

# **Integrated Risk Governance**

**as a NEW approach to deal with climate change**



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# Outline

- About our project
- New challenges
  - a complex, nonlinear, dynamic social-ecological system (China as an example)
- An integrated approach
  - An ICT based toolbox
- Summary



# Very Large-scale Disasters (fatality, property loss and affected area)



## Japan Triple Disasters







# Rich or Poor Countries in 2013



Floods in Germany



Boulder, Colorado, USA



Extreme Weather in Shanghai, China



Typhoon Yolanda, Philippine



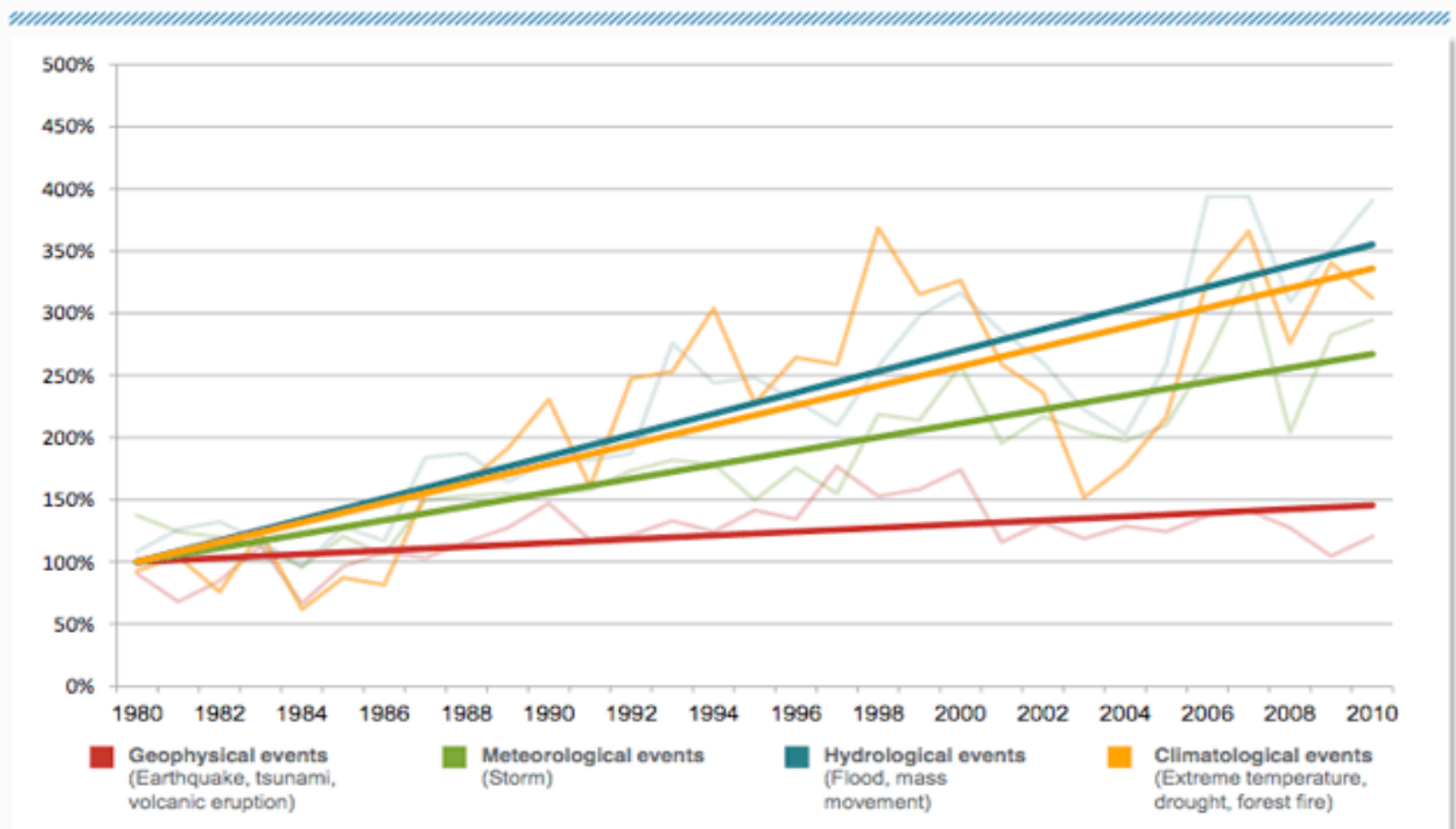
# Uptrend of Climate Change Related Events

NatCatSERVICE

## Natural Catastrophes Worldwide 1980 – 2010

Number of events with relative trends

Munich RE 





# Fact

Lacking of both governing and financial mechanisms at GLOBAL LEVEL to deal with both human-induced crisis and nature-induced disasters

e.g.

Global financial crisis (human induced)

Earthquakes (nature induced)

Global climate change (both human-nature induced)





# Project Background



Proposed by CNC-IHDP in 2006



Approved by IHDP in 2010



Launched in 2011 as an IHDP Core Science Project from 2010-2019



Co-Chairs

*Peijun Shi*, Beijing Normal University  
*Carlo Jaeger*, Potsdam Institute for Climate Impact Research



## Challenges to Adapt Climate Change

Dealing with a complex,  
nonlinear, dynamic social-  
ecological system

China as an Example



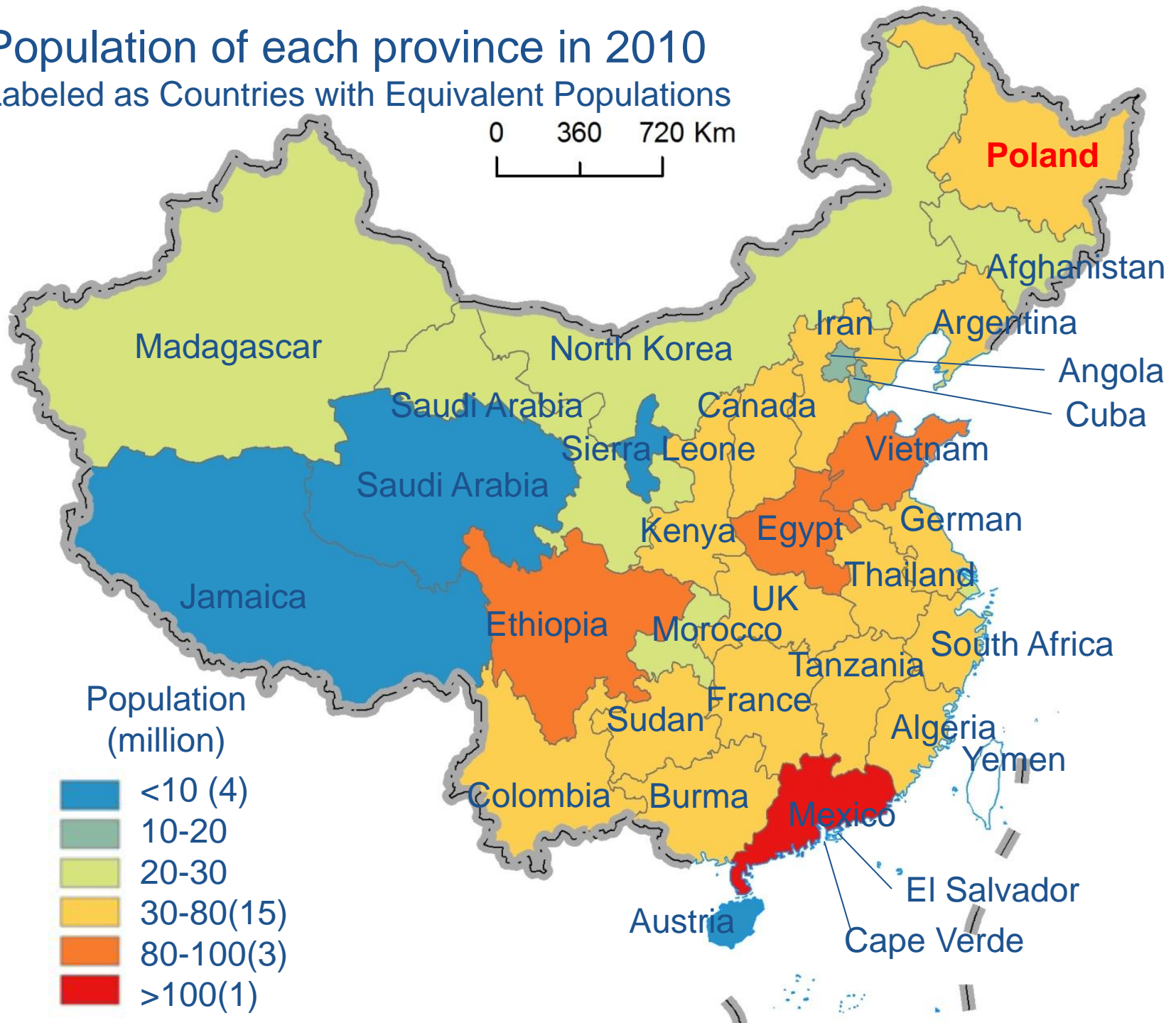
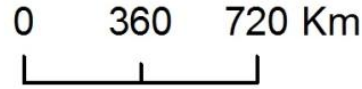


# Challenge One

## Irreversible Trends

# Population of each province in 2010

Labeled as Countries with Equivalent Populations

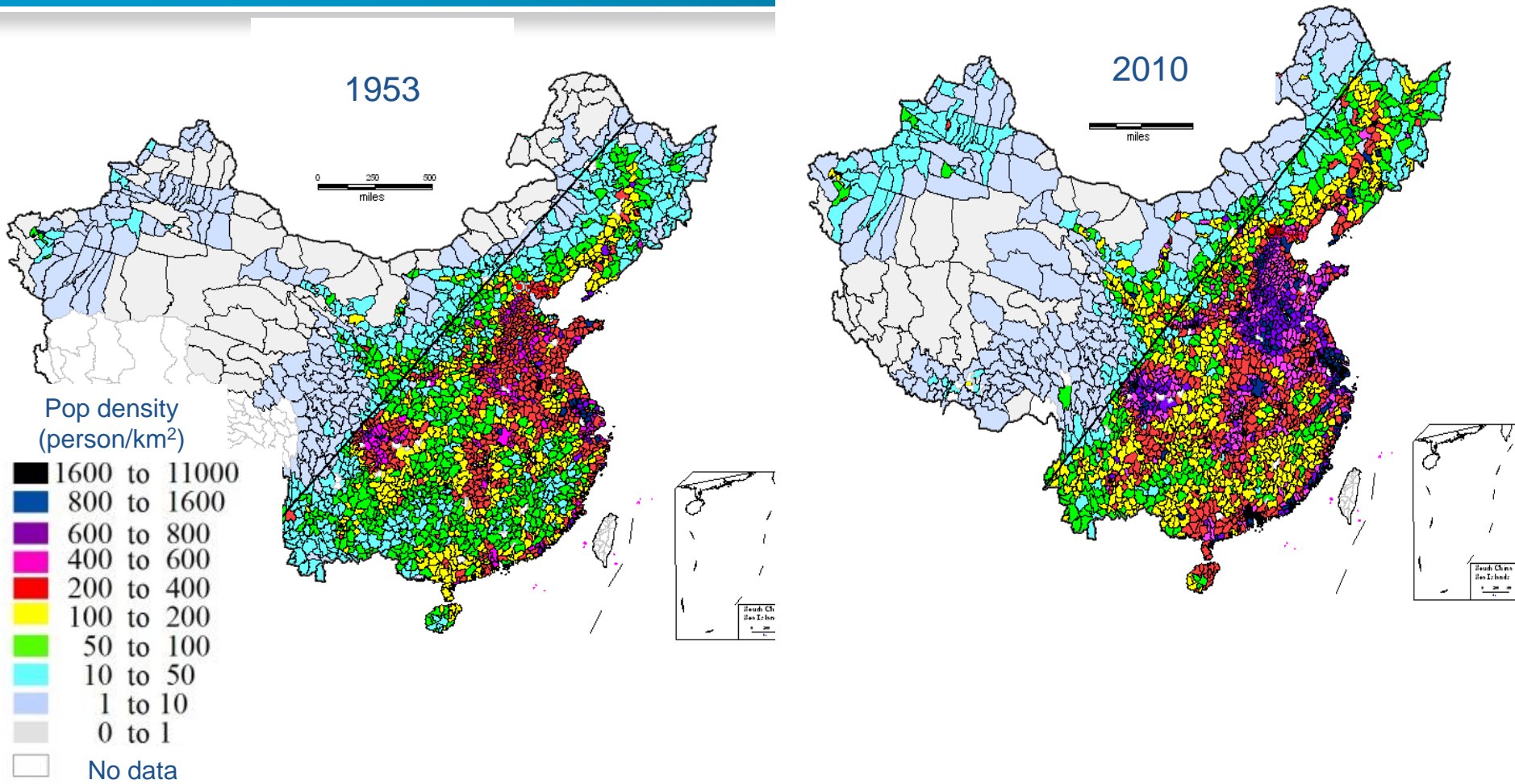


Population (million)



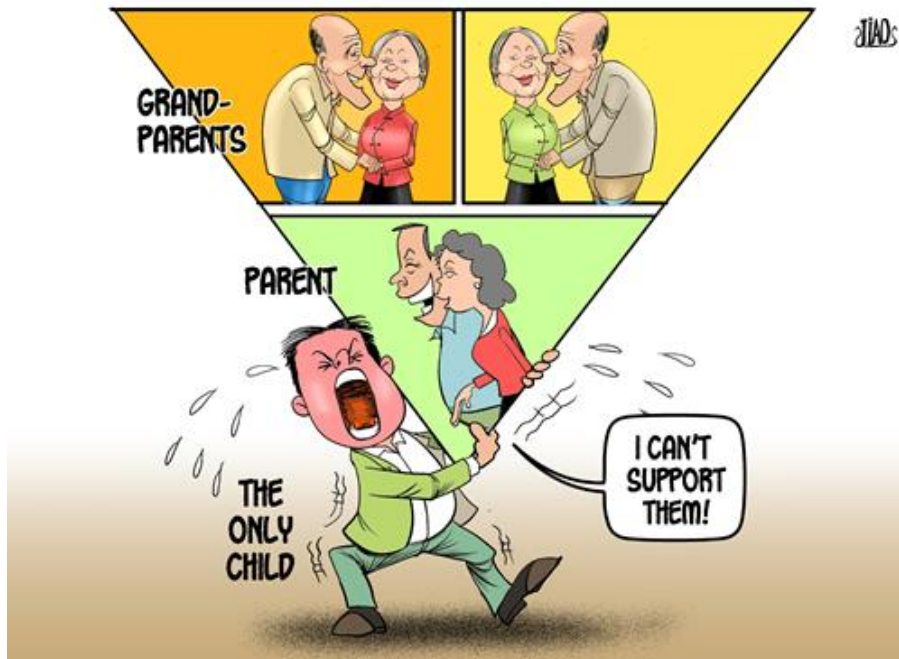


# Population density of China





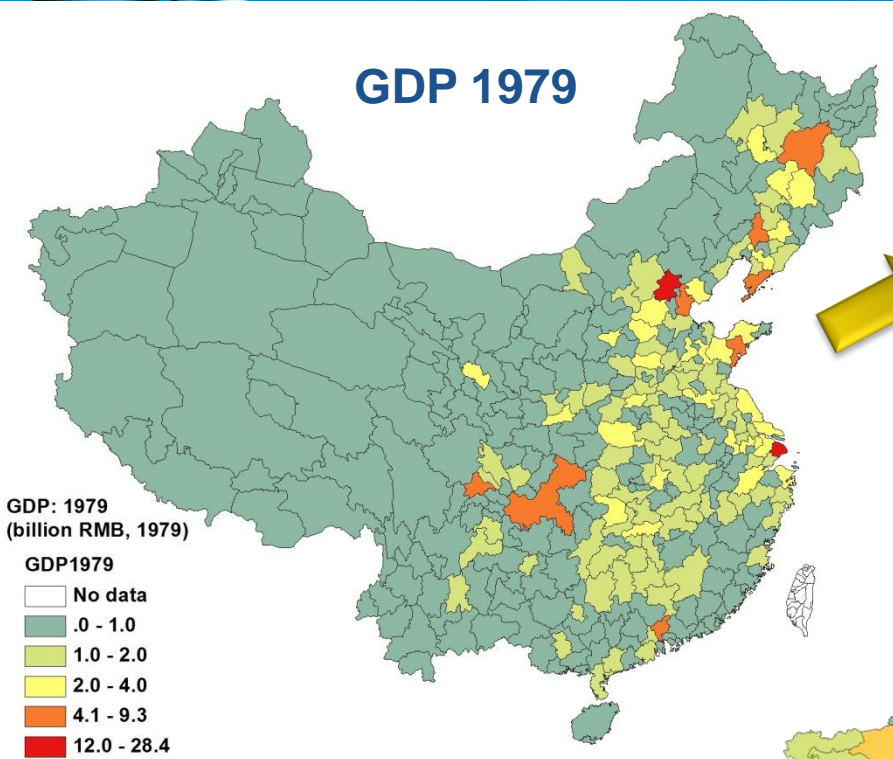
# One Child Policy



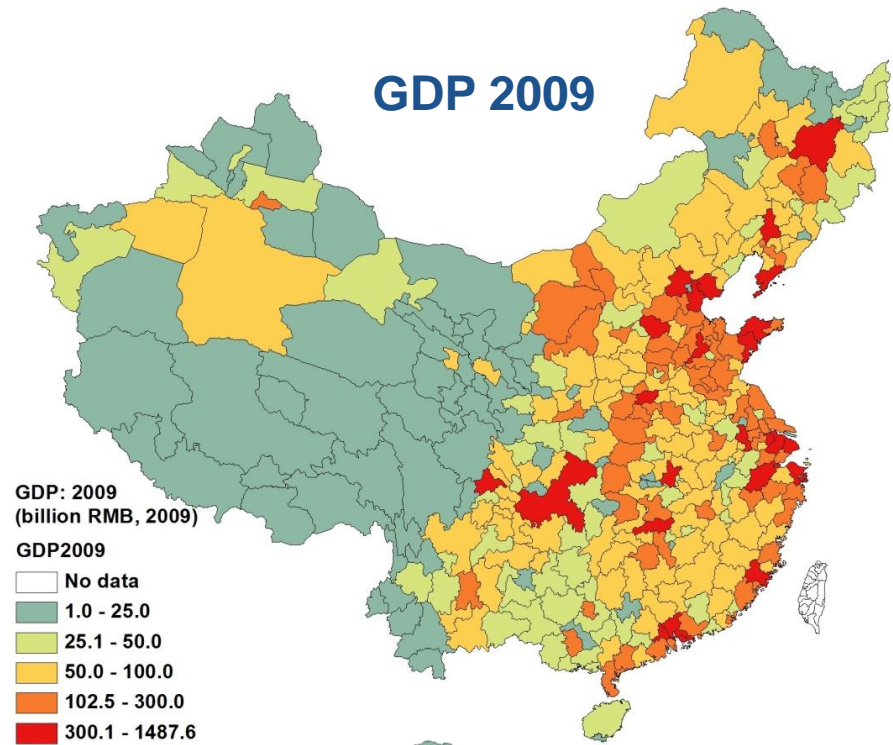


# Economic Exposure

GDP 1979



GDP 2009



GDP Change 2009:1979



Open Door Policy



# Rapid urbanization & land use changes



Shenzhen

2007





# Urban expansion at national scale



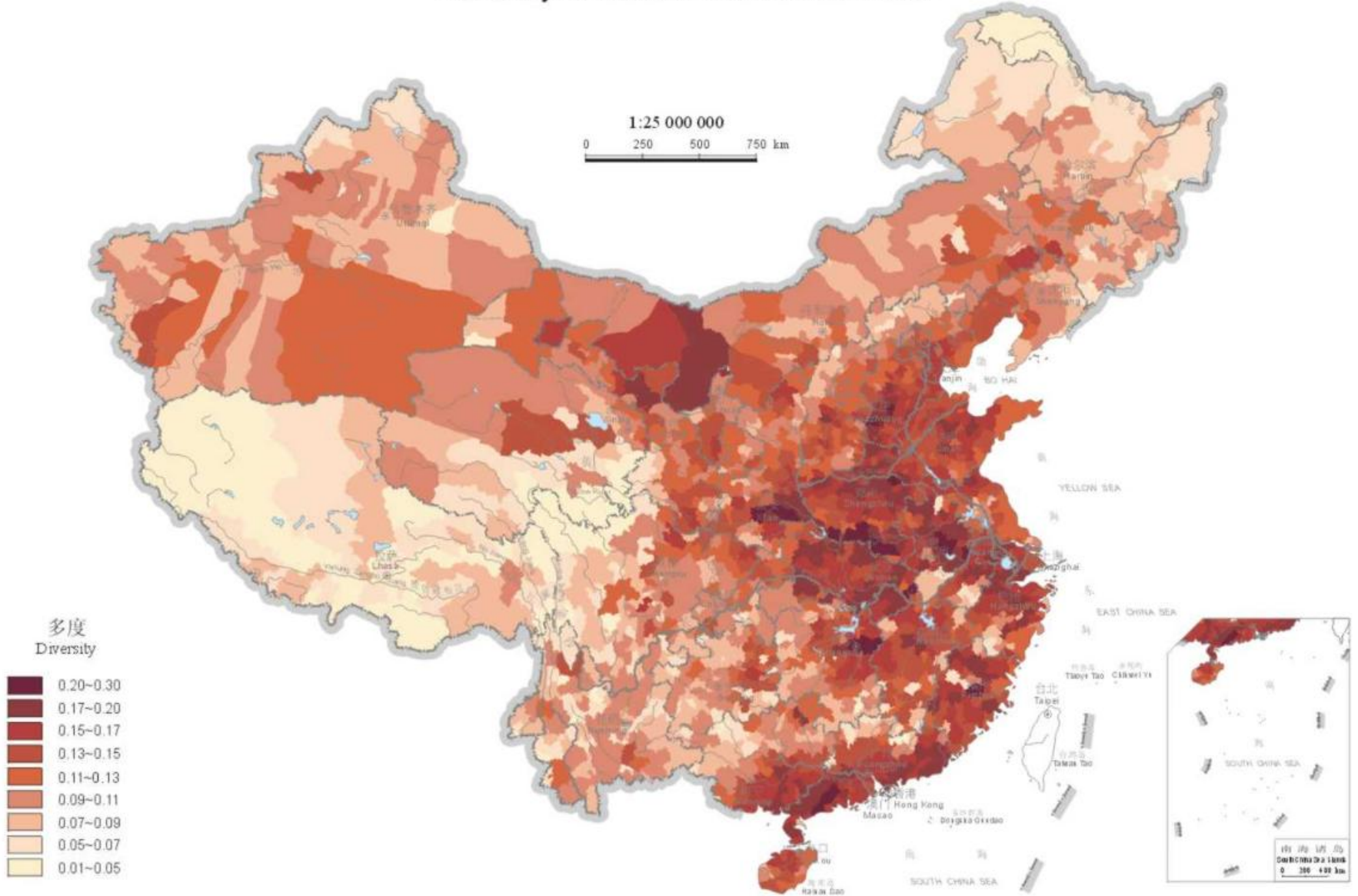


# Challenge Two

## Periodic Disturbances (Extreme Events)



# 中国自然致灾因子多度 Diversity of Natural Hazards in China







# Natural disaster in cities: floods

**Floods in 1998 (Yangtze River, Songhua River)**

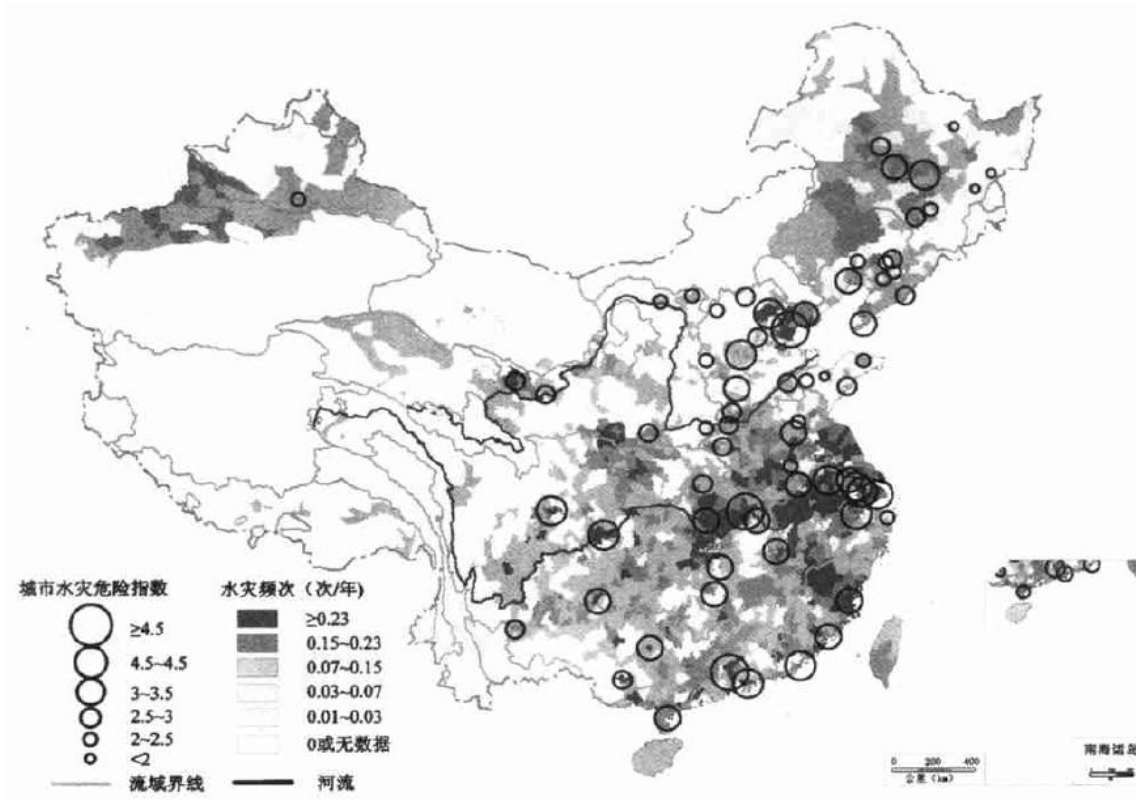
**Casualty: more than 4000**

**Direct economic loss: 255 billion RMB**

***Xinhua News***



# Flood Risks



(Wang, et al., 2004)

- average rainstorm days, maximum rainfall
- urban topography, urban river/lake network, drainage systems
- population density, land use, urban boundary
- losses from historic flood events



# **Challenge Three**

## **Reginality of Risks**



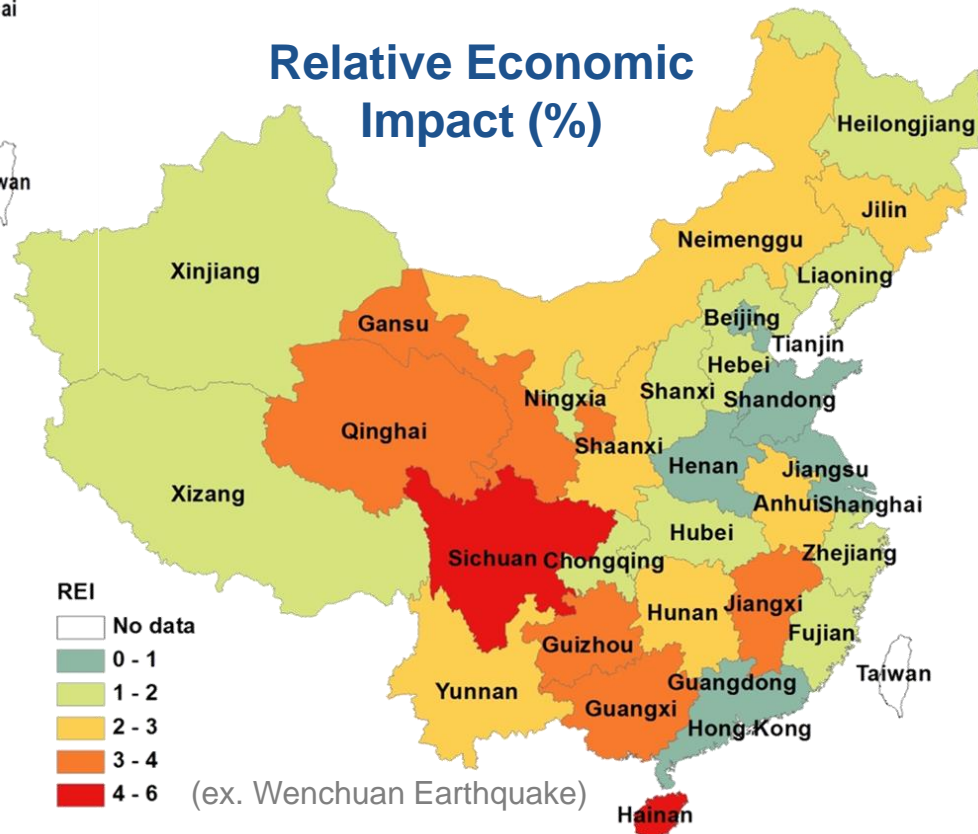


## Total Direct Losses (1992 – 2012)

# Provincial Disaster Losses' Distribution



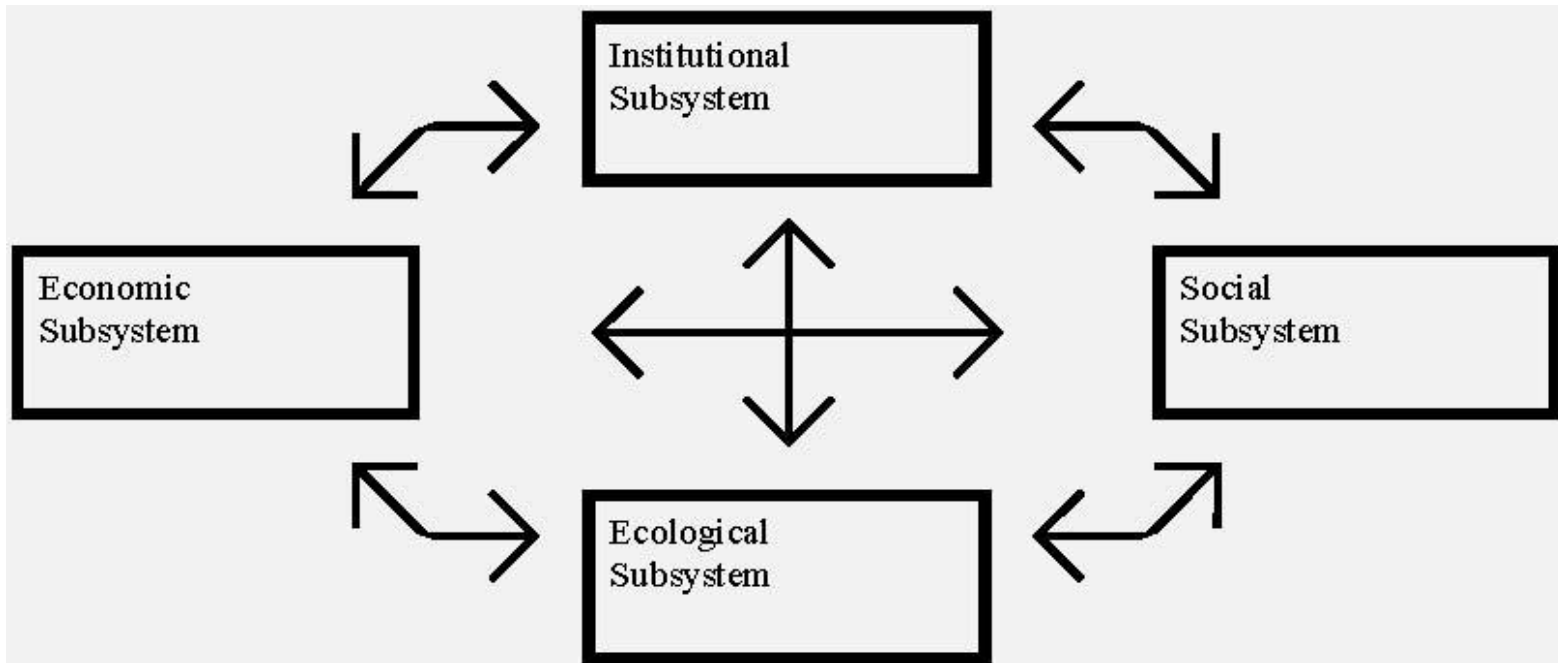
## Relative Economic Impact (%)





# Socio-Ecological Systems

## Integrated Approach



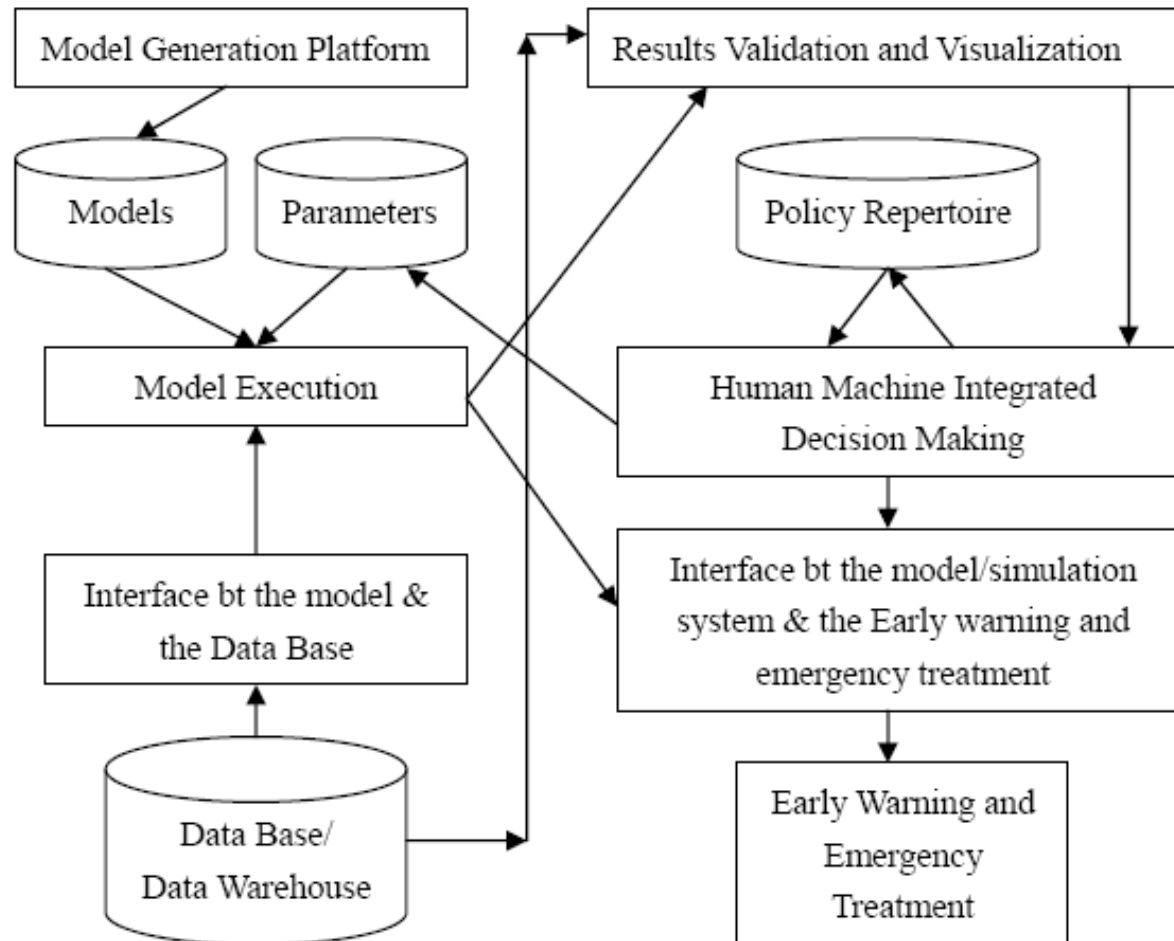
Increasing systematic risks at global scale  
(natural disaster, financial market, social-aging  
society, technology, etc.)



# **A Toolbox for better understanding climate change risks**



# Idealized Toolbox



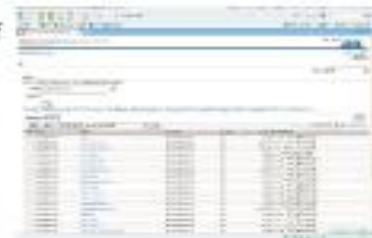


## Methodologies and Tools for Disaster Analysis and Mapping

- Mobile device-based tool for disaster data collection



- Historic disaster database of East China



- Disaster Observatory Prototype (DOP)



## Information and Knowledge Management Systems

- DRM China ([www.drm-china.com](http://www.drm-china.com))



- Shanghai Risk Information E-Library ([www.drm-china.com/e-library.aspx](http://www.drm-china.com/e-library.aspx))



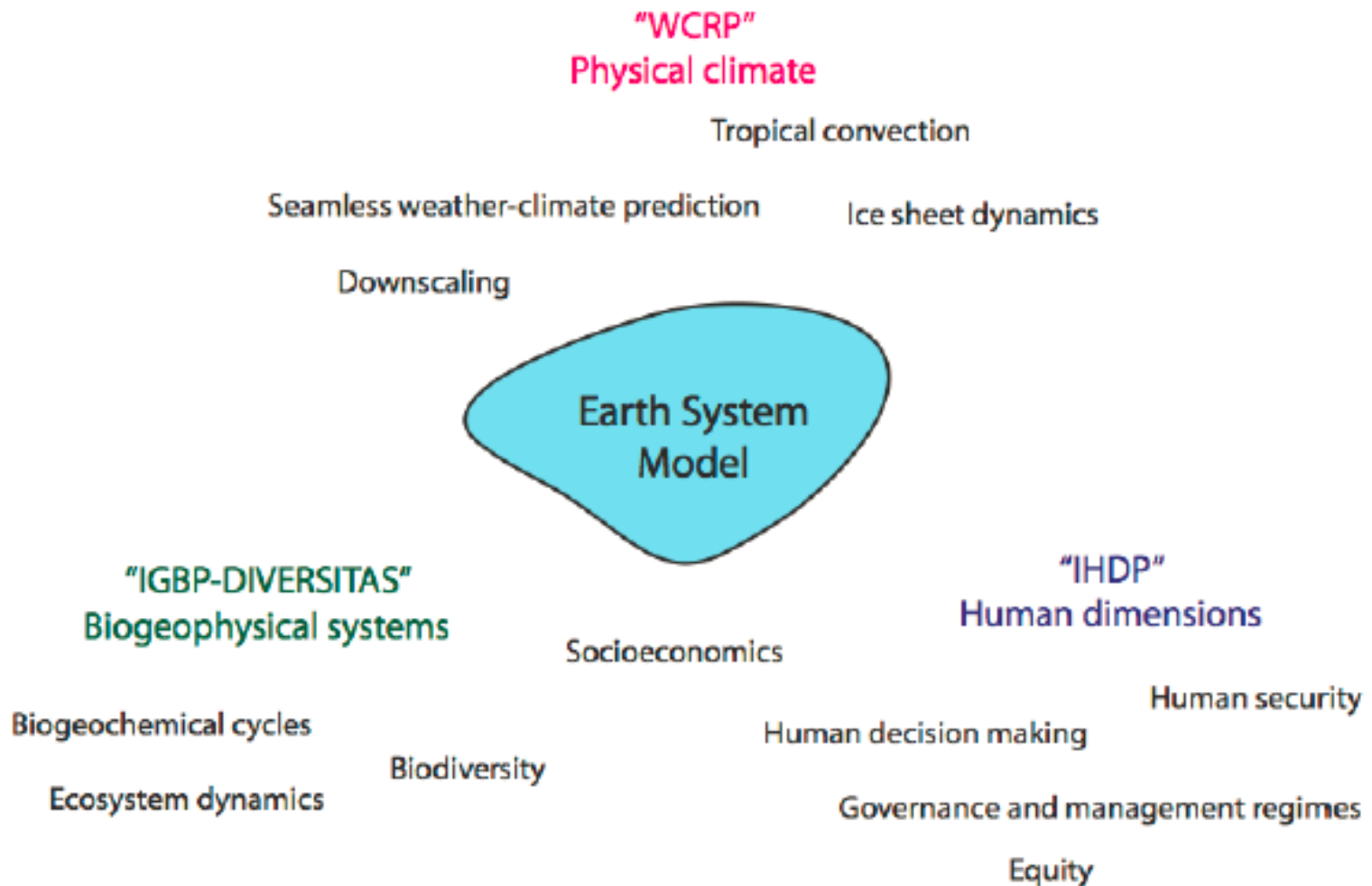
# UNDP-GRIP SHNU

GRIP-CERAM Shanghai is a Centre of Excellence for Risk Assessment and Management. It is supported by UNDP's Global Risk Identification Programme (GRIP). Officially launched in October 2011, GRIP-CERAM Shanghai serves as an innovative collaborative mechanism that supports China's national capacity development, public policy and decision making in disaster risk management.

GRIP-CERAM Shanghai has become an inter-institutional platform of 20 national and international institutions (including governmental agencies), with 50 professionals and practitioners. This network of institutions and experts are working closely to identify disaster risks in order to effectively reduce and prevent disasters in China. It sets up two research groups: the Risk Modeling and Assessment Group and the Disaster Information Analysis and Mapping Group, and a laboratory for developing Disaster Observatory technologies. In addition, an academic advisory committee has been established to provide technical advisory and strategic direction to the Centre.

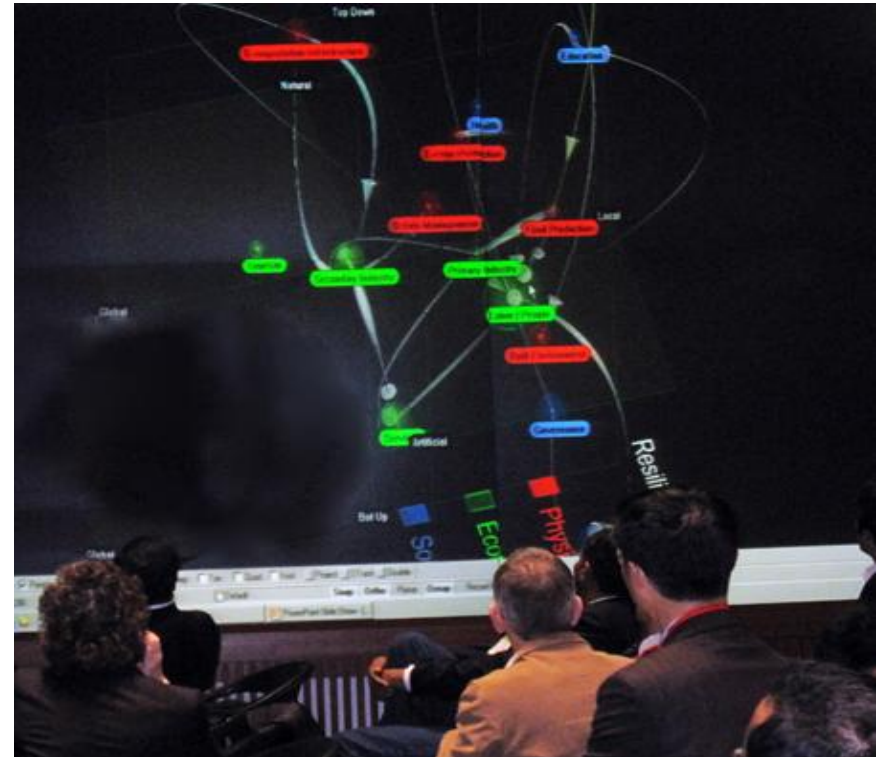


# Natural System Model and Agent-based Model





# A Visualization Platform







# Summary

- **Facing new challenges which require new systematic approaches**
- **Dealing with long-term crisis under a risk governance framework (social-ecological system)**
- **An efficient toolbox to support policy making, to educate public, and to identify **NEW opportunities****

**Thank you!**



**IRG-PrOject**  
[Integrated Risk Governance Project]



# Unintended consequence

- Creeping Environmental Problems
  - long-term, cumulating, slow-onset,
- Gov: short term
- Science: complexity, nonlinear, dynamic process, uncertainty
- Economics: Common goods
- Society: