Integrated, resilience-based planning for mitigation and adaptation in Asia

Ayyoob Sharifi, National Institute for Environmental Studies, Japan

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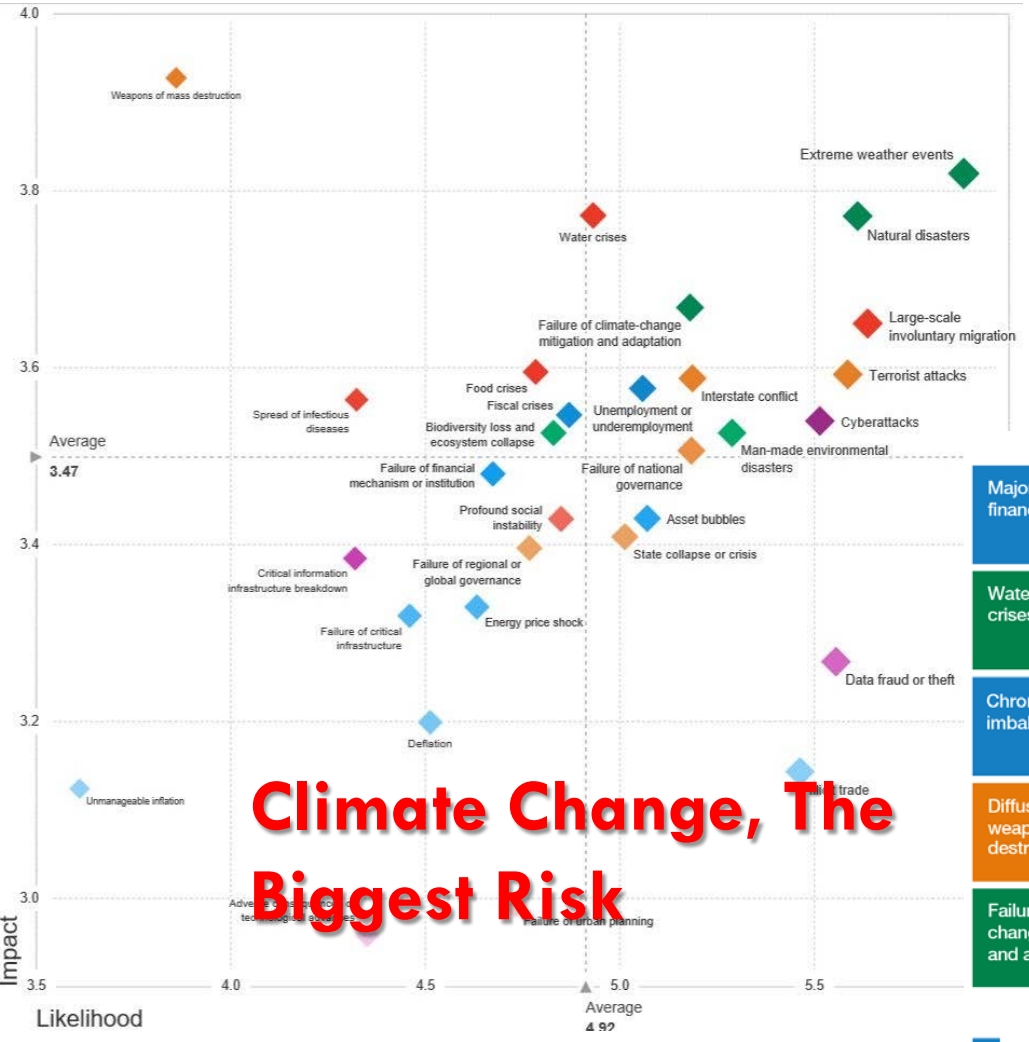
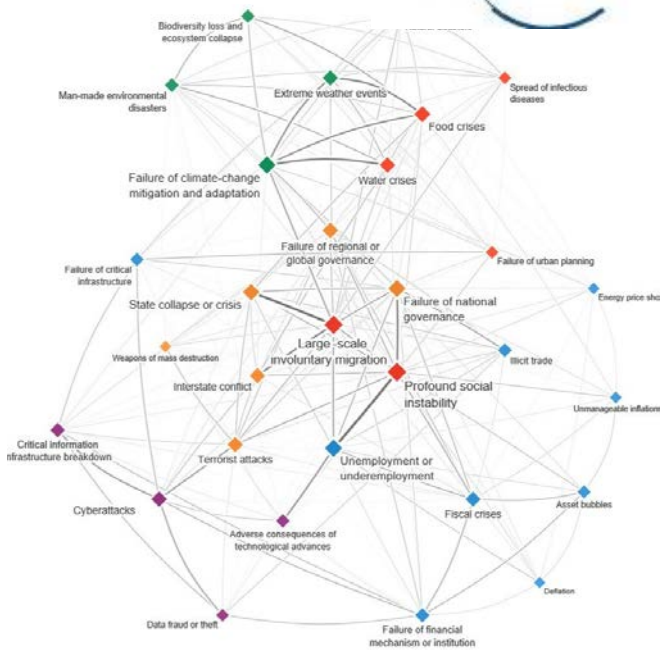
ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

LoCARNet

Climate Change Asia

Interconnected Risk Landscape





Climate Change, The Biggest Risk

2013	2014	2015	2016	2017
Major systemic financial failure	Fiscal crises	Water crises	Failure of climate-change mitigation and adaptation	Weapons of mass destruction
Water supply crises	Climate change	Rapid and massive spread of infectious diseases	Weapons of mass destruction	Extreme weather events
Chronic fiscal imbalances	Water crises	Weapons of mass destruction	Water crises	Water crises
Diffusion of weapons of mass destruction	Unemployment and underemployment	Interstate conflict with regional consequences	Large-scale involuntary migration	Major natural disasters
Failure of climate-change mitigation and adaptation	Critical information infrastructure breakdown	Failure of climate-change mitigation and adaptation	Severe energy price shock	Failure of climate-change mitigation and adaptation

Economic | Environmental | Geopolitical | Societal | Technolog

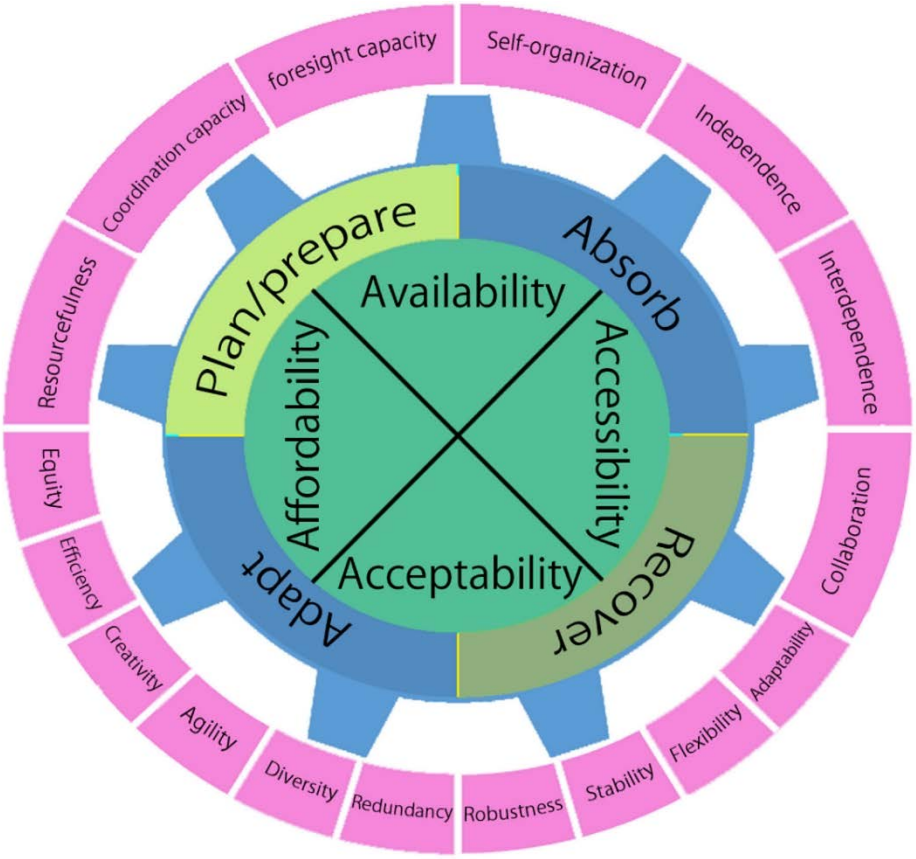
Resilience and adaptation

Incremental adaptation

- Dominant type
- Small-scale disruptions

Transformational

- Highly vulnerable system
- Severe/more frequent stresses
- Thresholds are crossed



Source: Sharifi (forthcoming)

Major elements of the framework for analysis

Comprehensiveness

Cross-scale relationships

Temporal dynamism

Uncertainties

Participatory approaches

Action plans

Shortcomings and Challenges, gaps in knowledge

General enough/flexible enough

Spatial and temporal dynamics

Modelling, simulation and scenario making

Dominance of vulnerability (not resilience) measures

Interlinkages and complex interactions

Can resilience assessment shed more light on the uncertain future?

Data availability for conducting assessment

Cost of assessment

A major challenge would be reducing information to an understandable and manageable level (optimization)

Developing integrated tools for assessing both sustainability and resilience

Energy System

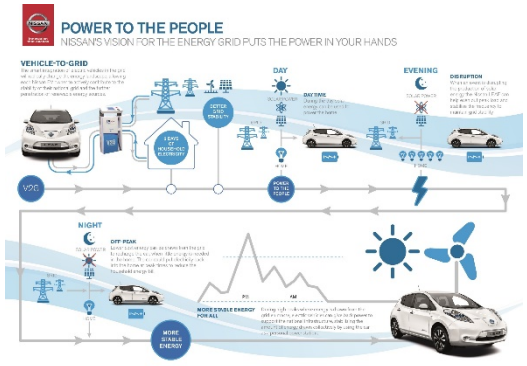
IT networks and equipment for system monitoring and control

- Real-time communication of operating conditions with utility mangers
- Optimizing response time to reduce potential loss of system function
- Better sharing of information between system
- Interactive feedback with residents (smart-metering/in-home displays)

Shift from centralized grid to decentralized systems (e.g. microgrid)

- Distributed generation
- Less exposure to extreme events
- Prevent cascading effects
- Energy efficiency enhancement
- Improved diversity, and reliability, clean energy, etc.

Source: Sharifi and Yamagata (2016); Arup, RPA and Siemens (2013)



Buildings

Passive design (orientation, natural lighting, high albedo, PCM, green roof/facade, etc.)

Automated systems to take advantage of local climate

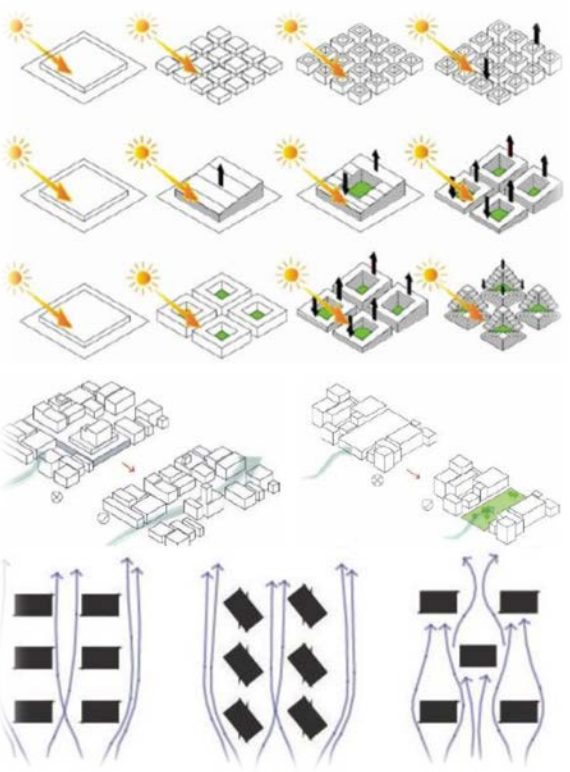
Solar energy panels

High-tech/IT infrastructure for failure detection (smoke, air quality,…)

Indoor human behavior simulation

Source: solaripedia.com

Source: Sharifi (2016)



Source: Raven et al.(2015)

Future challenges and opportunities

Adaptive mitigation

Life cycle costs

- Massive urbanization provides opportunities for eco-design

Nexus issues

- E.g. water-energy nexus

Trade offs

Consider context

- (climate, technical feasibility, site suitability)

Thanks for your attention

Ayyoob Sharifi, PhD.

Executive director, GCP

Research Associate, NIES

sharifi.ayyoob@nies.go.jp

sharifigeomatic@gmail.com

http://www.cger.nies.go.jp/gcp/