

S&T and its application in promoting inclusive DRR in the Pacific Islands



UNDRR GAR 2019

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Co-Founder, Resilience Innovation Knowledge Academy (RIKA)

www.rajibshaw.org AND www.rikaindia.com

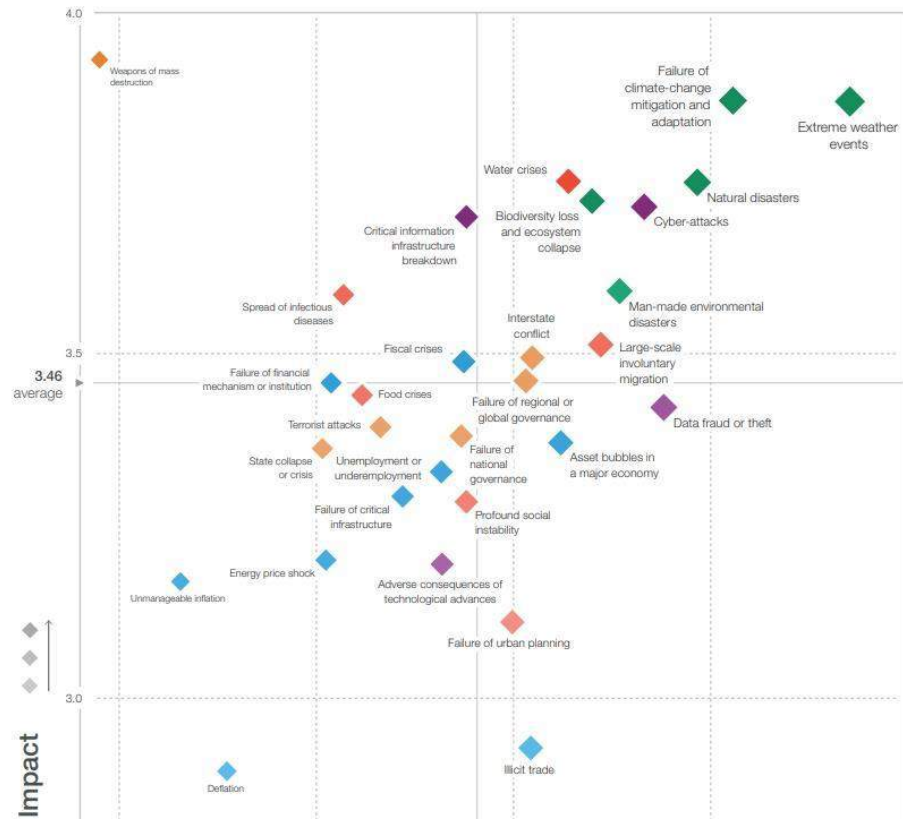


Figure IV: The Evolving Risks Landscape, 2009 – 2019



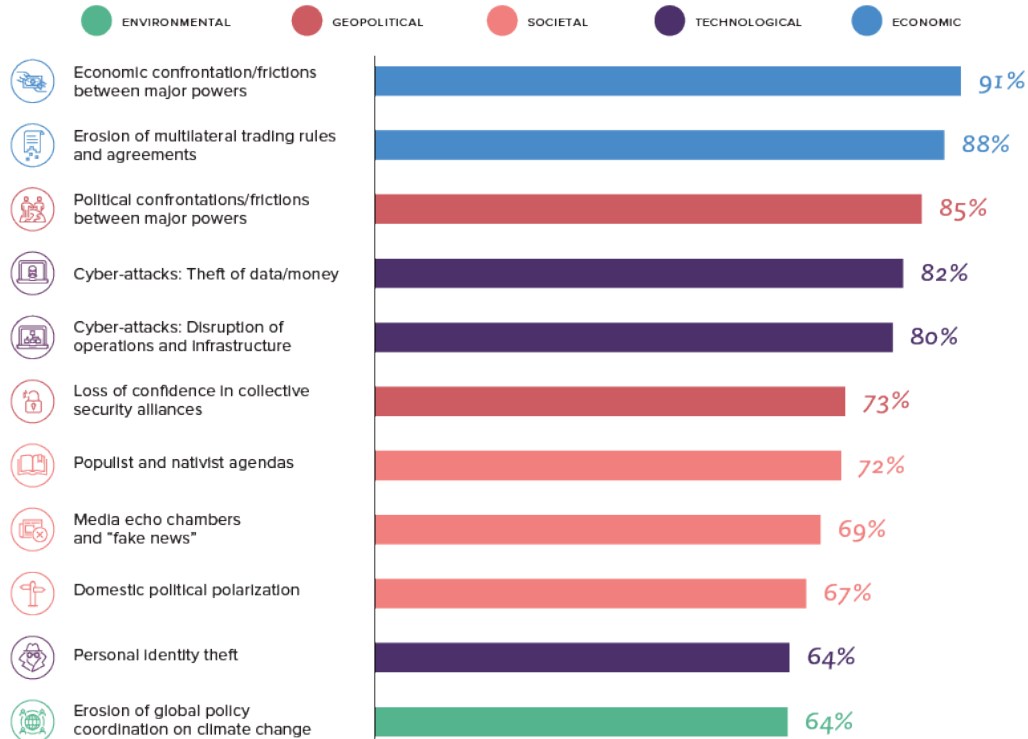
Source: World Economic Forum 2009–2010, Global Risks Reports.
 Note: Global risks may not be strictly comparable across years, as definitions and the set of global risks have evolved with new issues emerging on the 10-year horizon. For example, cyberattacks, income disparity and unemployment entered the set of global risks in 2012. Some global risks were reclassified: water crises and rising income disparity were re-categorized first as societal risks and then as a trend in the 2015 and 2010 Global Risks Reports, respectively.

Extreme event, failure of adp/mit, natural disasters
 Geopolitical risk (impact)
 Technological risk (likelihoods)

(WEF) Global Risk Outlook 2019

Global Risk Outlook 2019

RESPONDENTS EXPECTING RISKS TO INCREASE IN 2019



THE GLOBAL RISK OUTLOOK FOR 2019

Types of Risks: ENVIRONMENTAL (Green), GEOPOLITICAL (Red), SOCIETAL (Light Red), TECHNOLOGICAL (Dark Purple), ECONOMIC (Blue)

Top 5 Global Risks in Terms of Impact



Top 5 Global Risks in Terms of Likelihood



SOURCE: World Economic Forum – Global Risks Report 2019

SOURCE: World Economic Forum Global Risks Perception Survey 2018–2019

Managing / Treating / Living with **UNCERTAINTY**

A Global Outlook on Disaster Science



November 2017

Empowering Knowledge

An analysis of recent scholarly output and impact in disaster science according to the Sendai Framework for Disaster Risk Reduction, aiming to provide insights on the field to governments, research institutions, and funding agencies

Key Findings

2012-2016

Death toll versus publications

countries with the highest death tolls from natural disasters tend to have low volumes of disaster science scholarly output

27,273

the number of recent scholarly output in disaster science

Economic loss versus publications

countries with the highest economic losses from natural disasters tend to have the largest disaster science scholarly output

0.22%

the share of recent global scholarly output belonging to disaster science

9,571

the number of recent disaster science publications on geophysical disasters

>5,000

the number of recent disaster science publications on each of the following disaster types: geophysical, meteorological, chemical & radiological, and hydrological

China

the most prolific country in disaster science scholarly output overall and disaster prevention scholarly output

USA

the most prolific country in disaster preparedness, response, and recovery scholarly output

Japan

the most specialized prolific country in disaster science, overall and in research on each disaster management cycle stage

Philippines, Indonesia, Bangladesh, Japan, New Zealand, Thailand, Taiwan
territories with 125+ recent papers in disaster science that are 50%+ more specialized in disaster science than the global average

The Science and Technology Roadmap for the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030

<p>Total Number of actions: 58 Priority 1: 21 Priority 2: 14 Priority 3: 11 Priority 4: 12</p>	<p>Outcome 1: Assess and Update data and Knowledge</p> <p>[State of data, scientific, local and indigenous knowledge and technical expertise are assessed, updated and available on spectrum of Sendai hazards]</p>	<p>Outcome 2: Dissemination</p> <p>[Scientific evidence is synthesized, produced and disseminated in a timely and accessible manner that responds to the knowledge needs of policy-makers and practitioners]</p>	<p>Outcome 3: Monitoring and Review</p> <p>[Scientific data and information support are used in monitoring and reviewing progress towards disaster risk reduction and resilience building]</p>	<p>Outcome 4: Capacity building</p> <p>[Better capacity in all sectors and countries to access, understand and use scientific information for better informed decision-making]</p>
<p>Priority for Action 1. Understanding disaster risk</p> <p>[Total number of actions: 21 (8 + 4 + 3 + 6)]</p>	<p>1.1.1 Promote integrated and multi-disciplinary research 1.1.2 Conduct solution-driven research at all levels that involves the users in the earliest stages 1.1.3 Establish/link existing and update/maintain global databases 1.1.4 Develop methods, models, scenarios and tools 1.1.5 Integrate risk assessments across sectors 1.1.6 Promote scientific focus on disaster risk root causes, emerging risks and public health threats, insurance and social protection and safety nets 1.1.7 Analyse ethics of scientific input 1.1.8 Adopt a multi-hazard approach that integrates lessons learned, including trans-boundary, biological and technological and Natech hazards</p>	<p>1.2.1 Develop evidence-based research on effective dissemination strategies for informed decision and policy-making. 1.2.2 Promote access to data, information and technology 1.2.3 Integrate traditional, indigenous and local knowledge and practices 1.2.4 Develop partnerships between all S&T and DRR stakeholders, and integrate gender equality</p>	<p>1.3.1 Link Science and Technology progress to Sendai Monitoring indicators, and report using online voluntary commitment system 1.3.2 Promote coherence in data collection and M&E indicators with SDGs and Paris Agreement 1.3.3 Develop a liaison group between the DRR community and the major global assessments, such as IPCC 6th Assessment Report and other related assessment.</p>	<p>1.4.1 Build national and local capacities for the design, implementation and improvement of DRR plans 1.4.2 Promote inclusiveness, interdisciplinary, and inter-generational participatory approaches 1.4.3 Develop expertise and personnel to use data, information and technology 1.4.4 Promote the development and use of standards and protocols, including certifications 1.4.5 Utilize knowledge resources of S&T community for effective education programs on disaster risk reduction for scientists, practitioners and communities 1.4.6 Promote systems approaches in understanding disaster for better informed</p>

Implementation Oriented Technology (IOT): Mangrove as coastal buffer

Disaster Reduction Hyperbase (DRH)



Research

(By ICHARM,
Japan)

By DINAR CATUR
ISTIYANTO)

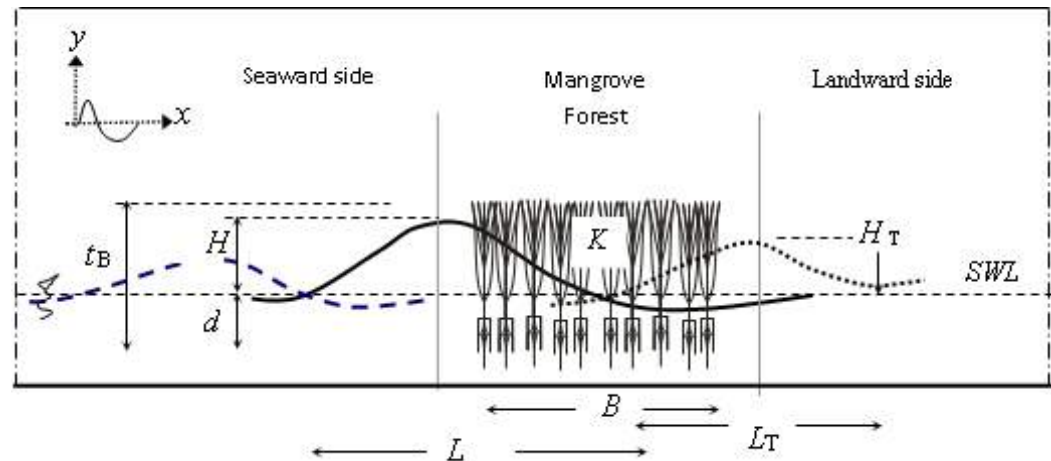
Engineering tool for planning coastal protection by using mangrove-forest

Training

(Coastal Dynamic
Research Center
Indonesia)

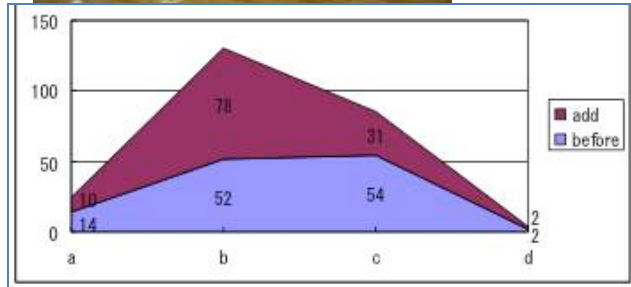
Action

(Cities and
municipalities in
West Sumatra
Province: Padang)



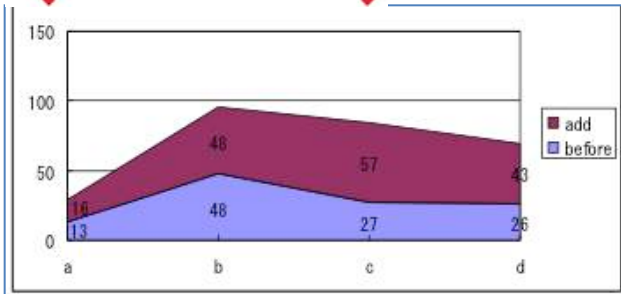
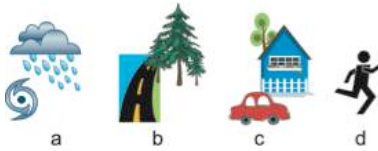
Source: DRH-10

Process Technology: Neighborhood Watching



Research

(Kyoto University, Japan)

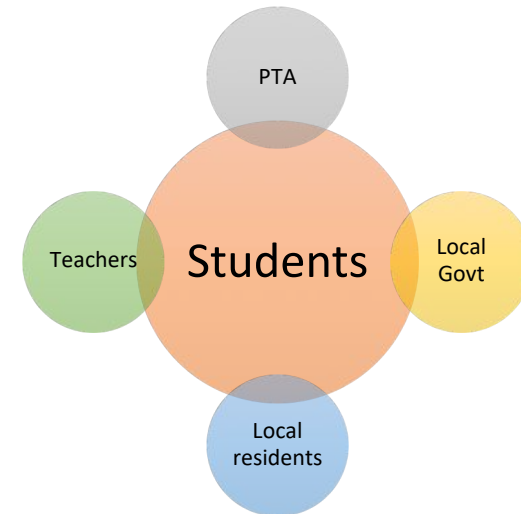
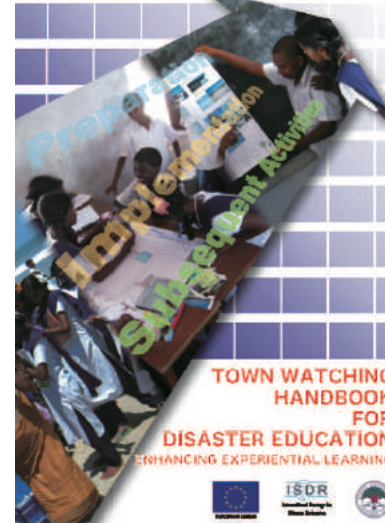


Training

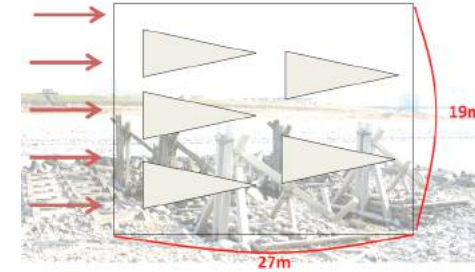
(City officials and School teachers in Saijo city, Japan)

Action

(in all schools in Saijo for last 11 years)



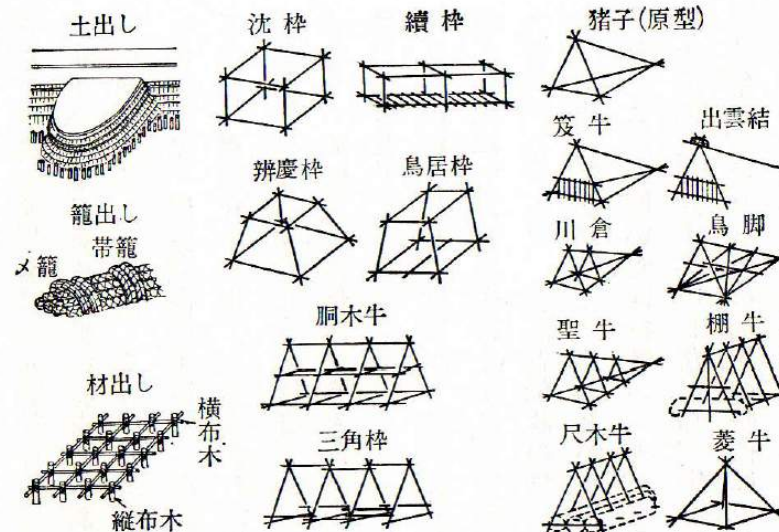
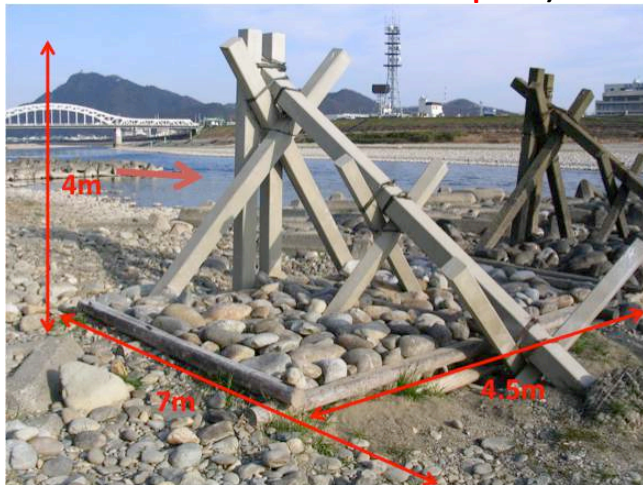
Transferable Indigenous Knowledge: River erosion Control



Research
(Kyoto University,
Japan)

Training
(Central and local
govt. official)

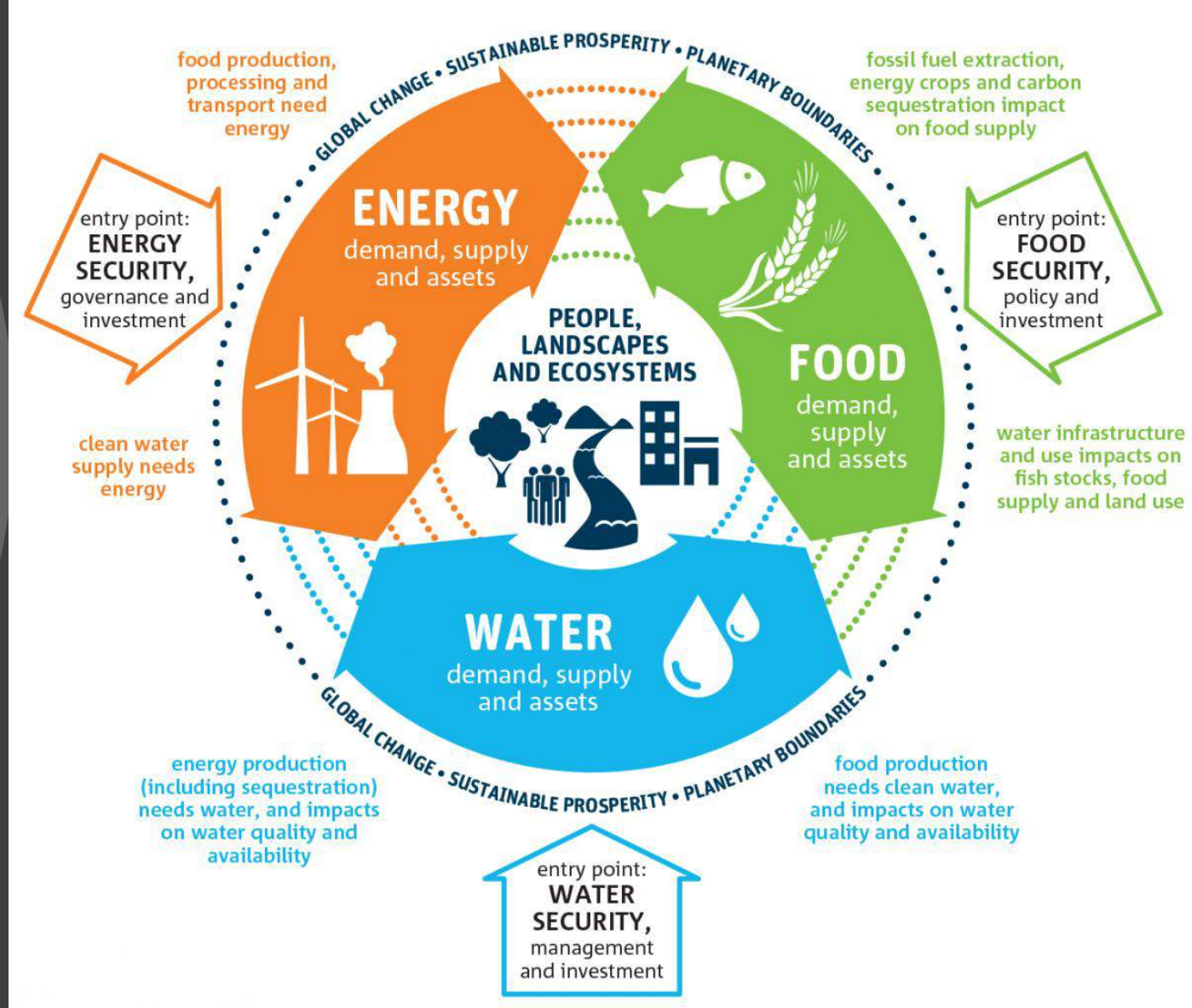
Action
(Customization
of materials in
local context)



Source: DRH

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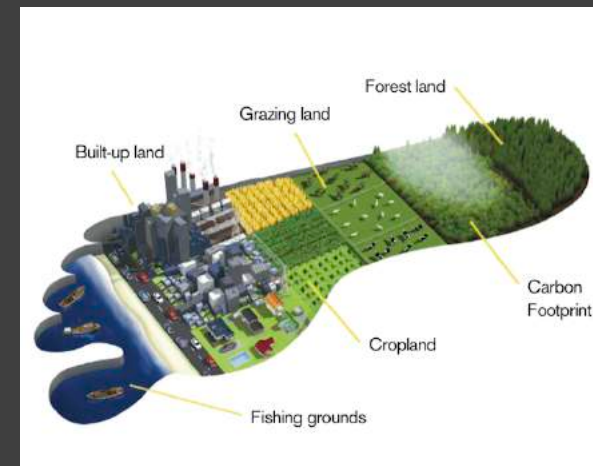
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Balance and tradeoff: A serious policy decision

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National policy with local implementation

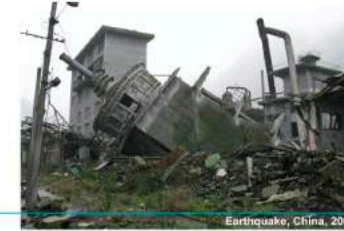


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NATECH: NATURAL Hazards induced TECHNOLOGICAL Disasters



OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response



Words into Action Guideline, UNISDR

GAR 19 Chapter on NATECH
ASEAN (ARMOR)
RAPID-N

2011

2015

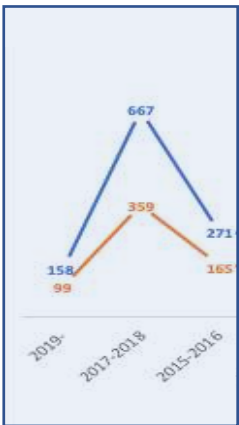
2018

2019

2017

Sendai Framework

WHO Chemical leak from NATECH Information



Google Scholar search - key word NATECH
Total publication count- 2190 (1997-2019)

Our future course of actions for NATECH



Evidenced based policy consultation

Regional consultations (S-T forum as well as APSTCDRR)

Regional bodies (ASEAN, SAARC, **SPREP**)

Specific countries (China, India, Indonesia, Malaysia, Philippines, Thailand)



Advocacy with private sectors

ARISE members as well as Chamber of Commerce

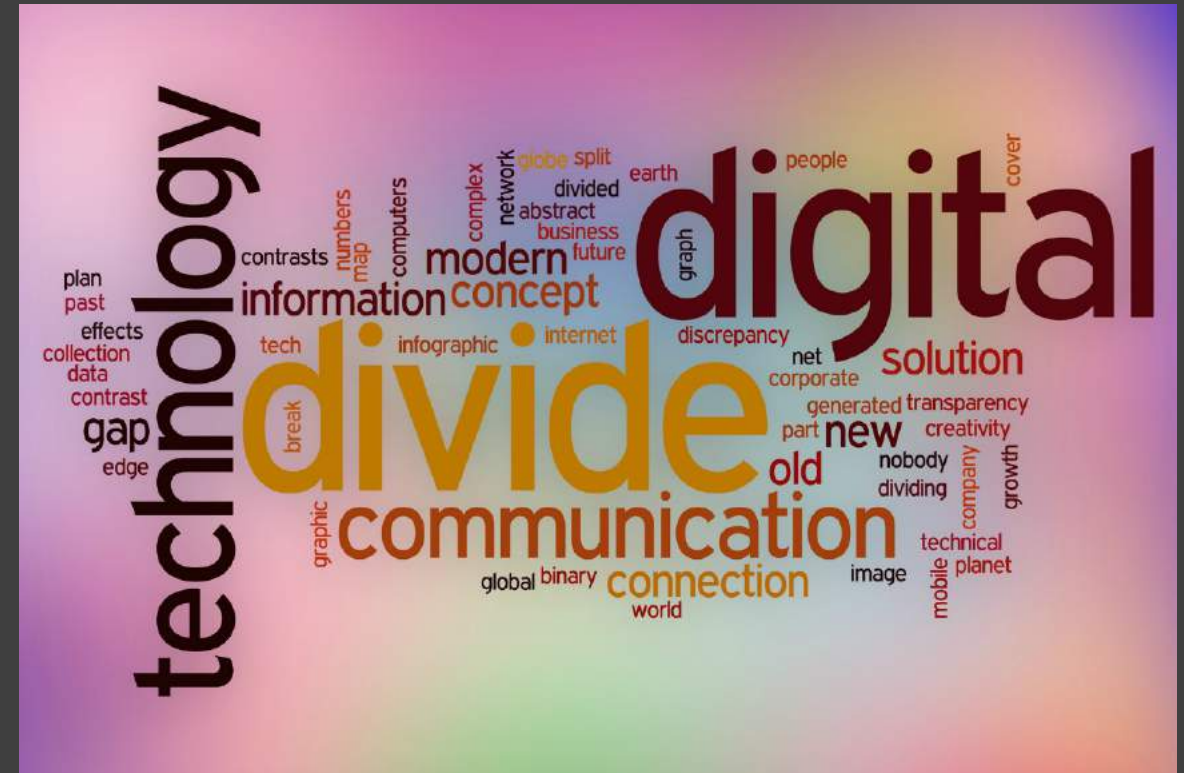


Civil society partnership for community risk assessments and awareness

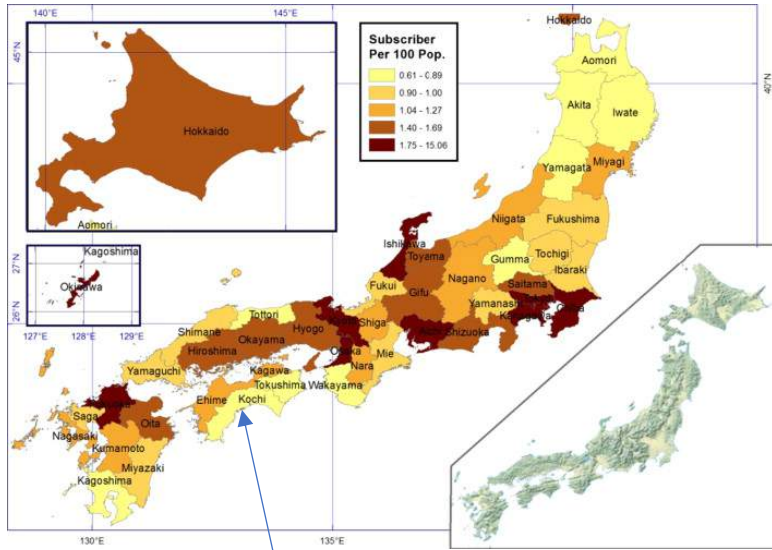
ADRRN collaboration

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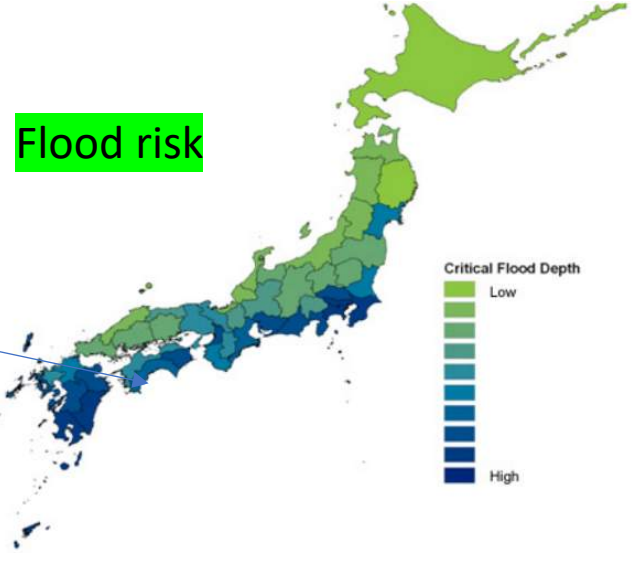
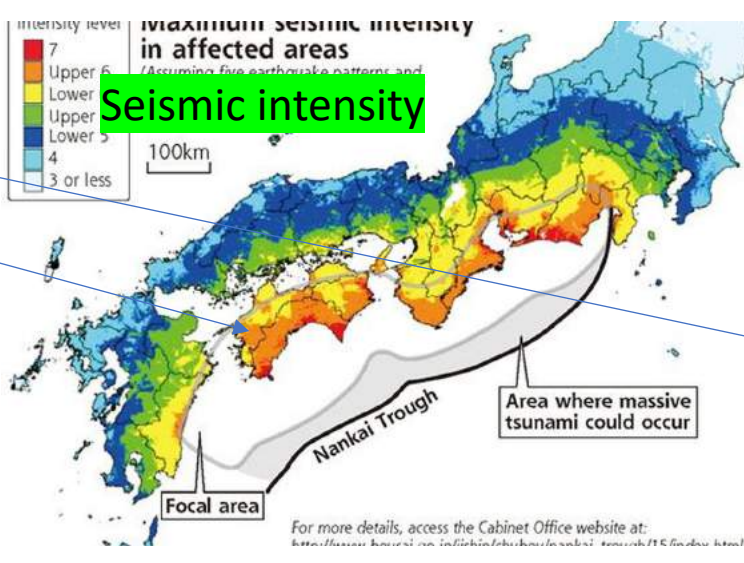
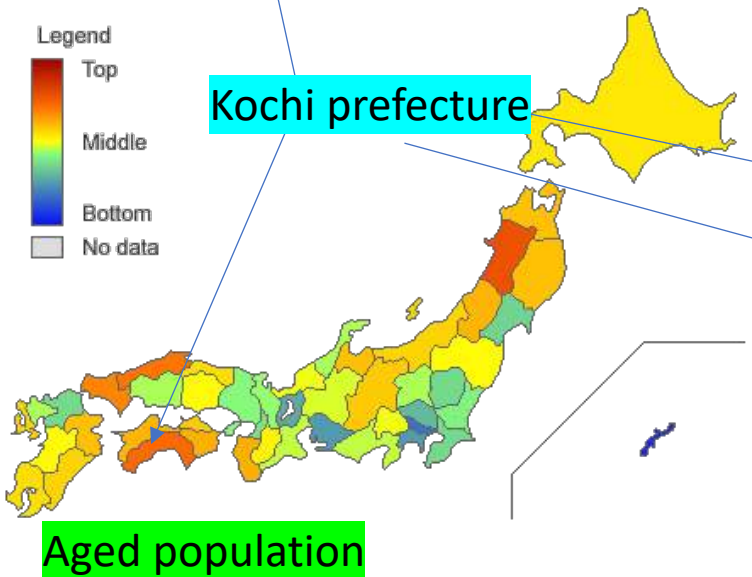
Digital media penetration



Nishida et al. (2014)

Digital divide and need for inclusiveness

- Countries and socio-economic clusters
 - Infrastructure based divide
 - Policy based divide
 - Urban rural divide
 - Age based divide
 - Gender based divide
 - Physical and mental challenge based divide



For more details, access the Cabinet Office website at: <http://www.cao.go.jp/soumou/infokan/infokan/sankai/sankai15/infokan.html>



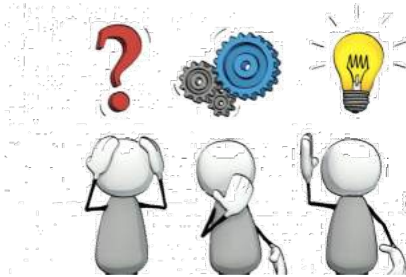
Government role is to develop the **entrepreneurship ecosystem**

Academia role is to establish **incubator** in universities with partnership with government, private, civil societies

Sci-preneur (Scientist + Entrepreneur) bring research into the core of disaster management activities of the private sector and policy making

Incubator Approach

How to bring **Youth and Young Professionals** to solve local problems and achieve the targets of SDGs?



(IPAD) - Incubator for **Peace Building**, **Climate Adaptation** and **Disaster Risk Reduction**



The repository of **students and faculty research** can be accessed, customized, scaled, repackaged and presented for possible funding and also for global visibility.



The incubator will support **“Start to Scale”** support for socio-economic and technology entrepreneurship and facilitates the conversion of research activity into entrepreneurial ventures.

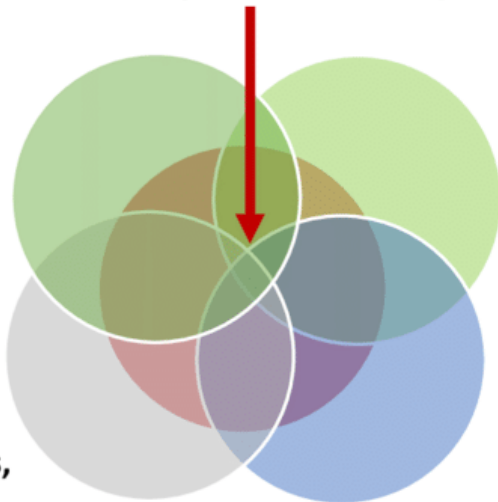


Resilient infrastructure system

Essential service provision
e.g., energy, communications, health, finance, transport, food & water provision, security

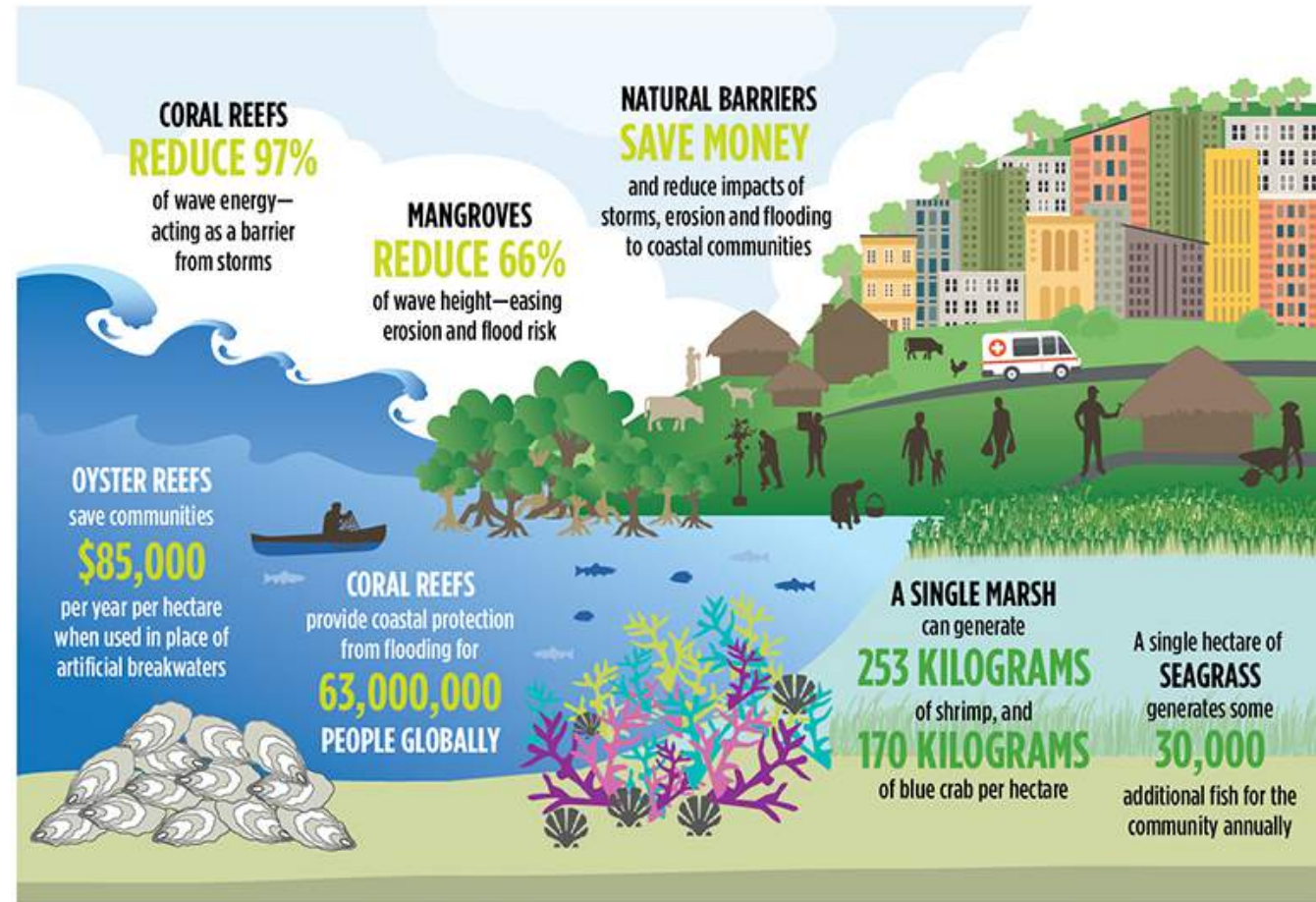
Human infrastructure
E.g., economic, cultural, social networks & structures

Grey infrastructure
E.g., buildings, roads, bridges, drains



Green infrastructure
E.g., urban forests, parks, trees, living walls, green roofs, sport fields, agriculture

Blue infrastructure
E.g., water-sensitive urban design, waterways



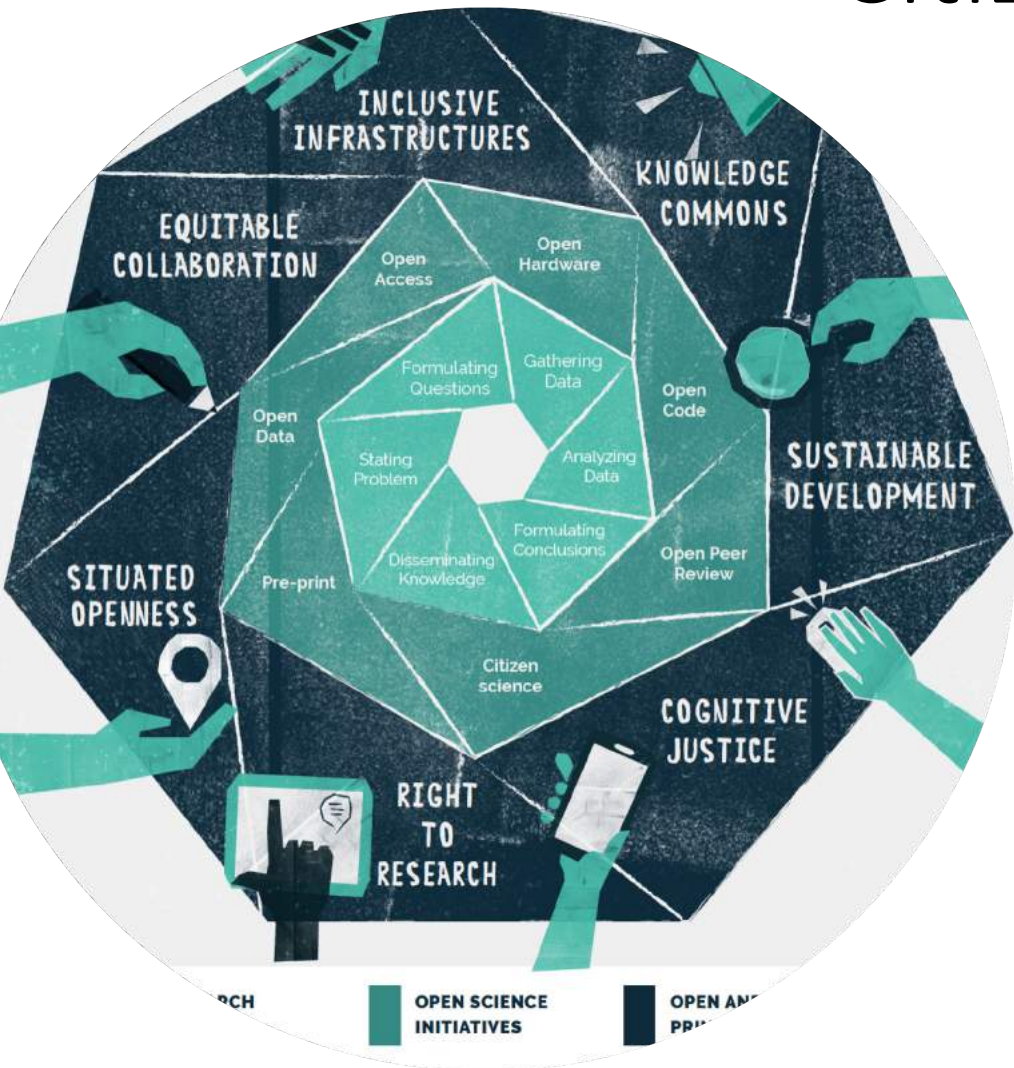
- Nature based solutions

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Citizen science

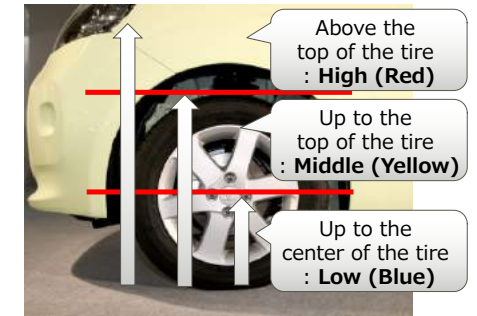


Technological intervention for Inundation flooding:

Water Level Measurement

Challenges:

- Short duration heavy rainfall
- Non uniform inundation flooding



Simple smartphone technology

3 types of smartphone apps for measuring water levels.

1. Select Type for DDMA



2. Input Type for Climate Schools



3. AR Type for Climate Schools



Processing



Water level Measurement



Map image

smartwatersolution.org

Smart WATER SOLUTIONS

Engage communities in reporting the water problems and receive possible solutions

0
Survey

LEARN MORE

Smart Water Solutions

Step.1 Upload Photo [1/5]

UPLOAD PHOTO

Your Name

Village name

Upzilla or Gram Panchayet name

District name

Point Source
Pond

Year of Use

Number of HHs using it
0

GPS location of point source
23.7246 90.3897 GPS

Step.3 About Source [3/5]

Colour
clear Light yellow Brown

Odour
None pungent

Turbidity / TDS
Yes No

Taste
normal salt

Transparency
clear Not clear

Step.4 About Contaminants [4/5]

Microbiological
Unknown analysis of planktons infectious diarrhea/dysentery None

Iron
Unknown sedimentation colour Fatigue, weight loss among children None

Arsenic
Unknown Already identified Analysis of sample Skin hardening (3) pigmentation in hands and None

Step.4 About Contaminants [4/5]

Microbiological
Unknown analysis of planktons infectious diarrhea/dysentery None

Iron
Unknown sedimentation colour Fatigue, weight loss among children None

Arsenic
Unknown Already identified Analysis of sample Skin hardening (3) pigmentation in hands and None

robi axiata 3G 13:06 69%

survey.smartwatersolution.org

blisters, itchiness,

Sodium / Salinity
Unknown Taste Hypertension, hyperacidity, gastrointestinal None

Fluoride
Unknown Already identified Sample analysis Discolouration of teeth, bone deformation, death None

BACK NEXT

Step.5 Suggested tips [5/5]

Following are some of the suggested solutions. Tell us your preferred option.

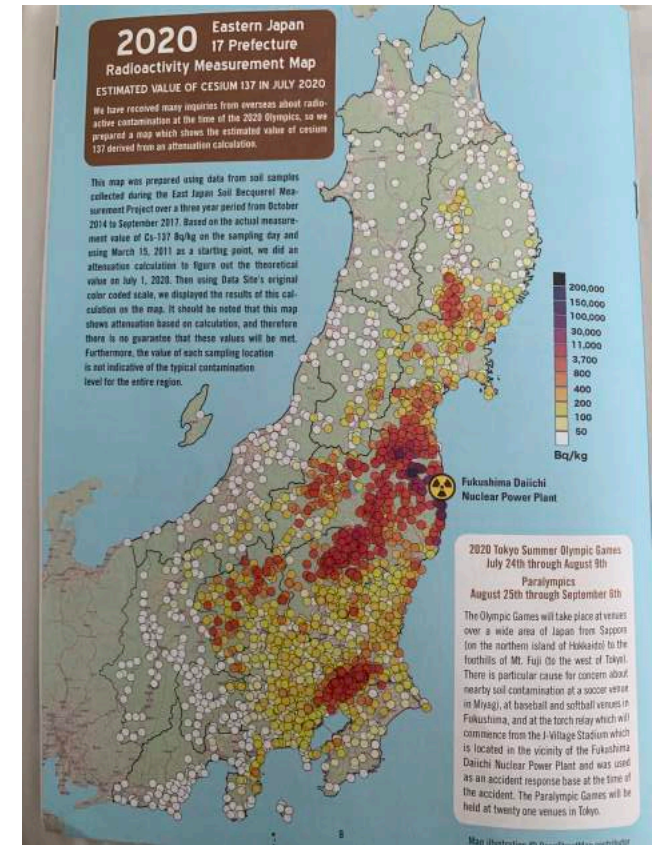
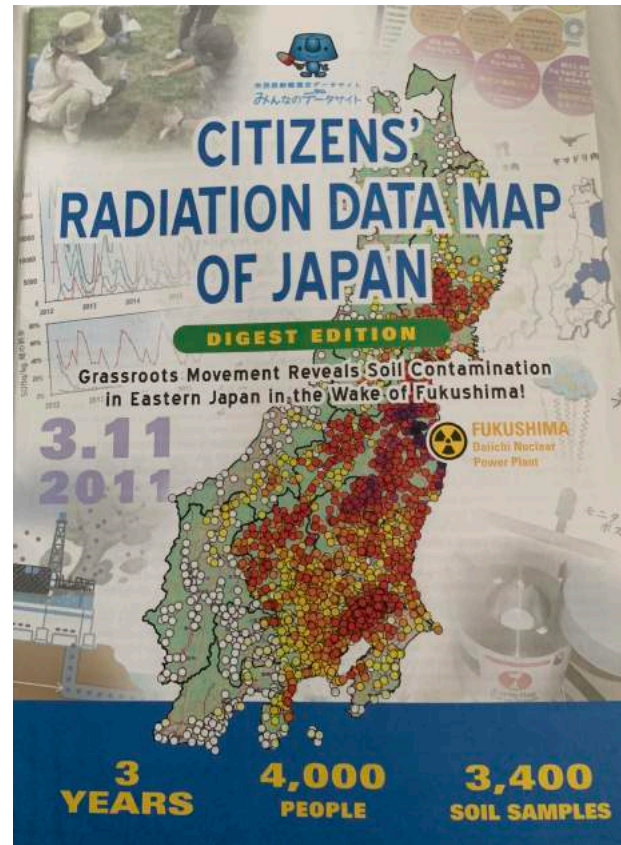
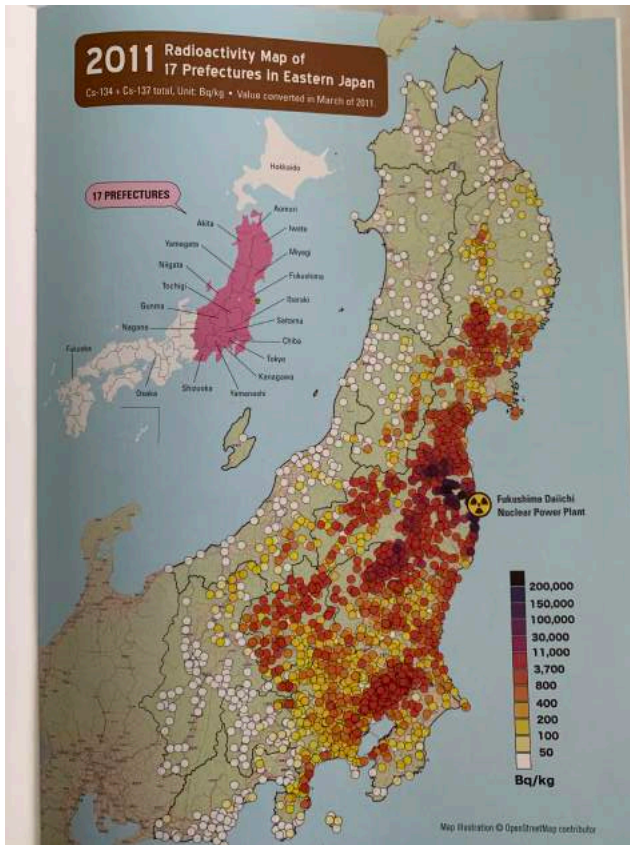
Iron : colour

Sedimentation Iron filter Find alternate source Rainwater harvesting

Arsenic : Already identified

identification of safe source Arsenic filters Pond sand filter Surface water use

Rainwater harvesting Ground water recharge Change aquifer Find alternate



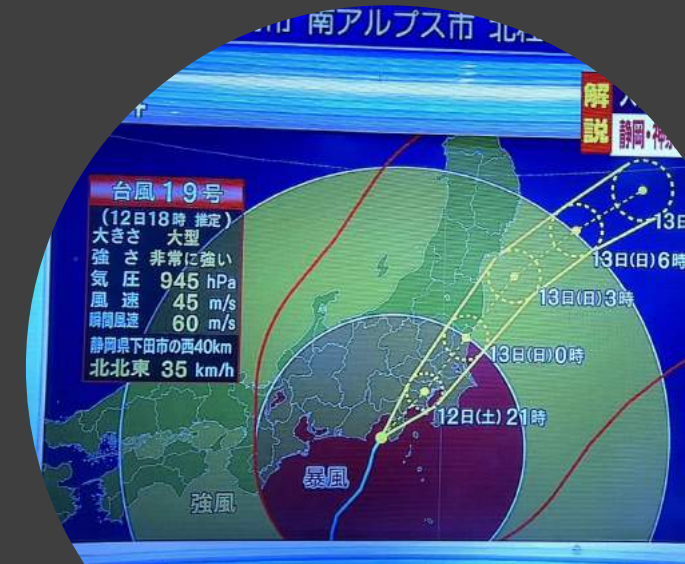
Citizen participation in radiation measurement

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予想雨量(～あす朝)	地域
800	東海
500	関東甲信・北陸
400	伊豆諸島・東北
300	近畿
200	四国・中国地方
100	北海道



Final Comments

- Science in national decision making and science investment **do not** necessarily linked to people's needs
- A strong **gap** exists on what we do and what is required
- Global and regional framework / priority actions for science exist, needs more national and **national – local linkage**
- S-T partners have different priorities however, **governance / legal framework** is required to ensure science-based policy making
- Science –policy linkage needs **private sector** and other stakeholder collaboration
- Incorporate appropriately the “**Citizen science**” in monitoring
- “**Demand driven innovation**” and “**innovation induced demand**”



2020 ASIA-PACIFIC SCIENCE AND TECHNOLOGY CONFERENCE FOR DISASTER RISK REDUCTION

"Science and Technology for Building Resilience of Communities and Infrastructure"

16-17 MARCH

Kuala Lumpur Convention Centre (KLCC), Kuala Lumpur, MALAYSIA

OFFICIAL WEBSITE

www.ukm.my/apstcdr

REGISTRATION IS NOW OPEN!

visit our website at www.ukm.my/apstcdr for registration.

Please Confirm Before 31 January 2020. We Hope To See You In Kuala Lumpur!

Partnerships are welcomed to host

**Thematic sessions
Exhibition booths**

Themes

Asia Pacific Status of Science and Technology in DRR (host: APSTAAG)

NATECH Risk Reduction: A New Challenge (host: APSTAAG)

Climate Change Adaptation in Cities (host: ANCST)

Higher education and capacities (host: APSTAAG)

Risk communication and emerging technologies

Science technology for local actions

Youth Stage – Uinspire/UNESCO

Collaborators Welcome!



International Science Council
Regional Office for Asia and the Pacific



Details and registration can be found at
<https://www.ukm.my/apstcdr>



International Association of Disaster Risk Reduction (IADRR)

Proposed by Cui Peng and Rajib Shaw

MISSIONS

Expect valuable inputs for improvement



International science platform for DRR

- Host international conferences, regional meetings and workshops to promote the development of DRR.
- Establish an online community for communications and collaborations on DRR endeavors.



Filling the gaps

- Bring all stakeholders –
 - Scientists: natural & social sciences
 - Researchers
 - Engineers
 - Decision makers
 - Architects
 - Urban planners
 - Public officials
 - Healthcare professionals
 - Media...
- To better contribute to the DRR endeavors.



DRR Publications

- The journal of the Association is proposed to be the *Progress in Disaster Science*, an Elsevier journal which was launched in the 2019 Global Platform for DRR, to support the research output and communications of DRR.

IADRR International Association of Disaster Risk Reduction



2020 - 2025

- Establishment of the Association as a legal entity, improvement of its organization and structure, ensure financial support and human resources for office operation.
- Organize an international conference and conference for general assembly, and to make regional contributions to the implementation of Sendai Framework.
- Develop over 2000 individual members who share the interests of DRR. Its journal, *Progress in Disaster Science*, becomes an SCI journal

2025 - 2030

- Apply for formal membership in International Science Council (ISC).
- Grow membership to over 5000 and play an important role in the global DRR endeavors.
- Its journal and DRR awards becomes more well-established and recognized within the international community, and serves as a catalyst for dedicated DRR professionals around the globe.

2030 - 2040

- Become a leading global, professional organization initializing and coordinating researches, teachings and practices of DRR in countries around the world.
- Members reach the target number of 10,000, and its international DRR conferences become well-established with global influence in the community.



ROADMAP

IADRR International Association of Disaster Risk Reduction

