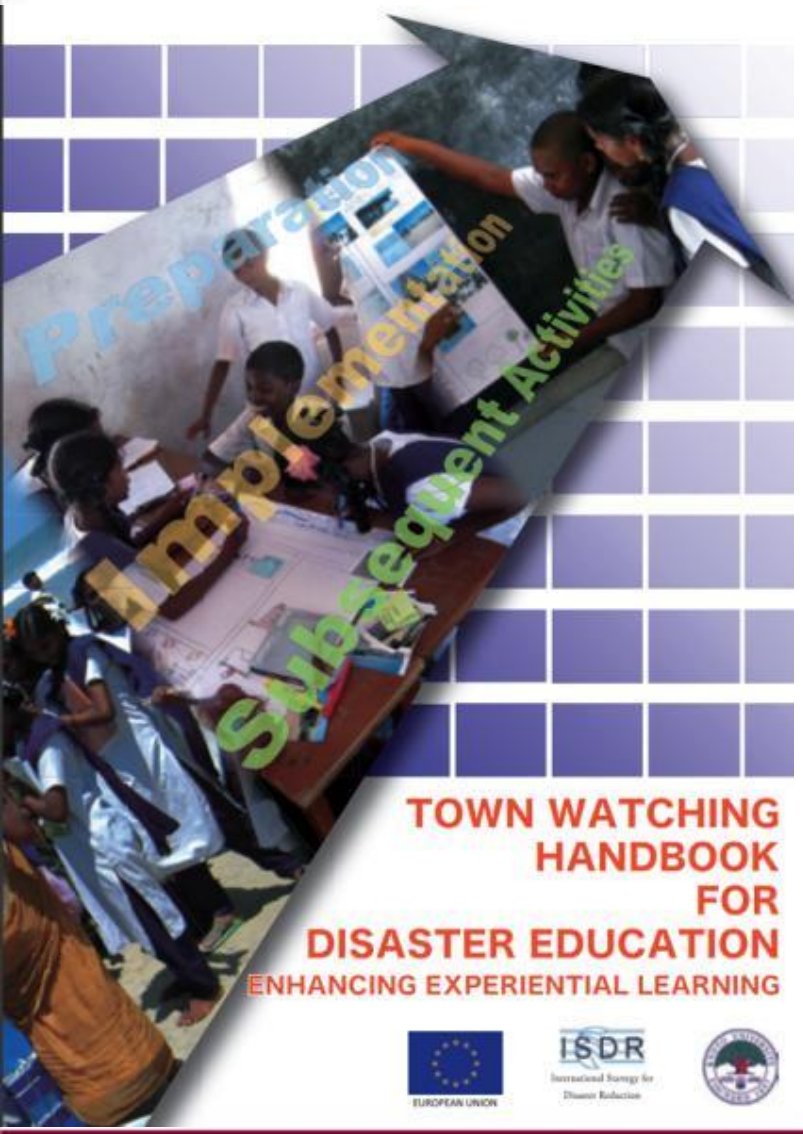


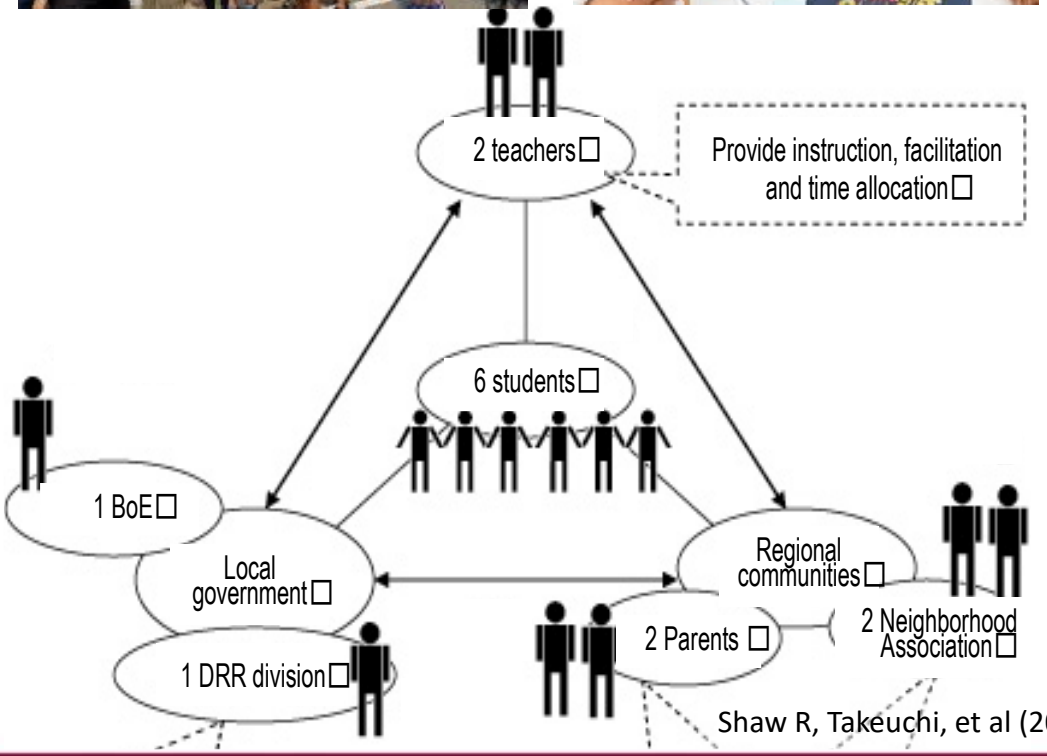
QUANTITATIVE HAZARD RISK ASSESSMENT

$$\text{Risk} = \sum_{\text{All hazards}} \left(\int_{P_T=0}^{P_T=1} P_{(T|HS)} * \left(P_{(S|HS)} * \sum \left(A_{(ER|HS)} * V_{(ER|HS)}\right)\right)\right)$$



Disaster Education & Community Resilience I Ehime Prefecture, japan





Shaw R, Takeuchi, et al (2009)

UTM DRR Day in Rantau Panjang, Kelantan, 13 Oct 2016

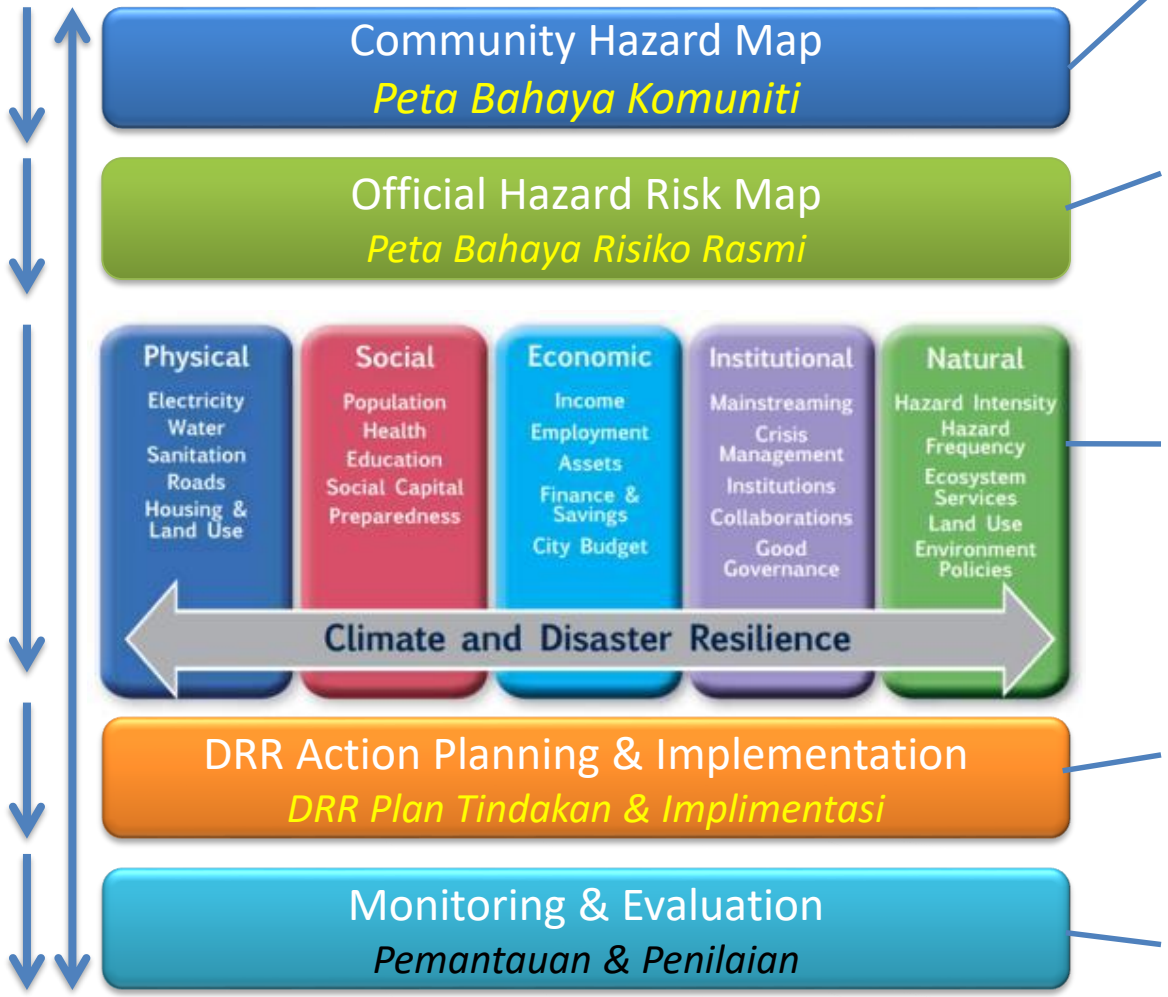

1. Planning


2. Town Watching


3. Creating Hazard Map


4. Presentation

Town Watching for DRR & Community Resilience



- Communities identifying their own risks through Town Watching *Komuniti mengenalpasti risiko mereka sendiri melalui 'Town Watching"*
- Comparing and calibrating with scientific hazard map *Perbandingan dan penilaian dengan peta bahaya saintifik*
- Conduct exposure & vulnerability assessment by various physical and social dimensions Penilaian keterdedahan & kerentanan aspek fisikal dan sosial
- Overlay with hazard map to create disaster risk map *Penindihan peta bahaya untuk menghasilkan peta risiko bencana*
- DRR planning and implementation based on disaster risk map *Perancangan dan implimentasi DRR pada peta risiko bencana*
- Evaluate effect of DRR actions & update disaster risk map *Penilaian hasil tindakkan DRR & kemaskini peta risiko bencana*

https://www.unisdr.org/we/inform/events/50547

Universiti Teknologi Malaysia Disaster Risk Reduction Day 2016

Type: Meeting or Conference
Organizer: Malaysian University of Technology (UTM)
Date: 13 Oct 2016
Location: Malaysia (Pasir Mas, Kelantan)
Venue: Gual Tinggi Elementary School

The Malaysia-Japan International Institute of Technology (MJIIT) of Universiti Teknologi Malaysia (UTM) Kuala Lumpur with the support of Japan International Cooperation Agency (JICA) will be organizing the UTM Disaster Risk Reduction Day 2016 (UTM-DRR2016) to be held on October 13, 2016 in Jajahan Pasir Mas, Kelantan, Malaysia, which experienced the historic flood disaster in 2014.

This program actively supports the International Day for Disaster Reduction of the United Nations Office for Disaster Risk Reduction (UNISDR) on October 13 and the Malaysia's Disaster Preparedness Month with the aim of developing and building a culture of risk awareness and disaster reduction.

Several community-based activities, including "Town Watching for Disaster Risk Reduction" will be organized with technical support by various governmental agencies and non-governmental organizations, including the National Disaster Management Agency (NaDMA), Malaysia Civil Defense Force (APM), Fire & Rescue Department, Ministry of Health, local city council and non-governmental organization. The program

5th Global Platform on Disaster Risk Reduction in May 2017.

COMMUNITY PROGRAM

DISASTER EDUCATION AND PREPREDNESS FOR SOCIAL RESILIENCE

Master of Disaster Risk Management (MDRM) Program

25 May 2017 @ Serendah, Selangor

Organized by:-

Disaster Preparedness and Prevention Center (DPPC)

Malaysia-Japan International Institute of Technology (MJIIT)

Universiti Teknologi Malaysia (UTM) Kuala Lumpur

High Impact Community based Disaster Risk Reduction @ Sabah, JMG & NADMA, 08-13 Oct





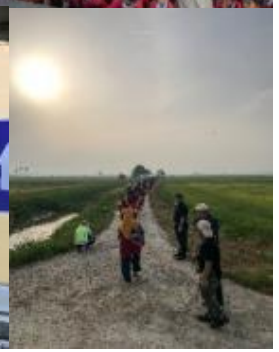


Stakeholder/Community Engagement, Field Visit & Disaster Education and Preparedness Program

Tsunami Drill & School Disaster Preparedness funded by UNDP & National Disaster Management Agency @ Kedah, 06-07 Aug 2018








With Dato' Seri Wan Azizah Wan Ismail, Deputy Prime Minister and YTM Dato' Seri Diraja Tan Sri Tunku Puteri Intan Safinaz Almarhum Sultan Abdul Halim Mu'adzam Shah, Chairman of Malaysia Red Crescent

Research Collaboration - Kyoto University and Universiti Teknologi Malaysia

Promoting Public-Private Partnership (PPP) in DRR

- Engaging private sector in Malaysia
  - Establishing ARISE Malaysia

UNISDR
United Nations Office for Disaster Risk Reduction

arise
PRIVATE SECTOR ALLIANCE FOR DISASTER RESILIENT SOCIETIES

@ khamarrul.kl@utm.my

STRENGTHENING PRIVATE SECTOR FOR DISASTER RESILIENT IN MALAYSIA

UTM UNIVERSITI TEKNOLOGI MALAYSIA

The University of DA NANG, Vietnam

Universitas Gadjah Mada, Indonesia

PHILIPPINE DISASTER RESILIENCE FOUNDATION

จุฬาลงกรณ์มหาวิทยาลัย Chulalongkorn University

DM UCH Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University

Local Partners:

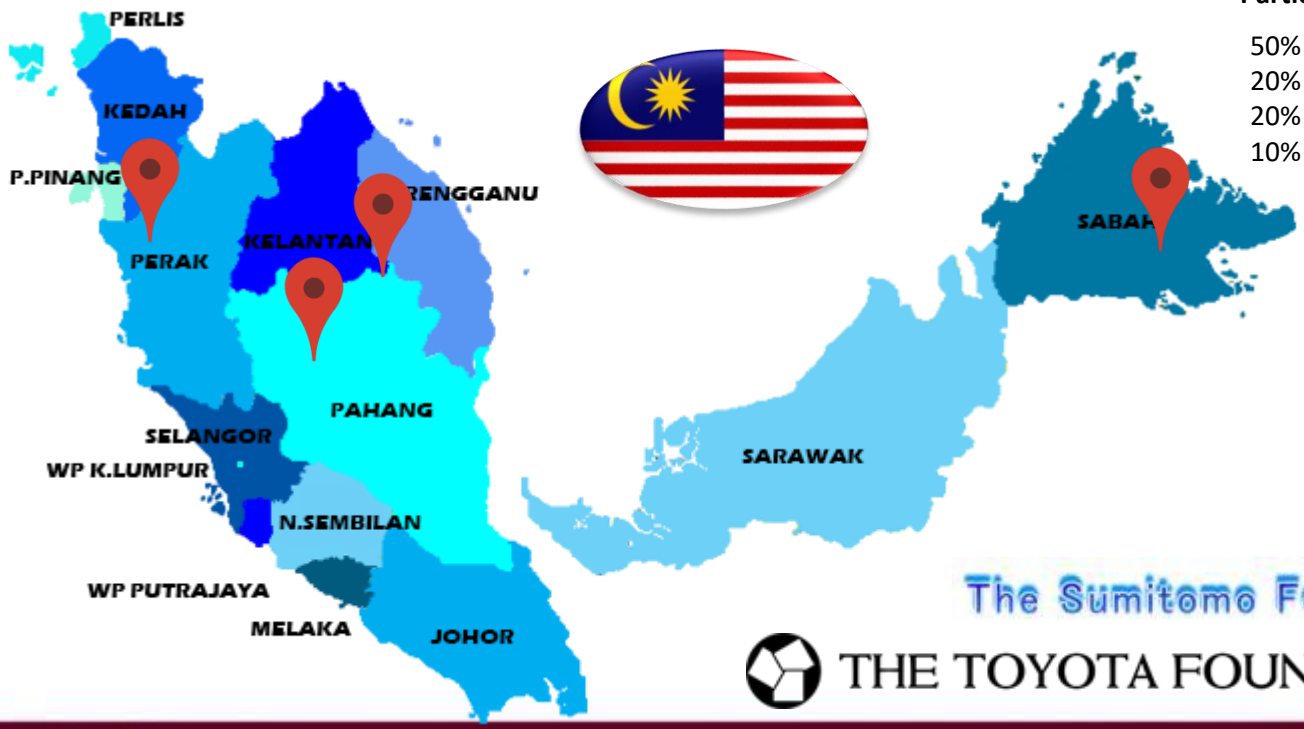
National Disaster Management Agency, the Prime's Minister Department

Malaysian Red Crescent Society

TNB RESEARCH (259519-A)

CREAM CONSTRUCTION RESEARCH INSTITUTE OF MALAYSIA

NADIM MALAYSIA (NATIONAL DISASTER MANAGEMENT ASSOCIATION) PERSATUAN PENGURUSAN BENCANA KEBANGSAAN



Participations:

50% - Private
20% - Community Officer
20% - NGO
10% - Universities

The Sumitomo Foundation

THE TOYOTA FOUNDATION

Framework for Sediment Disaster Management

Where (spatial)?

Mapping potential debris flow torrents

Analyzing regional susceptibility zones for debris flow

What & How (vulnerability)?

Inventory of possible affected zones/community & Elements-at-risk

Where (temporal) & What (risk level)?

Assessing debris flow hazard & risk

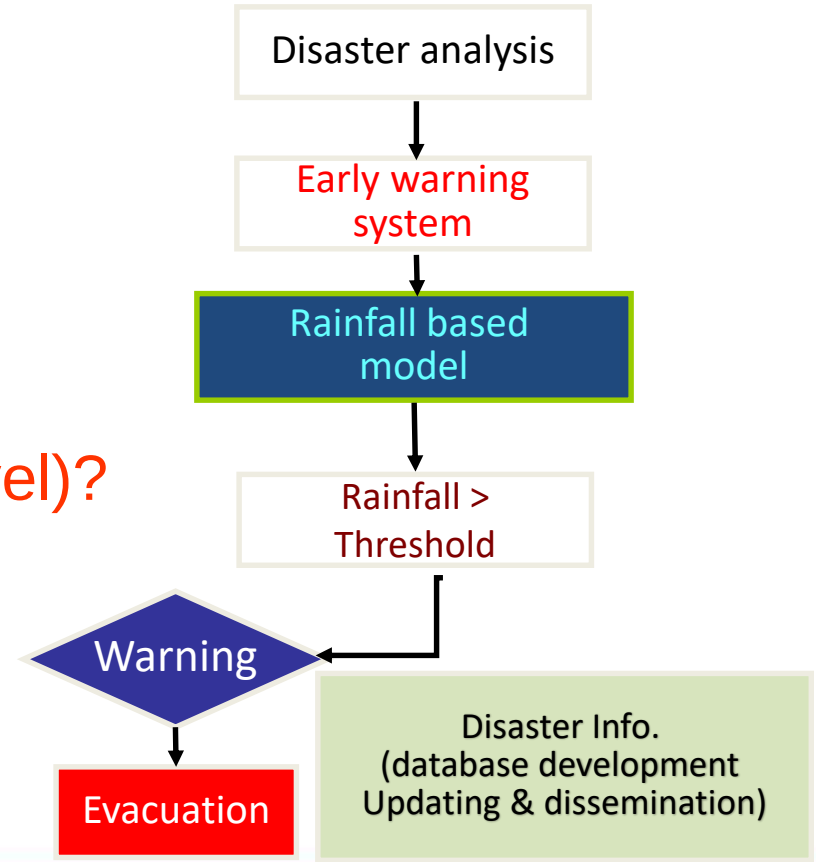
Engineering

Landuse restriction

Residential Relocation

Evacuation**

When? (Monitoring & Prediction)



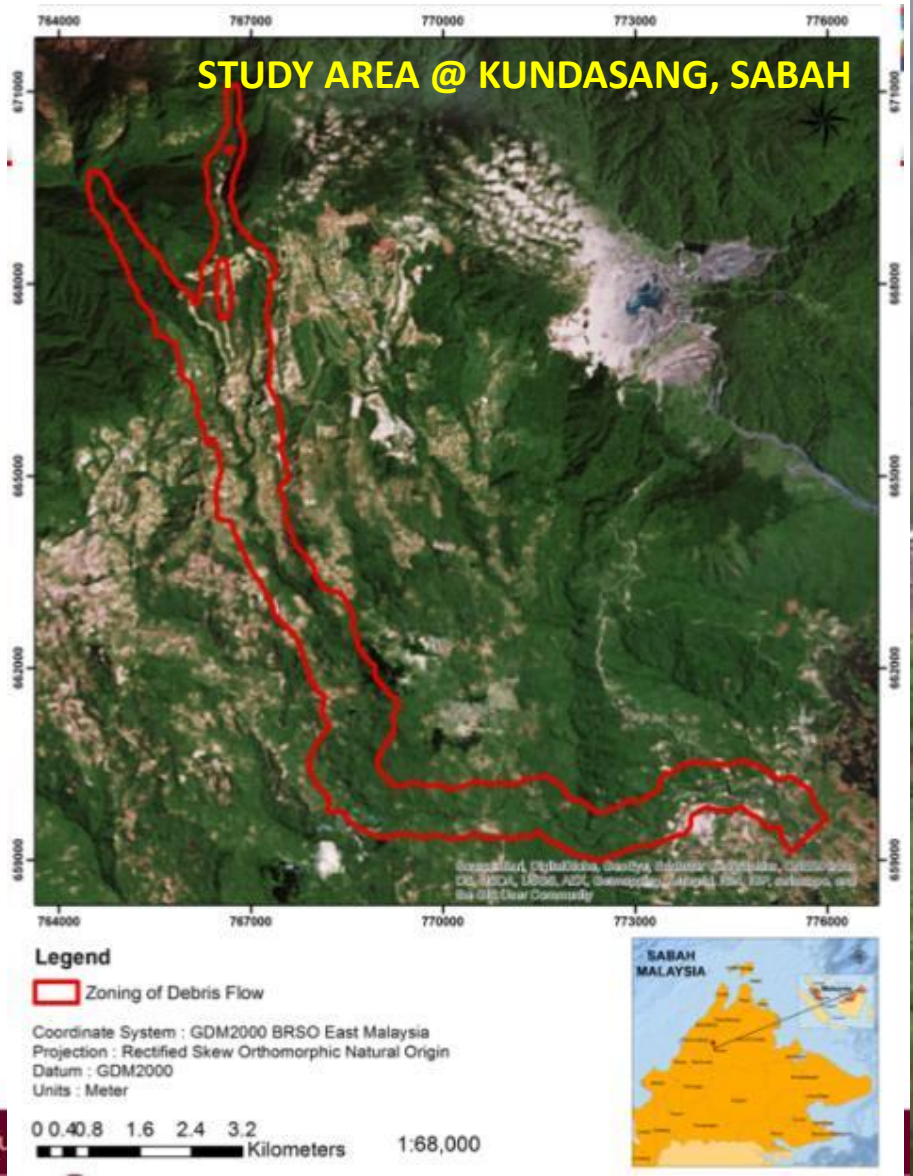
@ khamarrul.kl@utm.my

Kundasang (Ranau, Sabah) – home to UNESCO's World Heritage Site in Malaysia

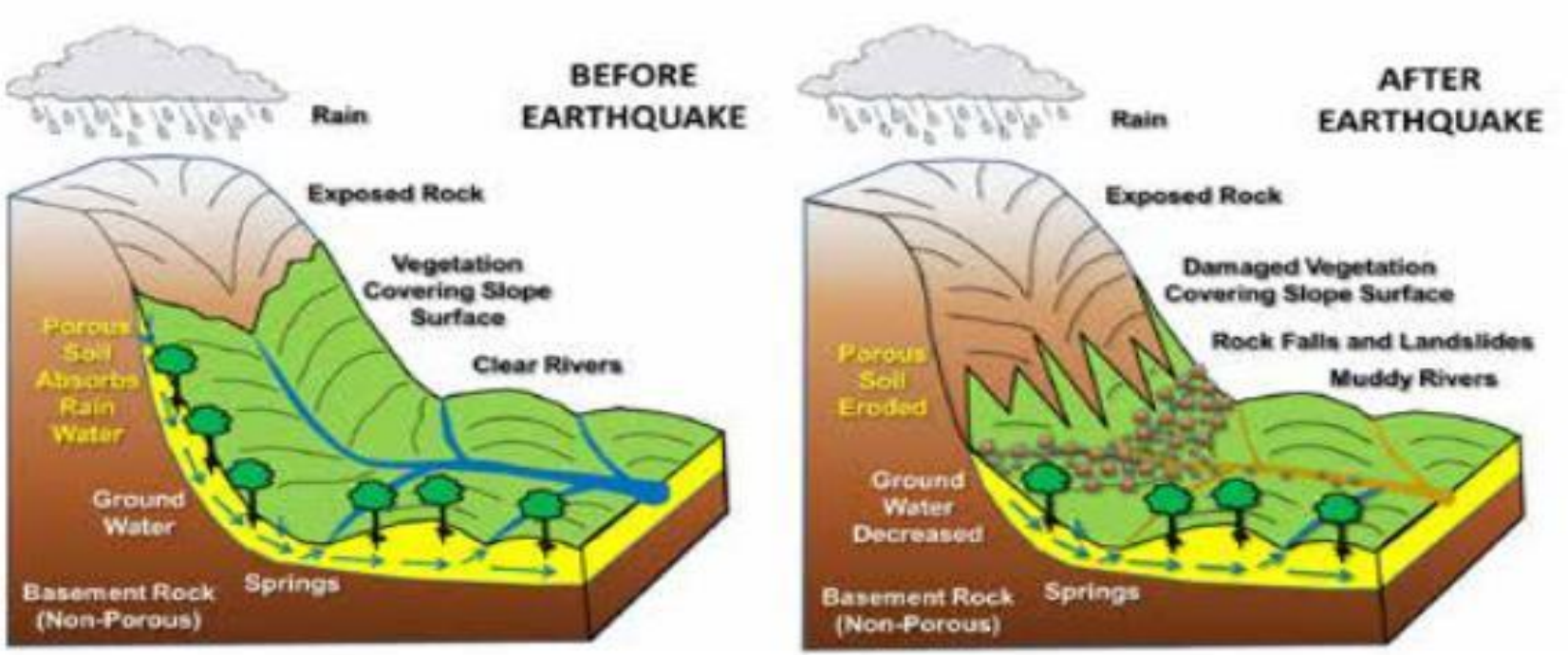
– Most tectonically active region in Malaysia, most attractive to tourism, community-at-risk


7 April 2015


20 July 2015


STUDY AREA @ KUNDASANG, SABAH
764000
767000
770000
773000
776000
Legend
Zoning of Debris Flow
Coordinate System : GDM2000 BRSO East Malaysia
Projection : Rectified Skew Orthomorphic Natural Origin
Datum : GDM2000
Units : Meter
0 0.4 0.8 1.6 2.4 3.2
Kilometers
1:68,000
SABAH
MALAYSIA

Debris flow simulation and analysis: a case study in Mesilau river, Sabah



- Impact of landslides on the hydrological systems of Mount Kinabalu water catchment.

JASTIP Japan - ASEAN Science, Technology and Innovation Platform

WENDI KYOTO UNIVERSITY

United Nations Educational, Scientific and Cultural Organization

UNESCO Chair on Water, Energy and Disaster Management for Sustainable Development (WENDI) Kyoto University, Japan

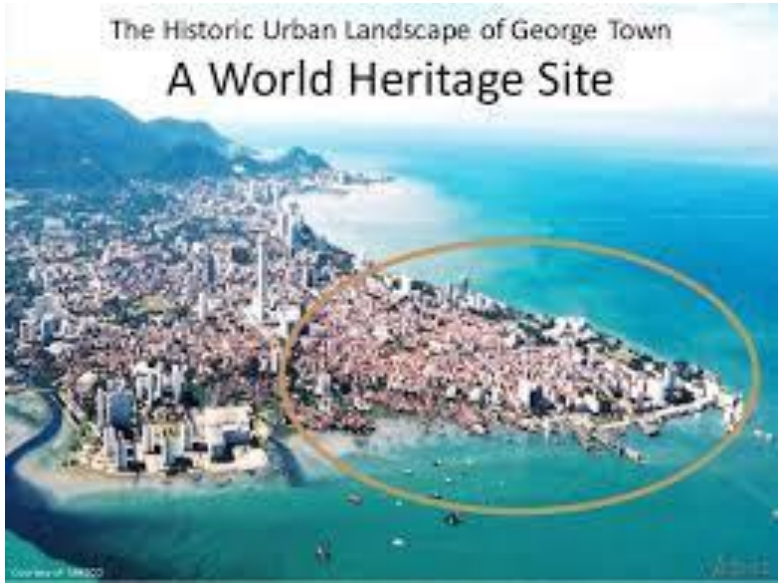
京都大学 KYOTO UNIVERSITY

Advancing Science in the UNESCO World Heritage Site for Disaster Resilience

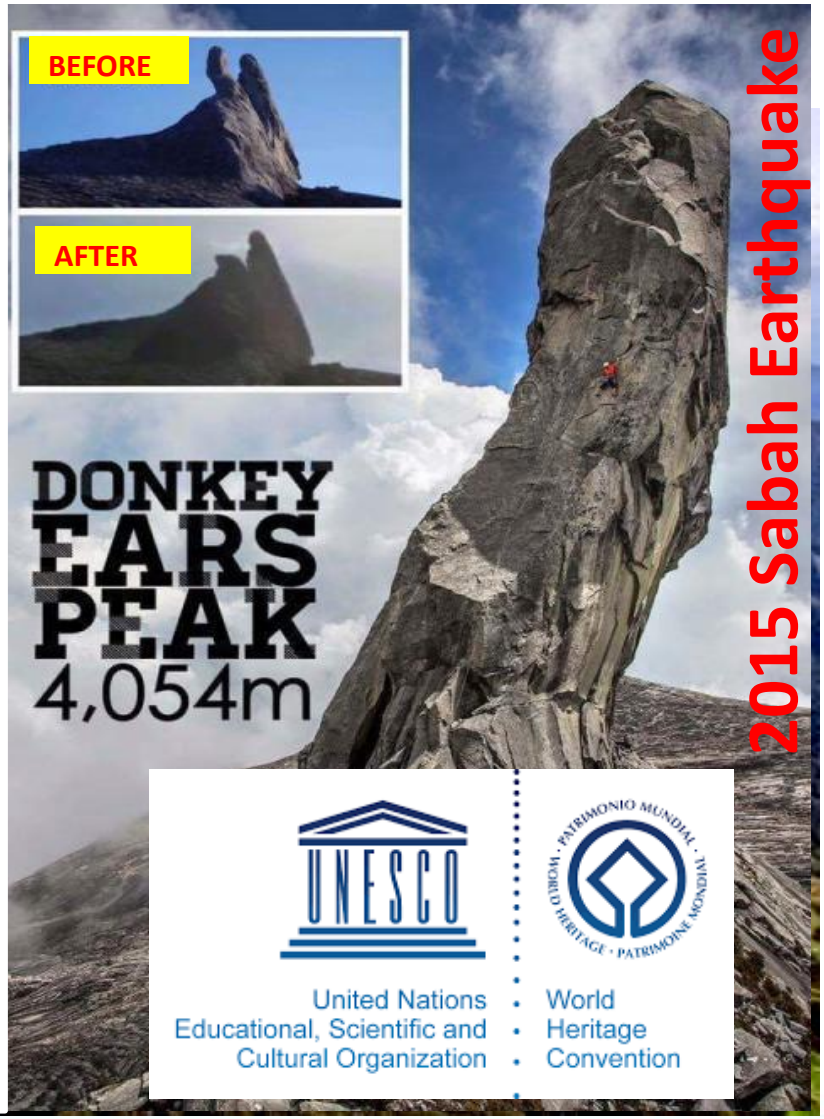
- Supporting Disaster Resilient City initiative,
- Assessing impact of socio-economic and environment
- Mainstreaming DRR into development planning/control

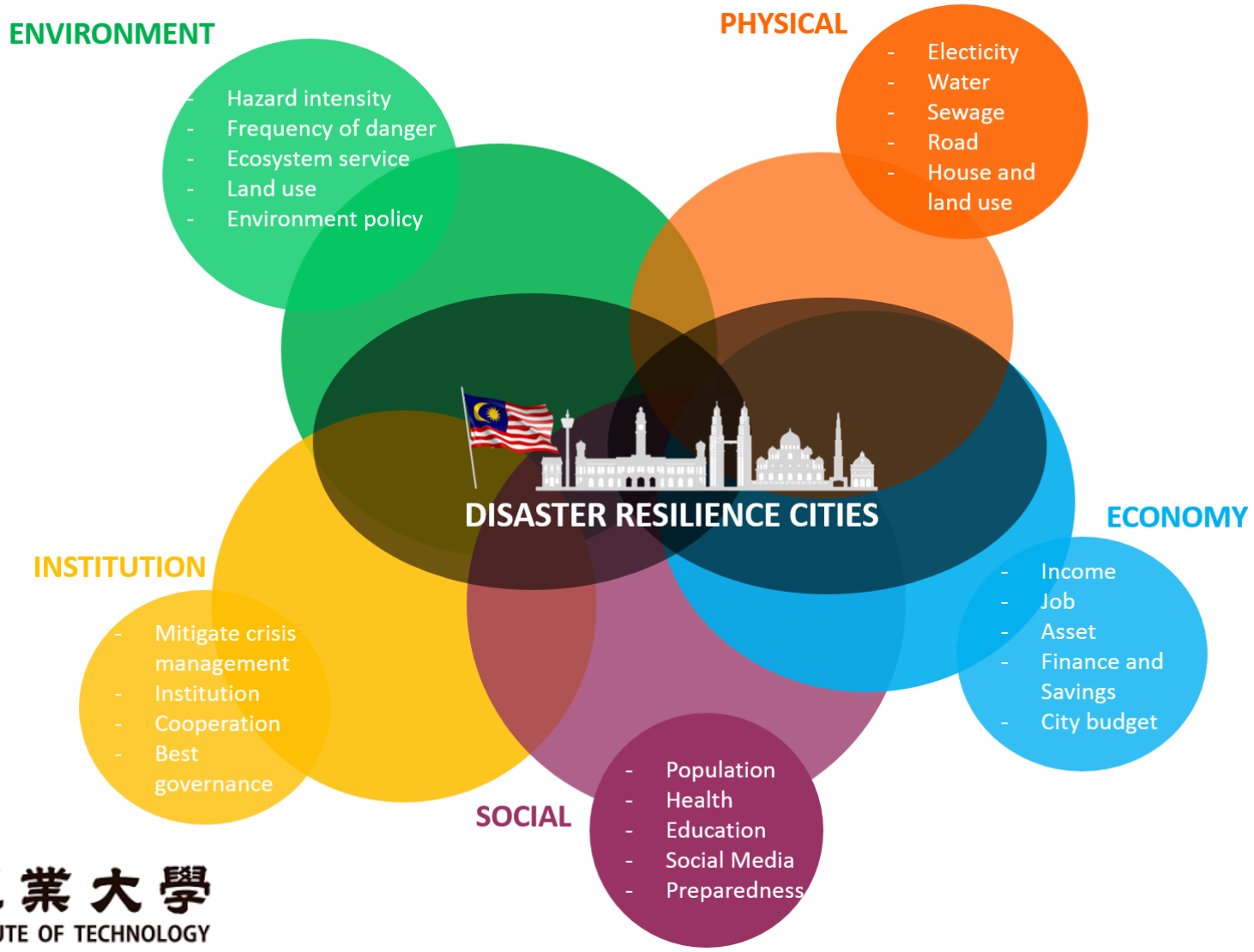
@ khamarrul.kl@utm.my

Climate is changing, we face a new disaster risk – An integrated approach


The Historic Urban Landscape of George Town
A World Heritage Site


KINABALU PARK
WORLD HERITAGE SITE

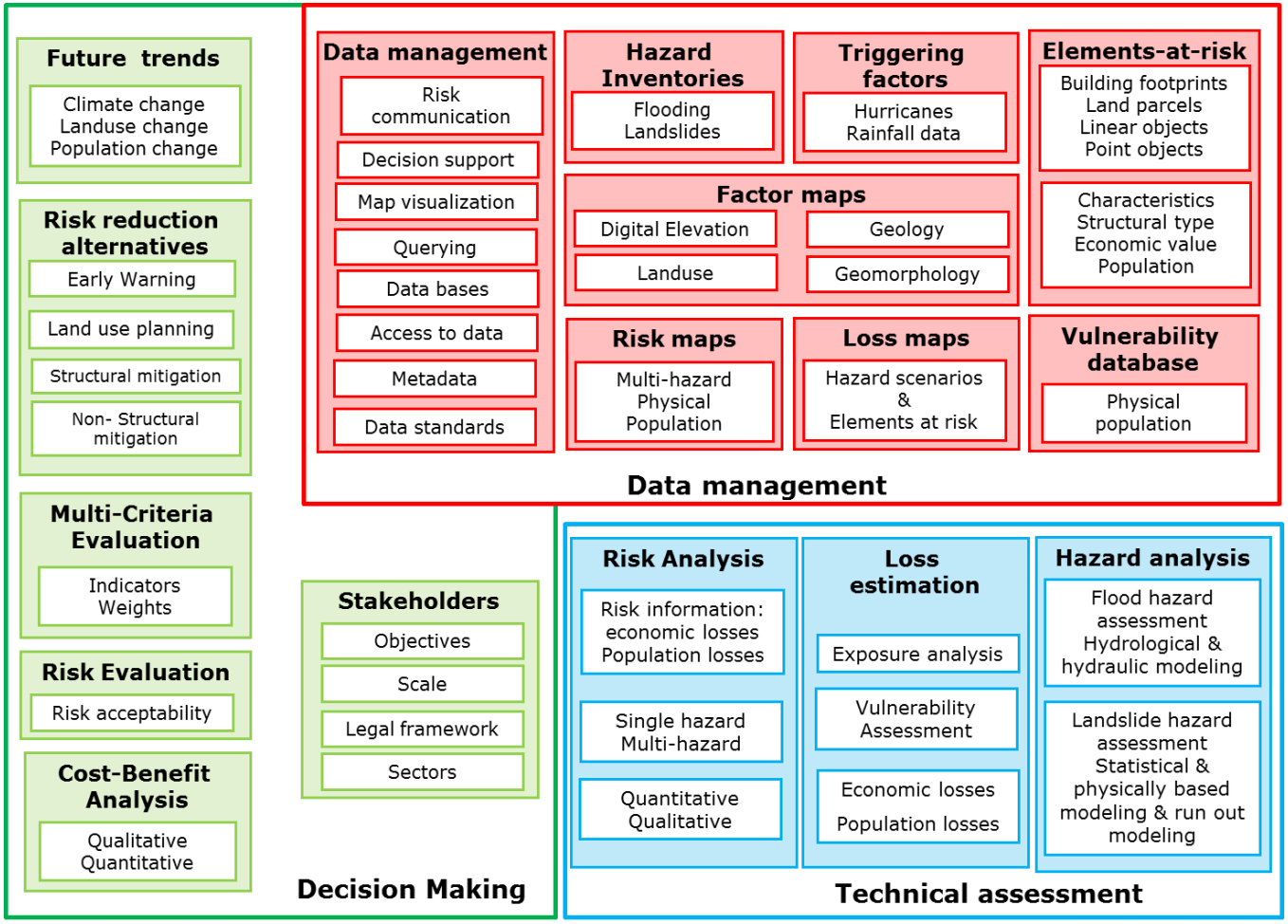

BEFORE
AFTER
DONKEY EARS PEAK 4,054m
2015 Sabah Earthquake
UNESCO
United Nations Educational, Scientific and Cultural Organization
World Heritage Convention


ENVIRONMENT
- Hazard intensity
- Frequency of danger
- Ecosystem service
- Land use
- Environment policy
PHYSICAL
- Electicity
- Water
- Sewage
- Road
- House and land use
DISASTER RESILIENCE CITIES
INSTITUTION
- Mitigate crisis management
- Institution
- Cooperation
- Best governance
ECONOMY
- Income
- Job
- Asset
- Finance and Savings
- City budget
SOCIAL
- Population
- Health
- Education
- Social Media
- Preparedness

New Approach : Multi-Hazard & Disaster Risk Management

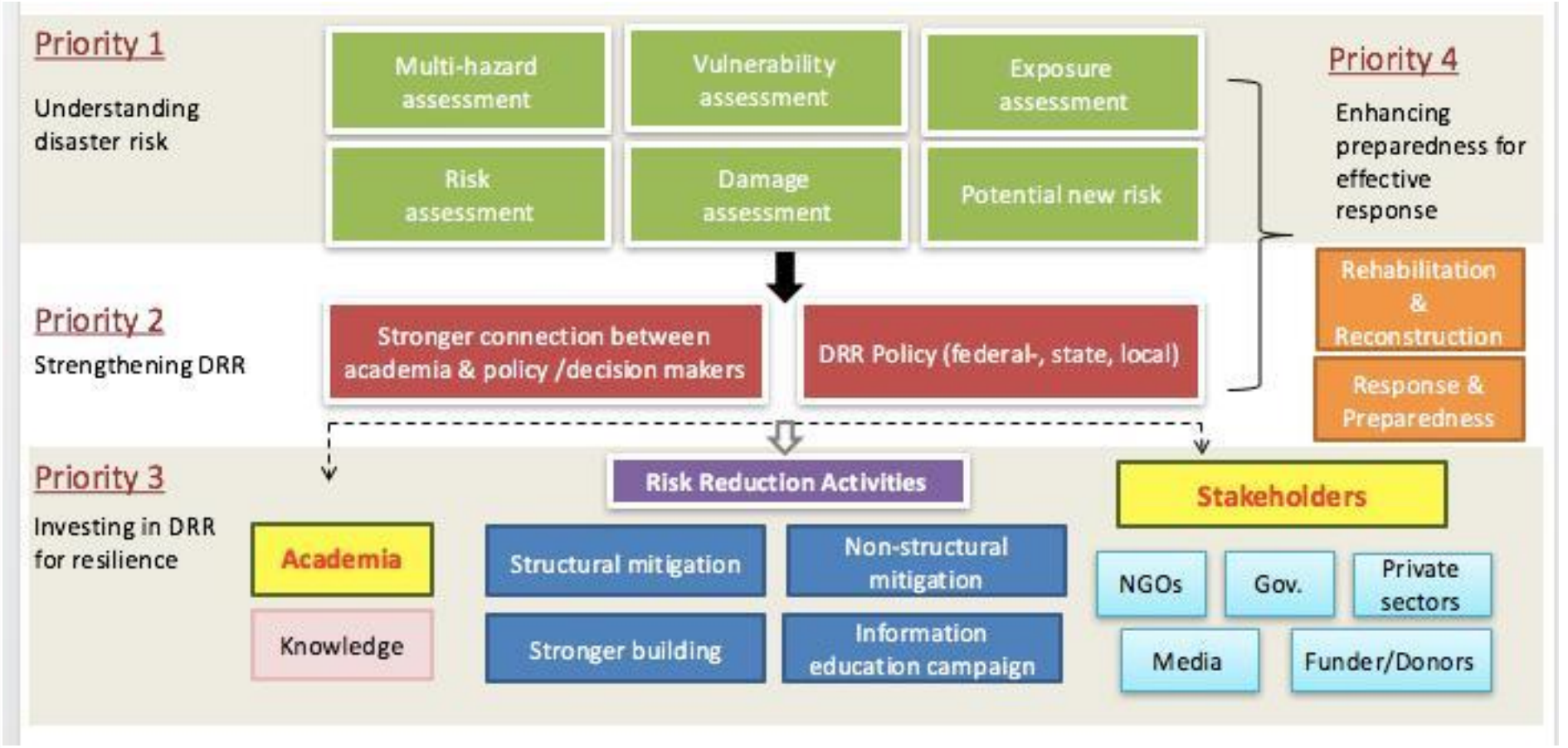
Three main components:

1) Technical assessment (hazard and risk)
2) Decision making (use cases)
3) Data management



Van Westen et al. (2015)

Sendai Framework for Disaster Risk Reduction 2015-2030: Progress & Challenges



Complexity of disaster – multisectoral & disciplinary group - special need & interest

Action oriented program – scientific-based decision support – transdisciplinary approach

THANK YOU FOR YOUR ATTENTION

Khamarrul Azahari Razak, PhD

UTM RAZAK School of Engineering and Advanced Technology
Universiti Teknologi Malaysia
54100 Jalan Sultan Yahya Petra
Kuala Lumpur
Tel: +6019-3649495
Email: khamarrul.kl@utm.my; khamarrul@gmail.com
Web: http://www.razakschool.utm.my/khamarrul

Visiting address:-
Room no. 32, Level 6,
Malaysia-Japan International Institute of Technology (MJIIT)
Universiti Teknologi Malaysia
Jalan Sultan Yahya Petra, Kuala Lumpur

Disaster Preparedness and Prevention Center
Malaysia-Japan International Institute of Technology
Universiti Teknologi Malaysia (UTM) Kuala Lumpur

Geospatial Intelligence Research Initiative
Cascading GeoHazards Research Initiative
UTM RAZAK School of Engineering and Advanced Technology
Universiti Teknologi Malaysia (UTM) Kuala Lumpur
54100 Jalan Sultan Yahya Petra, Kuala Lumpur

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