8th Workshop on Non-Linear Dynamics and Earthquake Prediction

3 - 15 October, 2005

Integrated Disaster Risk Management as an Innovation of Science and Technology: Issues, Methods and Challenges. Part III

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These are preliminary lecture notes, intended only for distribution to participants
Integrated Disaster Risk Management (IDRiM) and Governance: A Perspective and Methodology of Enhancing the Quality of Disaster Prevention

Norio Okada

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Lecture 3
8th Workshop on Non-linear Dynamics and Earthquake Prediction, 11 October, Trieste, Italy
Challenges to be made by scientists for themselves, practitioners, and common people.

- To deal with risks, **imagination** is the source of critical, creative and upward thinking; not depressive or downward thinking which makes people turn away from facing risks.

- To encourage people (both professional and common) to view risks as another landscape of our living sphere.

- To approach disaster planning and management in an **integrated manner** but try to solve it first as **simple and easy to act** as possible.
Integration is needed in

- Integration **DD**: Combining both **daily** and **disaster** mode (disaster and non-disaster cycle),
- Integration **MD**: Dealing with **multiple** hazards and **disasters**,
- Integration **KP**: Systematizing and linking a piece of particular, specialized **knowledge and technology** to relevant **policy concerns and governance issues**,
- Integration **DU**: Linking **disaster** management to **urban planning and management**,
- Integration **KD**: Spanning a gap between what we **know** and what we do= **Implementation knowledge**,
- Integration **MA**: **Methodological** Development by **Adaptive Management**
Integration **KD**: Spanning a gap between what we **know** and what we **do** = **Implementation knowledge**
Three types of missing knowledge and One Already there

• Frontier knowledge: Still much unknown (eg. Location of active faults)
• Existing knowledge: Already much known (eg. Lessons learned from past disasters, predicted typhoon/hurricane approaching real-time. )
• Implementation knowledge: Yet much unknown (eg. how to encourage and let people practice furniture nailing; still tacit and not formalized )
• We do not know enough about the above fact. (eg. Self-isolation and Mindset by specialization)
Implementation Divide

1 foot mini-action

1 big Mile

KNOWLEDGE

ACTION
Who are more responsible?

• Anyone who thinks it’s one’s mission to take a one-foot leap towards action.

• Scientists (researchers), why not take an initiative?

• Let us make the knowledge build-up of narrowing the gap a part of scientific achievements.
Challenges by scientists to approach people

• Scientists should work with practitioners and common people in fields and let them face the fact that it is rather a matter of their attitude and behaviors which keep them away from taking a leap towards action.

• Social and human scientists should take lead and formulate such knowledge of bottlenecks in attitudes and behaviors, and should find out knowledge of overcoming implementation bottlenecks in people’s attitudes and behaviors.
Hurricane Catherina
Well Imagined A year ago!

• When did this calamity happen? It hasn't—yet. But the doomsday scenario is not far-fetched. The Federal Emergency Management Agency lists a hurricane strike on New Orleans as one of the most dire threats to the nation, up there with a large earthquake in California or a terrorist attack on New York City. Even the Red Cross no longer opens hurricane shelters in the city, claiming the risk to its workers is too great.

Gone with the Water

National Geographic Magazine, Oct. 2004
By Joel K. Bourne, Jr. Photographs by Robert Caputo and Tyrone Turner

The Louisiana bayou, hardest working marsh in America, is in big trouble—with dire consequences for residents, the nearby city of New Orleans, and seafood lovers everywhere.
Early warning executed but

- Many people would not evacuate
  Reasons might have been:
  - “I know I should but I cannot act so”
    “Let us hope it will be okay”
    “How can I move without money and transport?”
    “Leave me here and do not force me out!”
"The killer for Louisiana is a Category Three storm at 72 hours before landfall that becomes a Category Four at 48 hours and a Category Five at 24 hours—coming from the worst direction," says Joe Suhayda, a retired coastal engineer at Louisiana State University who has spent 30 years studying the coast. Suhayda is sitting in a lakefront restaurant on an actual August afternoon sipping lemonade and talking about the chinks in the city's hurricane armor. "I don't think people realize how precarious we are," Suhayda says, watching sailboats glide by. "Our technology is great when it works. But when it fails, it's going to make things much worse."
Such high stakes compelled a host of unlikely bedfellows—scientists, environmental groups, business leaders, and the U.S. Army Corps of Engineers—to forge a radical plan to protect what's left.

Drafted by the Corps a year ago, the Louisiana Coastal Area (LCA) project was initially estimated to cost up to 14 billion dollars over 30 years, almost twice as much as current efforts to save the Everglades.
Why NOT IMPLEMENTED?!!

Mindset and Excused by High Priority Issues

Improving Communication and Desegregation
Managing Poverty
Increasing Risk Awareness and Capacity Building for Evacuation (Social-Colearning)

Structural Measures for Disaster Prevention
New York, September 11, 2001
102 Minutes : The Untold Story of the Fight to Survive Inside the Twin Towers
by Jim Dwyer and Kelvin Flynn

• The Police and Fire Department had no idea to work together and communicate.
• They had agreed to do so in their manuals but very reluctant to drill accordingly beforehand.
• Sense of mistrust, rivalry and fear to accept seemingly minor technical routines (probably afraid to ruin solidarity and morale based on “the conventional methods”).
Select a house
Loss of a house property
### Calculated Damage in a house (Result)

#### Furniture Reallocation plan considering Inundated Depth

**Selected Flood Scenario**

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<table>
<thead>
<tr>
<th>Furniture</th>
<th>2nd Floor</th>
<th>1st Floor</th>
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<tbody>
<tr>
<td>TV</td>
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**Inundated Depth**

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**Current Furniture Allocation**

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**Furniture Allocation**

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**Summary**

- Damage to furniture in a house.
- Inundated depth and reallocation plan.
- Current furniture allocation.
- Calculated damage in a house.
Integration **KP**: Systematizing and linking a piece of particular, specialized **knowledge & technology** to relevant **policy concerns and governance** issues

**Policy Linkage: Octopus Model**
(Okada, 2002) Multidisciplinary Approach

We need multiple legs (polyped) which cling to other interface areas.
RISK LANDSCAPE
Participatory Approach based on a Workshop Method

As a PDCA Cyclic Process
(10 times speed than actual time)
Imagination + Simulation = Imagination

Imagination + Experience = Experience
Critical Ima-simulation
Critical Experi-magination
vs.
Vital (Lively, Communicative, critical-implicit)
Vital Experi-magination
Problems in conventional disaster risk case studies (2)

- ignore potential for participative approach to “social co-learning” among potential stakeholders
- fail to provide for continuous monitoring as part of a proactive, anticipatory approach
- identify learning points, but are not designed to convert learning to knowledge that leads to action
- research driven by narrow academic agenda, not broader need for knowledge that will benefit actual communities
What makes CASiFiCA different and unique?

- Continuous monitoring (from Pre- to Post disaster time)
- Cross-referencing (Multilateral Monitoring, from region to region) and Collaborative monitoring
- Adaptive Management for Field-Based Disaster Research (starting from a small but testable research piece)
- Time-bound (three years)
- Practice-bound (Policy-makers, Practitioners, End-users-involved)
- Benchmarking for research outcomes
Typical Conventional Case Study Approach

Disaster A
- START
- END
- retroactive
- non-continuity

Disaster B
- START
- END

Disaster C
- START
- END

NO CROSS-PLACE REFERENCE
Case Station Approach

Place

A

B

C

Disaster A

Disaster B

Disaster C

START

START

START

Time

CROSS-PLACE REFERENCE

>>> 

>>>>>>>>>

>>>>>>>>>>
Social Co-learning Process
= Multilateral Knowledge Development

Stakeholders

- Academics
- Community People
- Administrators
- NGO’s
Academic Co-learning and Life-cycle Process
= Multilateral Human Resource Development

(a) Students as Future Scientists
(b) Students as Future Practitioners
(c) Students as knowledge-carriers, spirit-holders, capacity-disseminators
CASiFiCA-MEXT
Definition and Qualification

• Case station and Field campus are a set of each CASiFiCA Country sub-project.
• The case station is an organ of research function.
• The field campus(es) is (are) field work place where PhD and postdoc-level students work with practitioners, and write a thesis, guided by (a) local supervisor(s) and international/interdisciplinary supervisor(s).
• The NEXUS-IDRiM community is a primary source of international/interdisciplinary supervisor candidates.
NEXUS-IDRiM Charter

Academic Initiative Network Community oriented towards Implementation Science for Integrated Disaster Risk Management (IDRiM)

Whereas, the world is afflicted by continuing disasters of greater and greater severity, and

Whereas, the key to reducing the impacts of disasters and advancing progress in our societies is growth and sharing of knowledge, and

Whereas, the academic community is the nexus for knowledge, therefore
Case Station/ Field Campus

Prioritize Actions

Advocates
Change Agents

Advocacy
Motivational Tools

Learning and Implementation Process

Institution / Organization
Case Station

Case Studies
Best Practices

Field Campus
Integration **DD**: Combining both **daily** and **disaster** mode (disaster and non-disaster cycle),

Disaster Cycle (Alexander)
Disaster impact
Preparedness
Relief
Rehabilitation
Reconstruction
Mitigation

Pre-disaster risk reduction phase

Risk Management

Preparedness

Mitigation

Early warning
Disaster impact

Emergency
Relief
Rehabilitation
Consequence Management

Post-disaster recovery phase

Source:
Ye Yaoxiang (2005)
Proactive and Retroactive Disaster Management

- **Ex ante**
  - Increasing preparedness/Non-construal mitigation
  - Disaster (emergency) planning and drills exercised

- **Immediate after**
  - Evacuation order/Early warning
  - Disaster (emergency) planning executed

- **Ex post**
  - Disaster experience
  - Tradition/education

- **Ex ante**
  - Restoration planning/urban master plan

Conventional risk communication study

Urban/disaster planning
Integration **DU**: Linking disaster management to urban planning and management

**Conventional risk communication study**

- Ex ante
  - Increasing preparedness / Non-construal mitigation

**Urban/disaster planning**

- Ex ante
  - Disaster (emergency) planning and drills exercised / urban master plan
- Ex post
  - Evacuation order / Early warning
  - Disaster (emergency) planning executed
- Ex ante
  - Restoration planning / urban master plan revised

**Time**
Economic losses (billion US$) caused by natural disasters in 1960s-1990s

<table>
<thead>
<tr>
<th>Decade</th>
<th>Losses (billion US$)</th>
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</thead>
<tbody>
<tr>
<td>1960s</td>
<td>75.5</td>
</tr>
<tr>
<td>1970s</td>
<td>138.4</td>
</tr>
<tr>
<td>1980s</td>
<td>213.9</td>
</tr>
<tr>
<td>1990s</td>
<td>659.9</td>
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</tbody>
</table>

Source: Ye Yaoxiang (2005)
1960s - 1990s on a global level

Source: Ye Yaoxiang (2005)
World population (billions)

China’s Urbanization Rate

Source: Ye Yaoxiang (2005)

Urbanization rate (%)

Annual percentage point

Great Leap Forward, 3 million workers increased

2.6 million workers migrated to rural area

Cultural Revolution, urban school-leavers went to countryside

Implementing reform and open policy
Integration KP: Systematizing and linking a piece of particular, specialized knowledge & technology to relevant policy concerns and governance issues

• This world is now a man-techno-complex system society.
• Governance is indispensable but its knowledge unexplored yet.
• Participatory approach on different levels of social autonomy is just one way of achieving a governance scheme.
• Adaptive management is just one of way of governing the man-techno-complex system society.
Nailing Furniture to the Wall (a Japanese Experience)

- Everybody agrees it’s important, but
- Very few people practices it. Why so??
- Hypotheses to be continuously tested (for example):
  There are different groups of peoples with different attitudes.
  We need to identify some appropriate target people.
  → “Social Marketing” Methods may be needed.
  Typology hypothesized:
  - I am eager to learn and practice it. Then I would like to assist others.
  - So far it was all right without it, so it will always be all right with me.
  - It is troublesome and I have more important things to do.
  - I would like to find some one who can help me but don’t know who he/she is.
  - Even if I can find someone like that, I still feel uncomfortable to have him/her step in my bedroom.
Workshop and participatory approach may or may not work

- Adaptive management in a PDCA cycle process
- **Hypothesized models/policies**
- Proactive approach
- **Continuous monitoring**
- Evaluation of process development
- Formalization of implicit knowledge
- **Social co-learning by specialists, students and residents**, like capacity building for Tsunami disaster in inexperienced regions
- **Cultural calibration through cross-country monitoring**
Collaborative Modeling

Model

Claims

Modification

Stakeholder
Missing Knowledge of Sustainability: Vital Integration

- Vitae system (Living body) as both the object and subject of Sustainable Management
- Three functions as a systemic (organic) whole.
  1. To live through (to survive)
  2. To live vigorously (to vitalize)
  3. To live together with others (to con-vive)
- To build resilient capacity should mean dynamic and rhythmic balance of the whole in tension and relaxation over time.
Vitae system

- Survivability: Live through
- Vitality: Live lively
- Conviviality: Live together

Simultaneously satisfied
Vita Functional Integration
Scream

(and/or)

Sink

(Sustainable System (Viability))

(and/or)

Swim
Vitae system (Human)

共

天 Time

Survivability

命

地 Space

Vitality
Vitae system

Conviviality

Live together

Survivability

Live through

Vitality

Live lively

Tension mode 緊張位相

Sympathetic nerve mode 交感神経系位相

Functional Integration of Vitae System
Conviviality

Survivability

Vitality

Relaxation mode 弛緩位相

Para sympathetic nerve mode 副交感神経系位相

Live together

Live through

Live lively

Vitae system
Vital Rhythms

Tension

Mini-disaster Festival Mini-disaster Festival Mini-disaster


relaxation relaxation relaxation relaxation relaxation
Integrated disaster reduction drill

ENJOY and CREATIVE!

Fire extinguisher drill

Emergency toilet set-up training

Furniture fixing device set-up training

Disaster map drawing

Source: Yamori, 2005
Tsunami monument

Tsunami parade at Hiro.

Storm surge trace

REMEMBER THE PAST
EVACUATION DRILL INVOLVING TOURISTS

The City of Rikuzen-Takada, Japan

Phuket, on April 29, 2005.
Vitae System Dynamics

- S=Survivability, V=Vitality, C=Convivality
  E=Environment, t=time
- S (t) as Stamina= Function of V (t) and C (t).
- V (t)=Function of S (t) and C (t).
- C (t)=Function of S (t), V (t) and E (t).
- S (t), V (t) and C (t) are mutually interactive and interdependent.
- The Dynamism is highly nonlinear and complex.
- The System is semi-open-ended.
- The 21st century still misses the knowledge of this kind.
- This is a part of implementation knowledge (science).
Networked Vitae System

• Every vitae system covers a marginally extended and thus a more resilient system is expected.

• Thus each governs the area of one’s own locality, and thus to be networked to service the entire region.
Networking of Vitae systems

Diagram showing relationships between Survival, Vitality, and Conviviality.