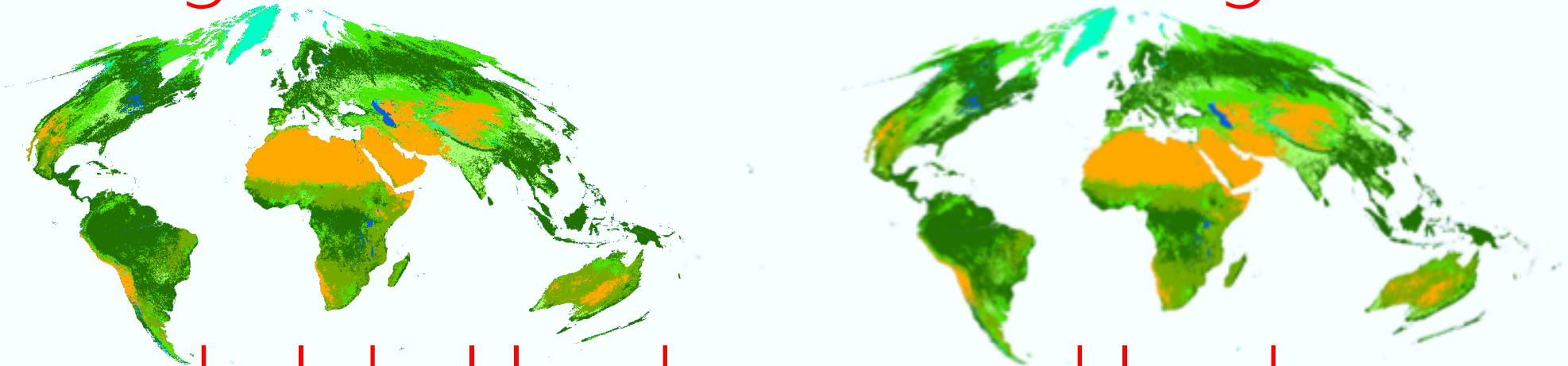


# Planetary health needs frequent monitoring of global environmental changes



and global land cover and land use

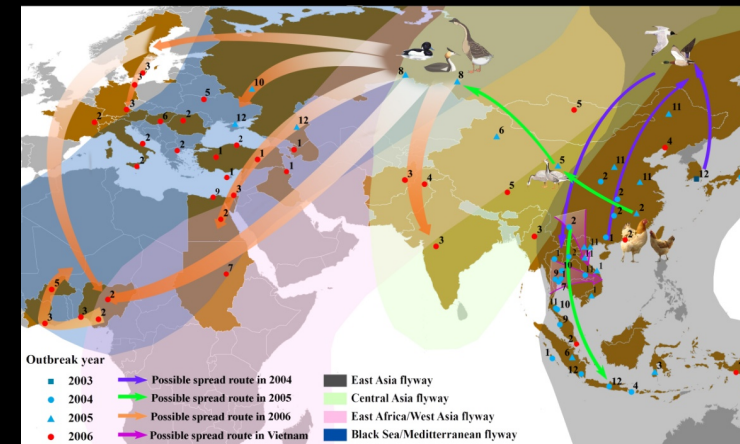
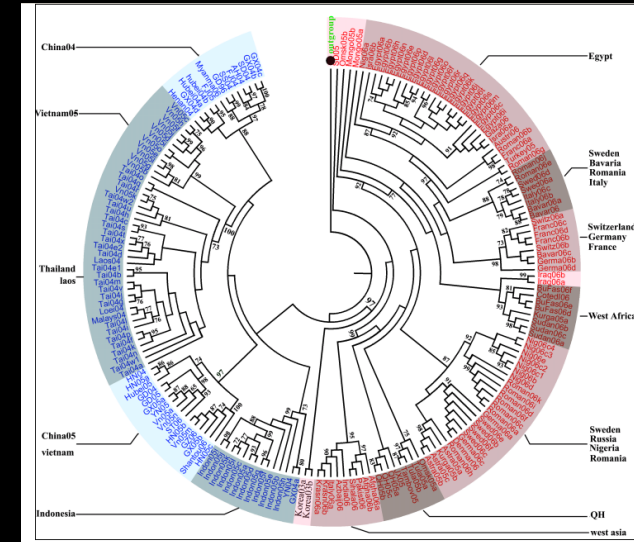
Peng Gong  
Department of Earth System Science  
Tsinghua University  
September 30, 2018,  
Beijing Hotel, Beijing City

We are entering into an integration era where ground, air and space based sensors can be used collectively to monitor mother Earth

In combination with bioinformatics analysis, the integrated observation of Earth helps us understand the mechanism of disease spread

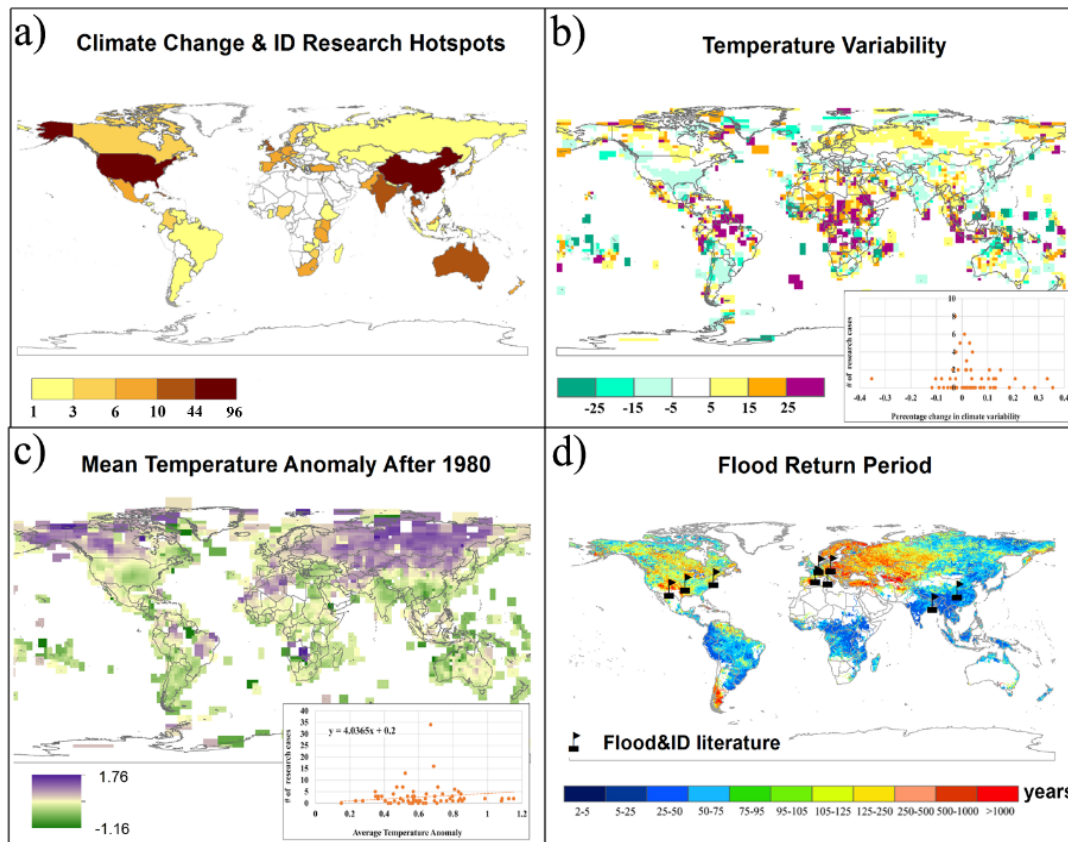
Wilkelski  
 Liang et al, PLOS One 2010

Tian et al, PNAS 2015  
 Xu et al, Scientific Reports 2016



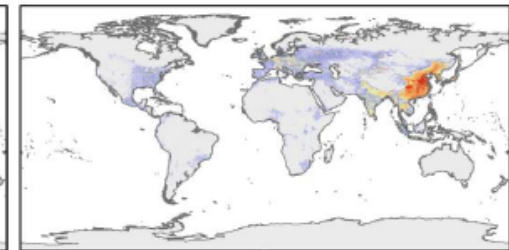
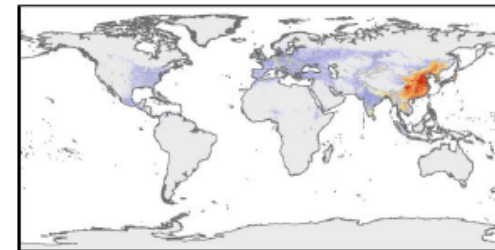
# Planetary Health needs a health-centered cross-disciplinary approach that unites efforts by social, economic, and physical scientists

Zhang et al, Nature, 2017



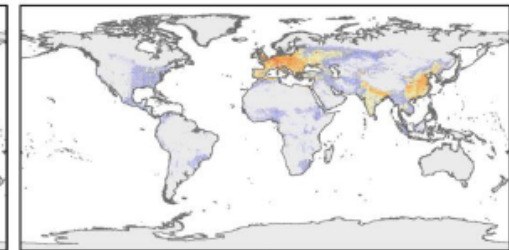
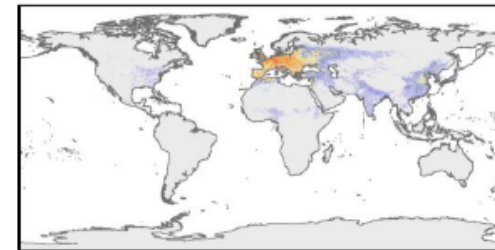
Region where pollution was produced

Region where goods were consumed



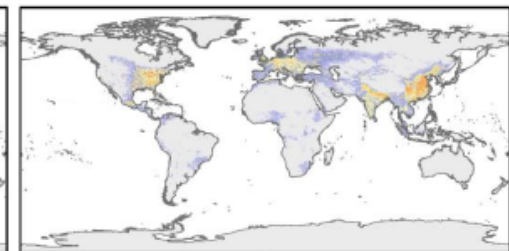
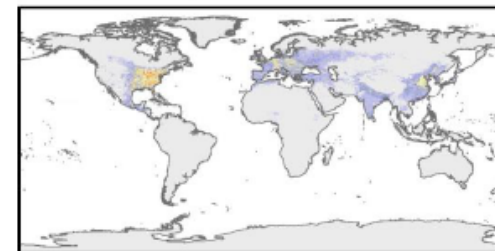
a. pollution produced in China

e. goods consumed in China



b. pollution produced in Western Europe

f. goods consumed in Western Europe

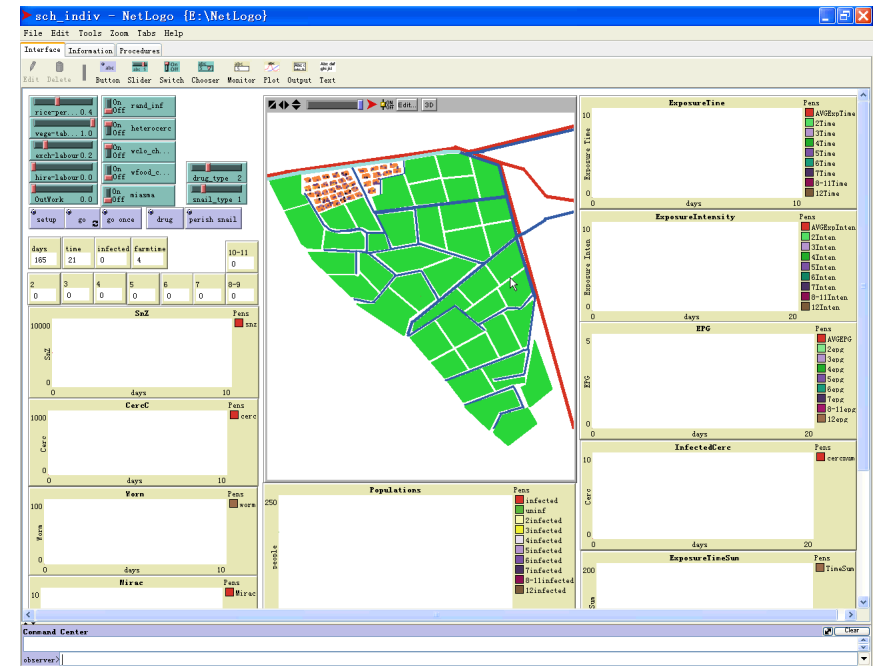
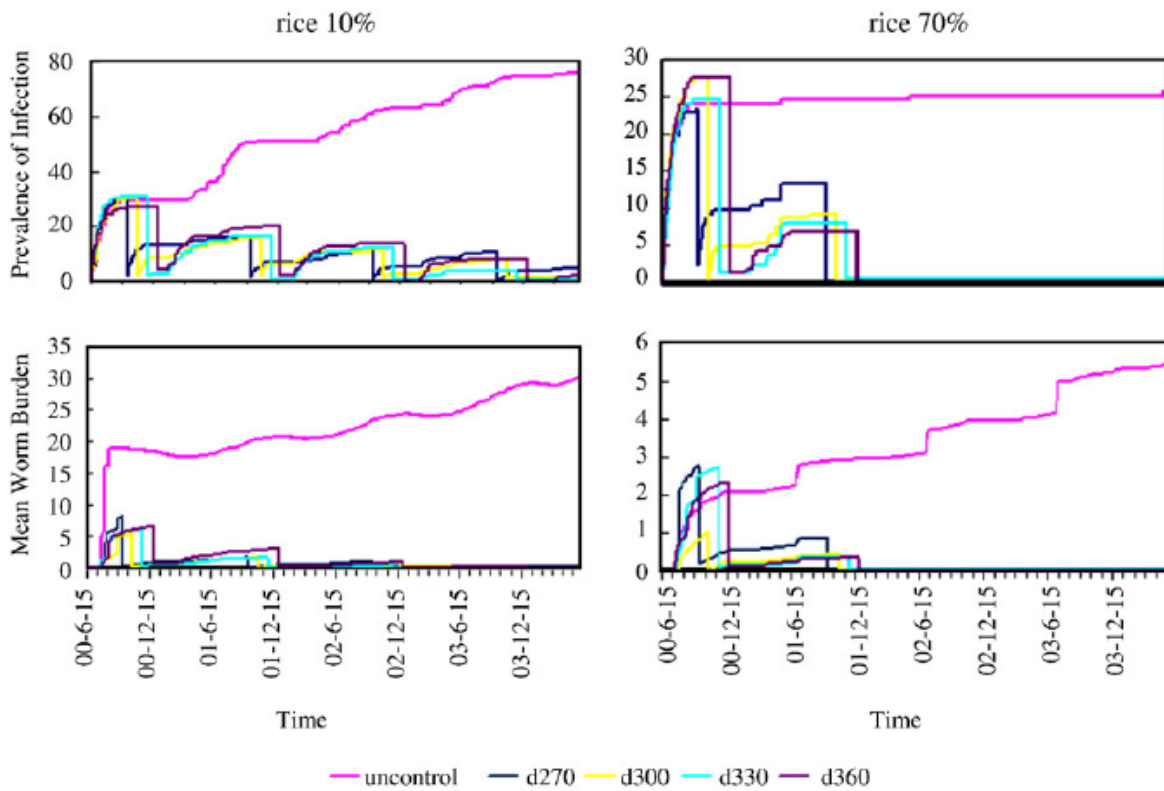


c. pollution produced in the U.S.

g. goods consumed in the U.S.



# We must couple time and space to solve real world problems

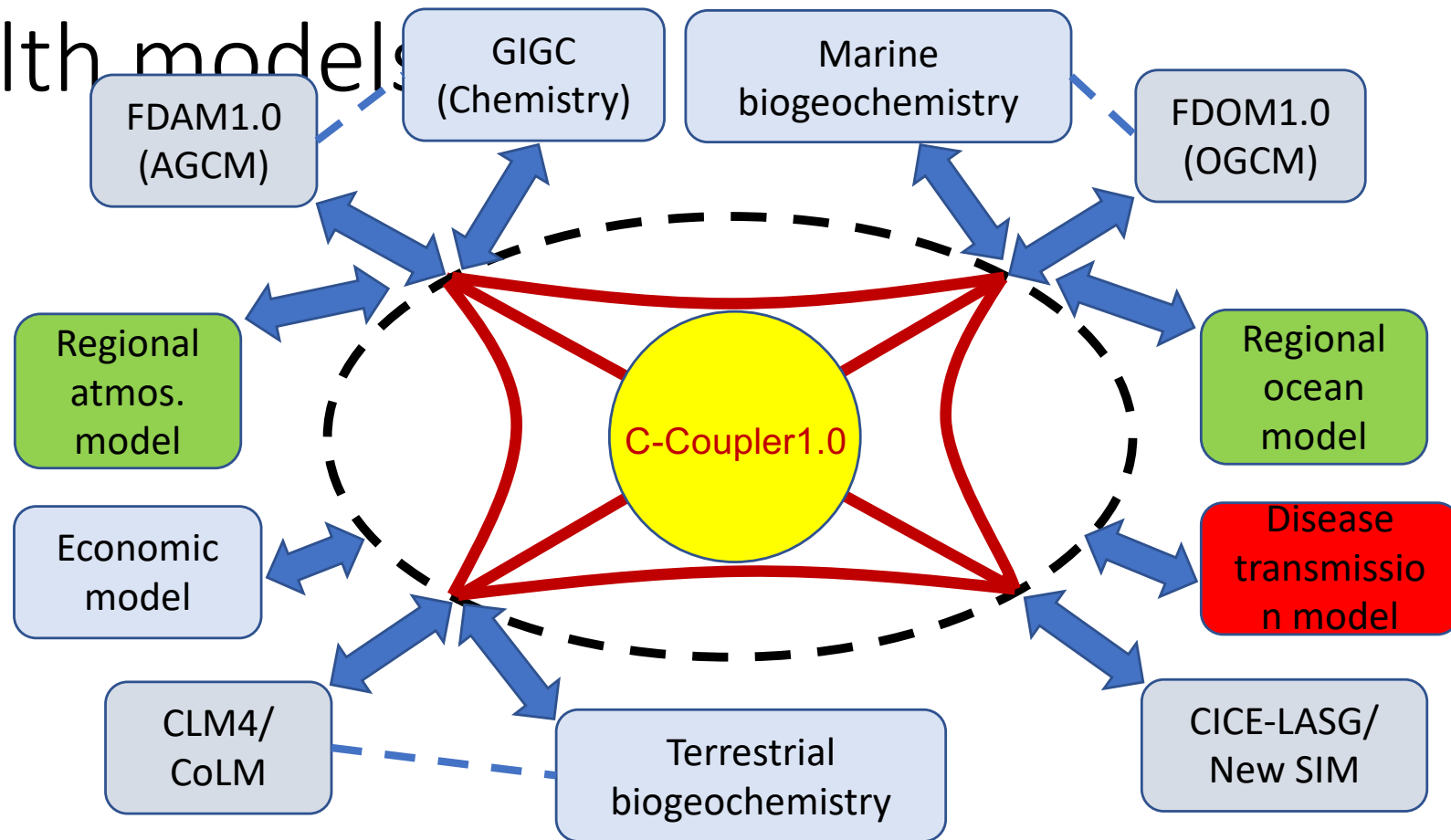


Can health be modelled?

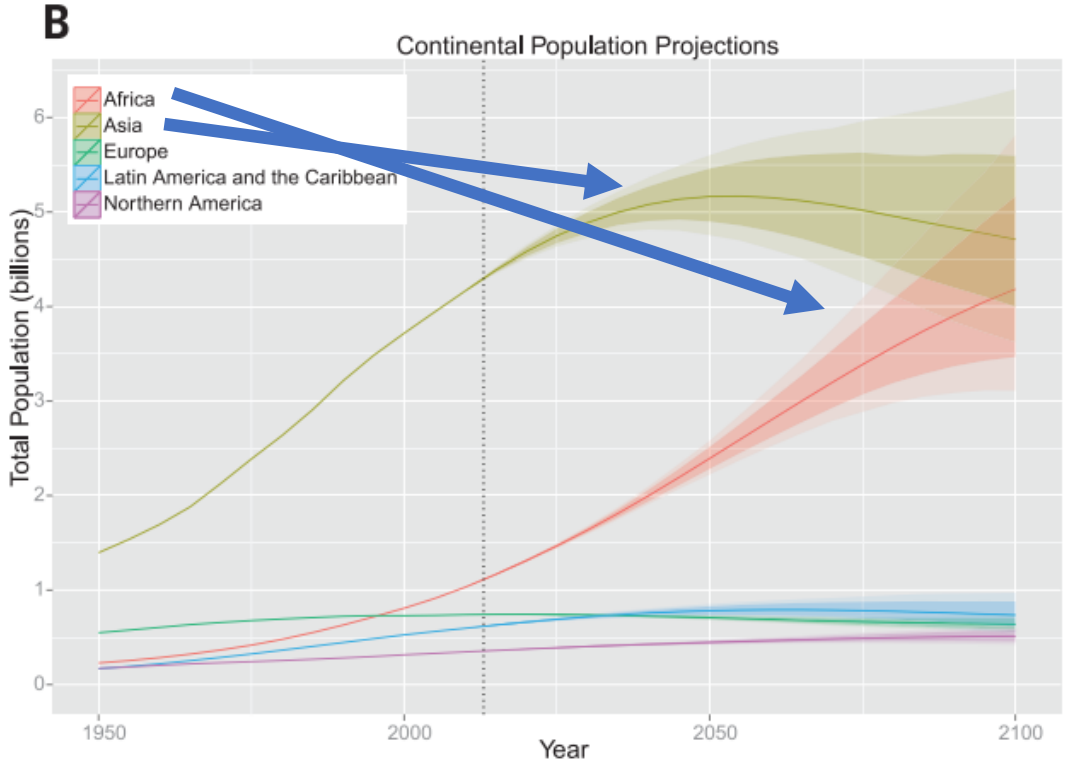
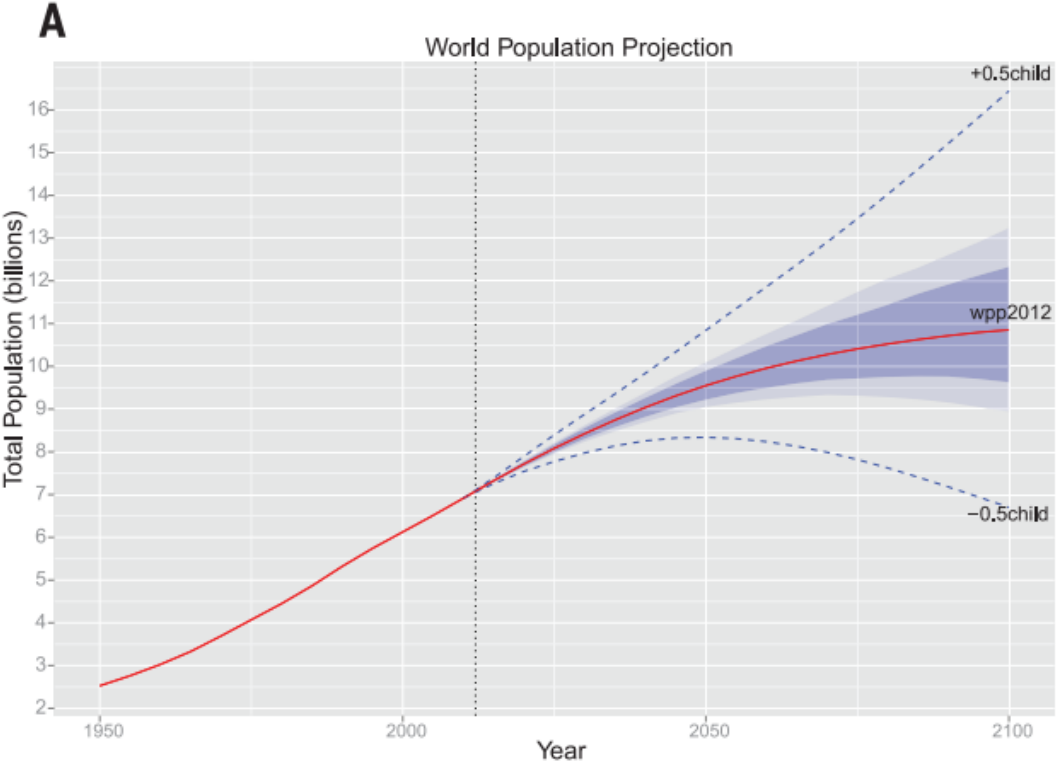
Hu et al., Epidemics, 2010  
Liang et al, PLOS One, 2010

Planetary Health needs better predictive tools:

Linking health modelers to build planetary health models

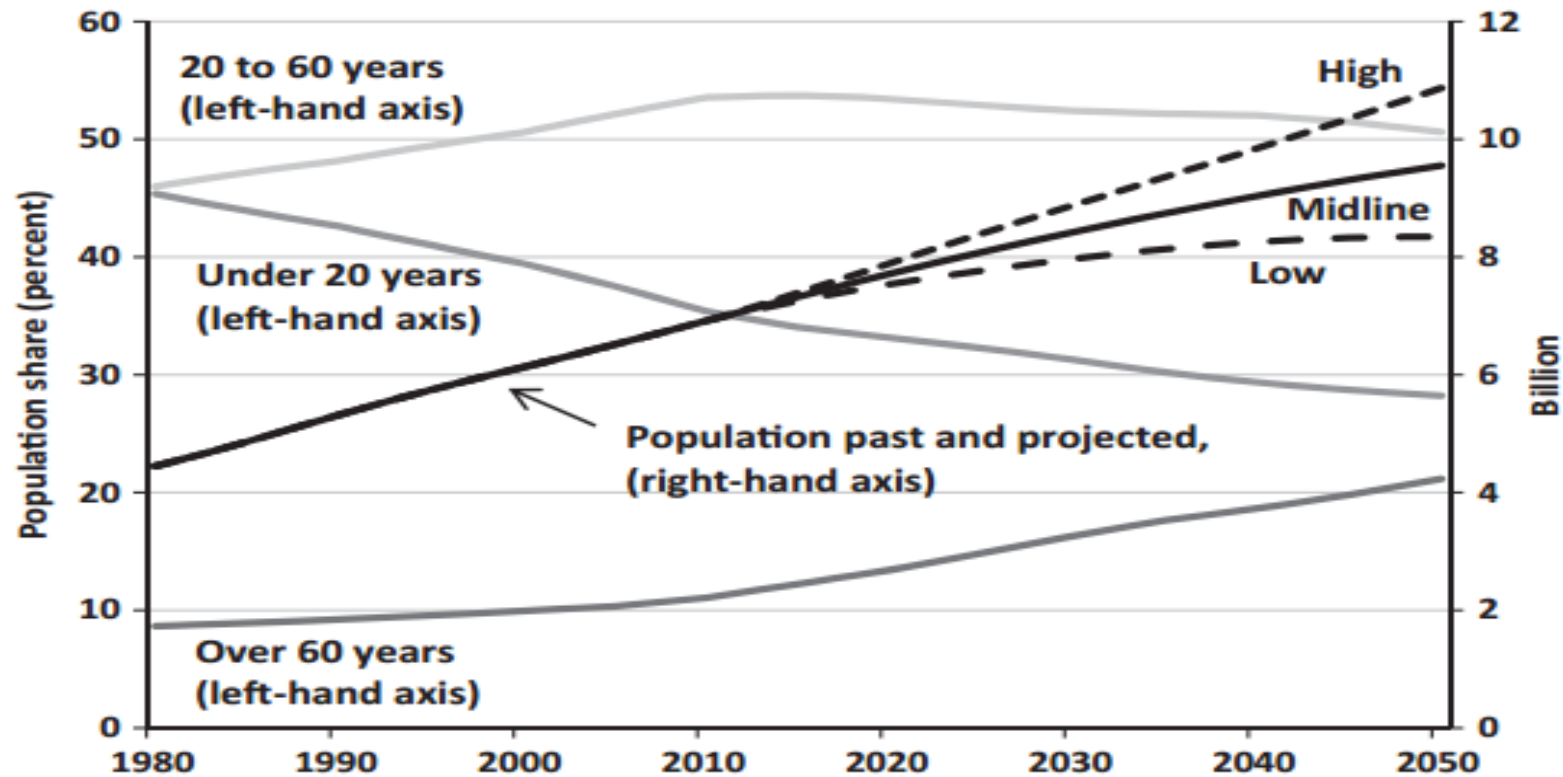


World population stabilization unlikely this century?  
China's population is predicted to peak at 1.4 billion before 2030



Gerland et al., Science 2014

# Population ageing is a major characteristic of the 21<sup>st</sup> century



# What is Planetary Health?

Put simply, planetary health is the health of human civilisation and the state of the natural systems on which it depends.

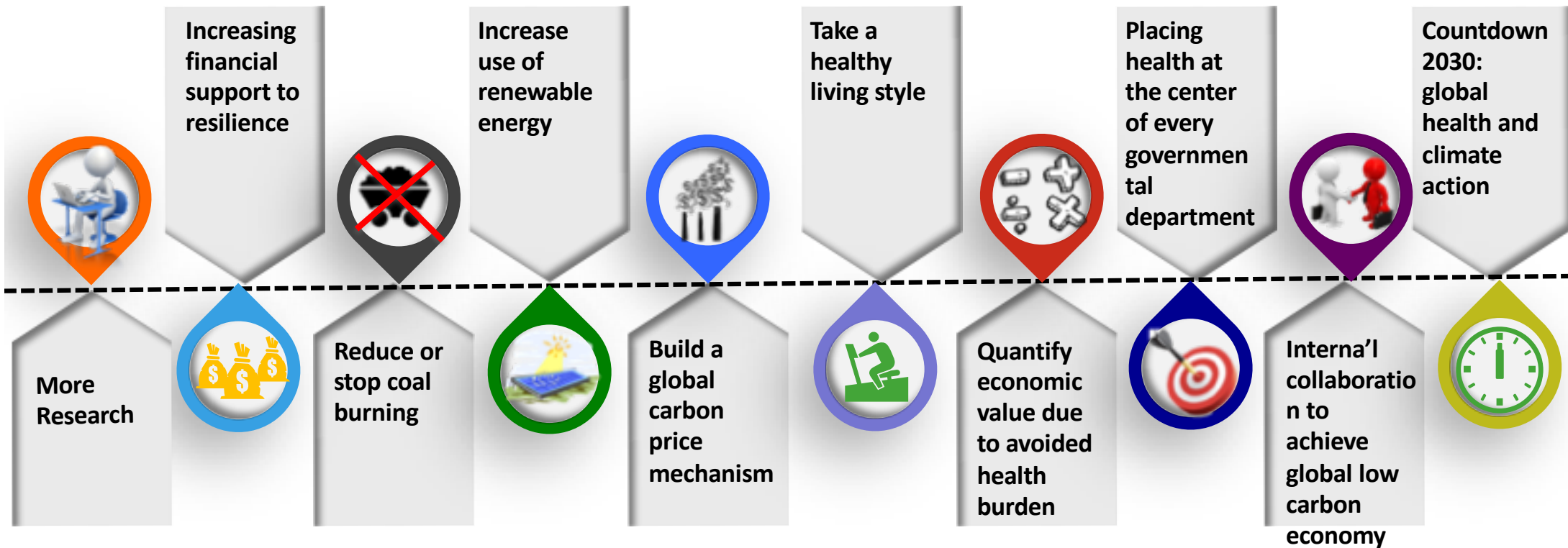


Published online on June 23<sup>rd</sup> and in  
Lancet on November 7<sup>th</sup>, 2015

- Review the climate science and the impacts of climate change on human health
- Present policy response options around four central themes:
  - community resilience and adaptation
  - energy and technical solutions
  - economic policy and financing mechanisms
  - political mechanisms



# Placing health at the center of response to climate change – 9 emergent action suggestions



# THE LANCET

2018年4月

www.thelancet.com

## 健康城市：释放城市在健康中国建设中的力量



“只要城市始终以前所未有的速度和规模在发展，数亿居民的健康和福祉，以及中国城市的可持续性和宜居性将取决于采取果断的行动。”



THE LANCET

清华 — 《柳叶刀》中国健康城市特邀报告

## The Lancet Commissions



THE LANCET

## The Tsinghua-Lancet Commission on Healthy Cities in China: unlocking the power of cities for a healthy China

Jun Yang, José G Siri, Justin V Remais, Qi Cheng, Han Zhang, Karen KY Chan, Zhe Sun, Yuanxuan Zhao, Na Cong, Xueyan Li, Wei Zhang, Yuxi Bai, Jun Bi, Wenjia Cai, Emily YY Chan, Wanqing Chen, Weicheng Fan, Hua Fu, Jianqing He, Hong Huang, John S Ji, Peng Jia, Xiaopeng Jiang, Mei-Po Kwan, Tianhong Li, Xiguang Li, Song Liang, Xiaofeng Liang, Lu Liang, Qiyong Liu, Yongmei Lu, Yong Luo, Xiulan Ma, Bernhard Schwartländer, Zhijong Shen, Peijun Shi, Jing Su, Tinghai Wu, Changhong Yang, Yongxuan Yin, Qiang Zhang, Yirping Zhang, Yang Zhang\*, Bing Xu\*, Peng Gong\*

Lancet 2018; 391: 2140-84

Published Online

April 12, 2018

[http://dx.doi.org/10.1016/S0140-6736\(18\)30486-0](http://dx.doi.org/10.1016/S0140-6736(18)30486-0)

See Comment page 2086

\*Co-chairs of the Commission

### Executive summary

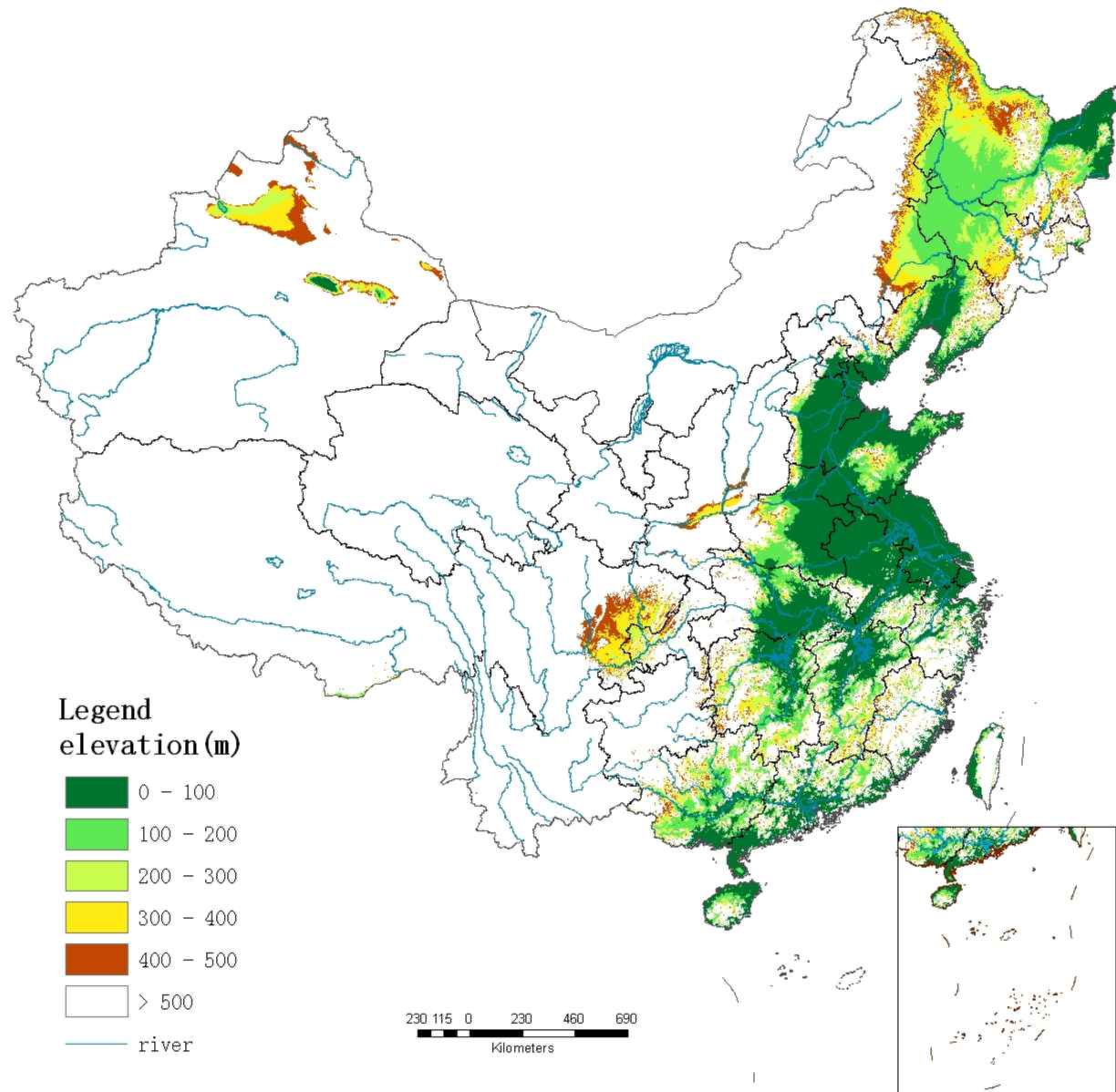
Over the past four decades, rapid urbanisation in China has brought unprecedented health benefits to its urban population, but has also created new challenges for protection of and promotion of health in cities. With the shift from rural to urban living, more people than ever enjoy the health advantages that cities can provide,

Meanwhile, cities in China are also testing new strategies for urban health management, such as China's pilot Healthy Cities project.<sup>1</sup> Management of chronic diseases and mental disorders in cities has improved dramatically and major progress has been made regarding access to preventive and primary health services. All these efforts have contributed to the

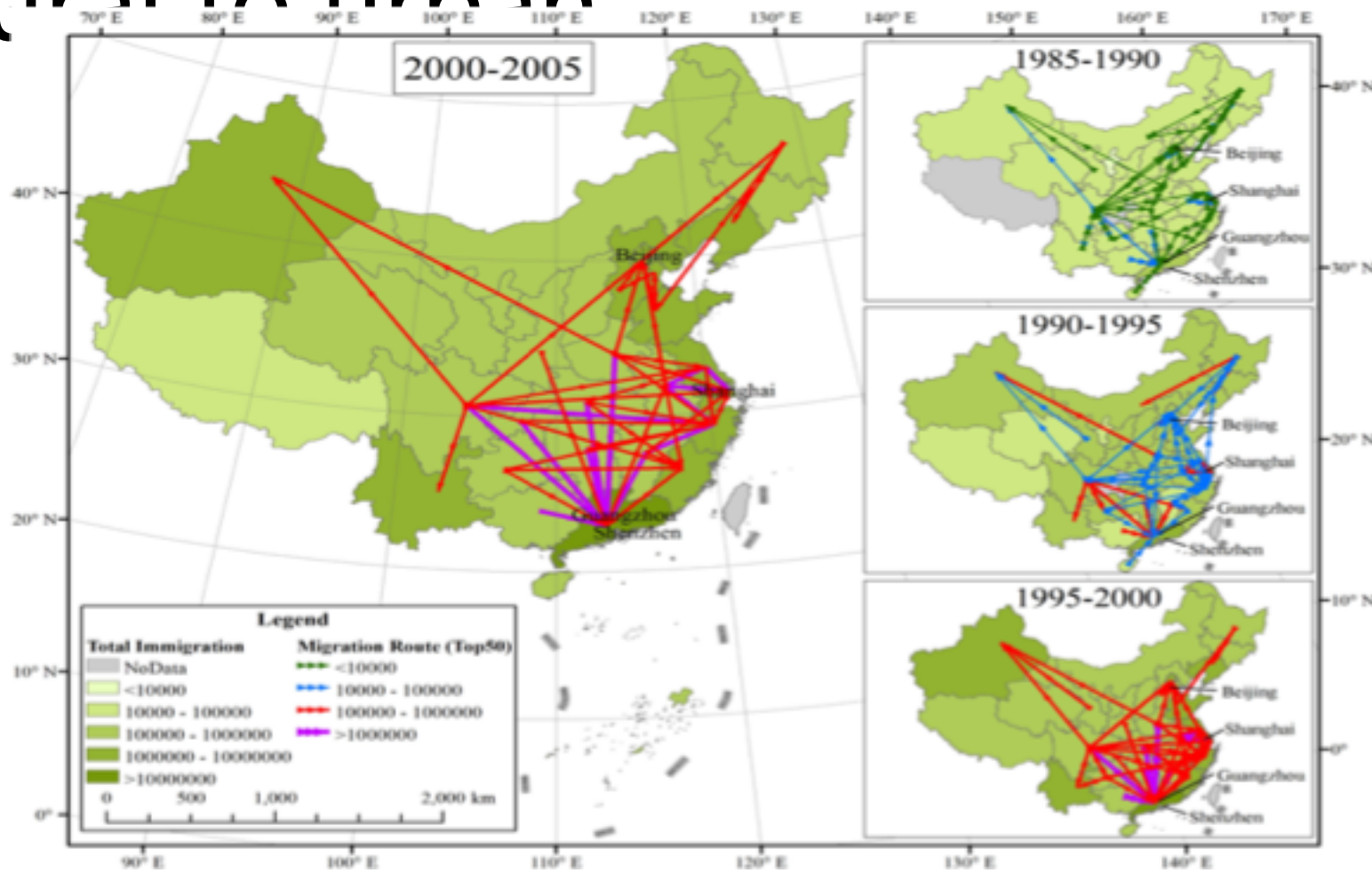
# China 's population distribution

Plain area occupies  
approx. **20%**  
of China's total  
terrestrial  
area

Approximately **80%** of  
China's population  
live on the plains



# Top 50 cross-provincial population migrations in China 1985-2005 – from west to east, rural to urban



Gong et al, 2012  
Lancet



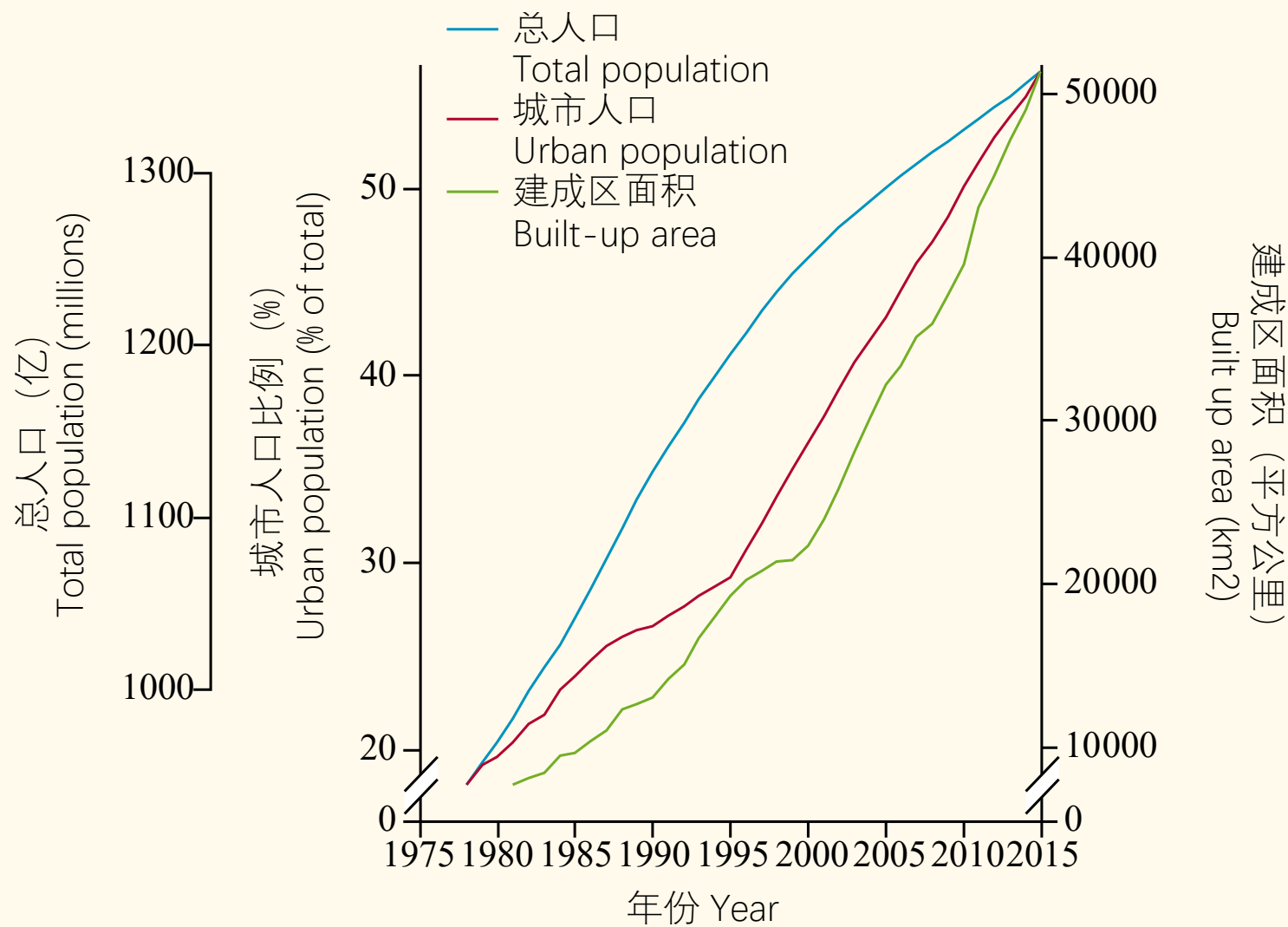
# Background

- Continuing urbanization in China
- Ecocivilization development
- New-type urbanization
- Healthy China

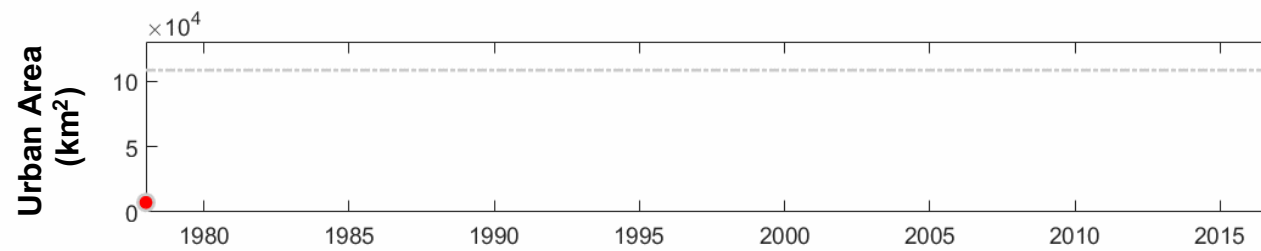
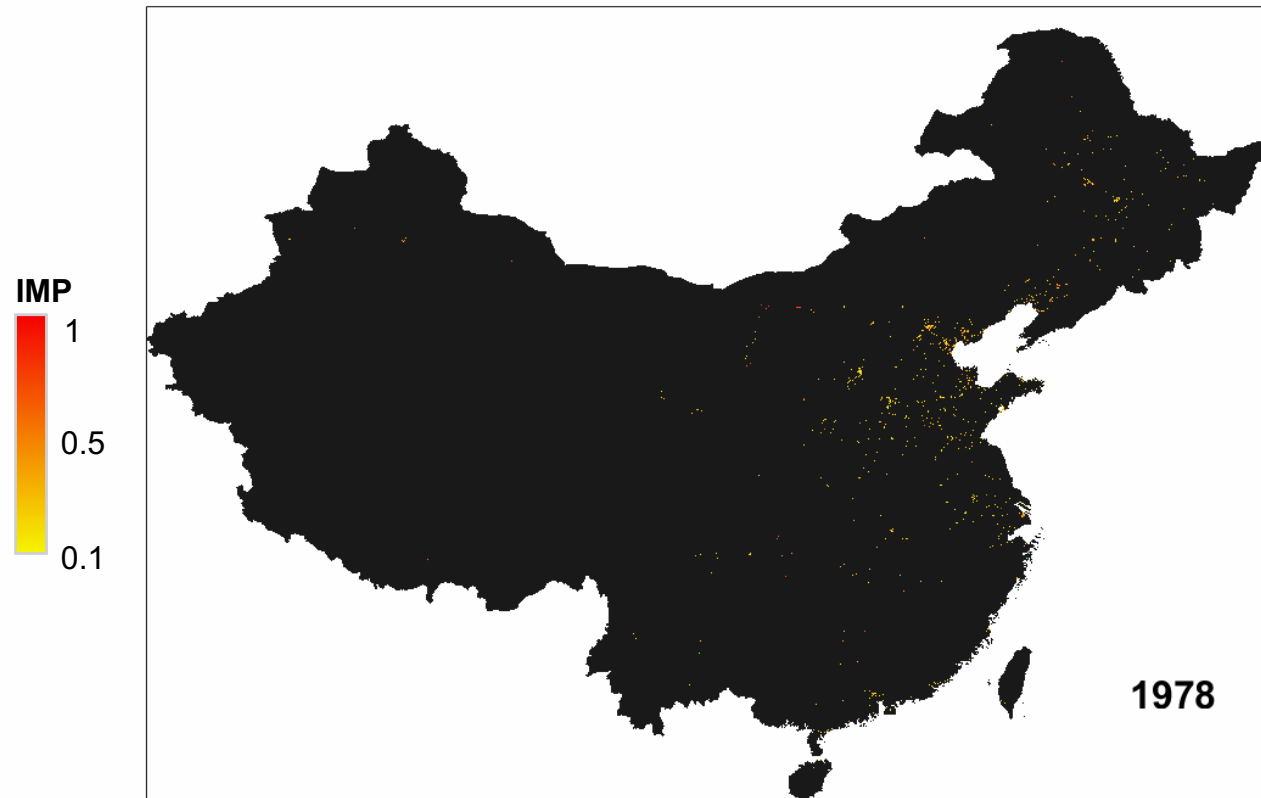


# Total population, urban population, and total built-up area, 1978–2015

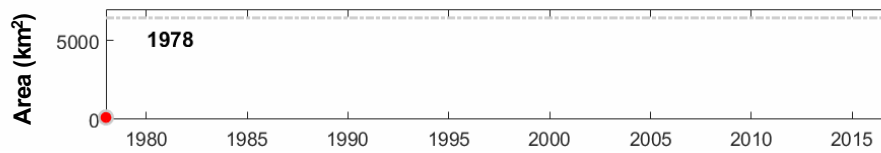
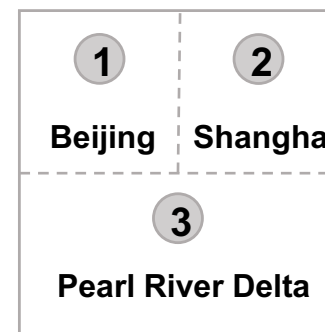
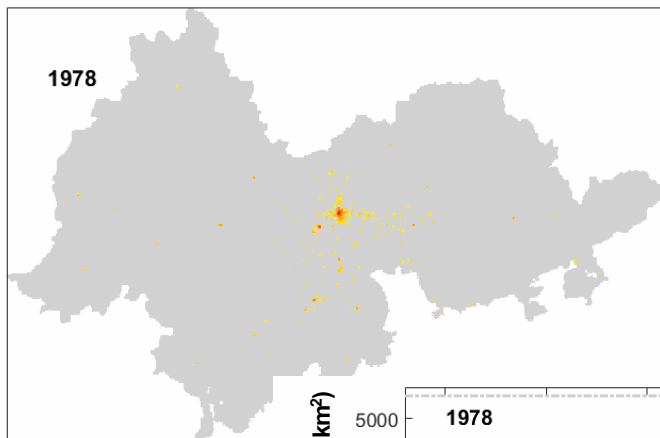
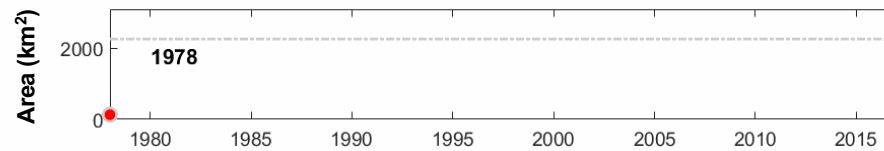
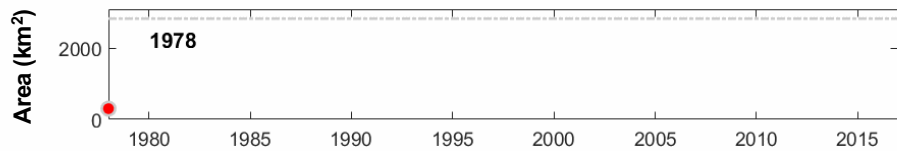
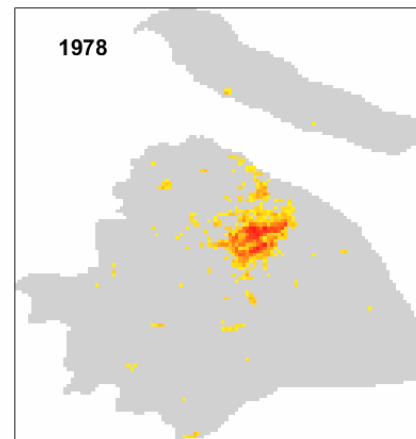
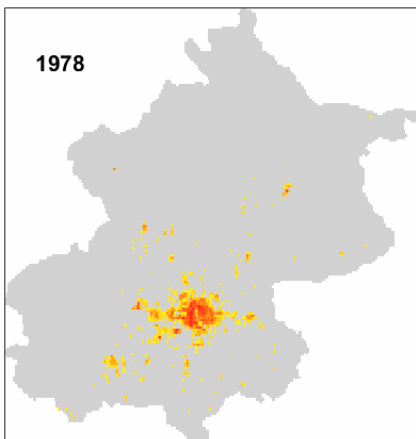
Source: National Bureau of Statistics of China.



# Impervious area expansion



Max. Area





# Major challenges

- Non-communicable disease burden
- Emerging infectious disease
- Aging population
- Rising health expenditure
- Health inequity



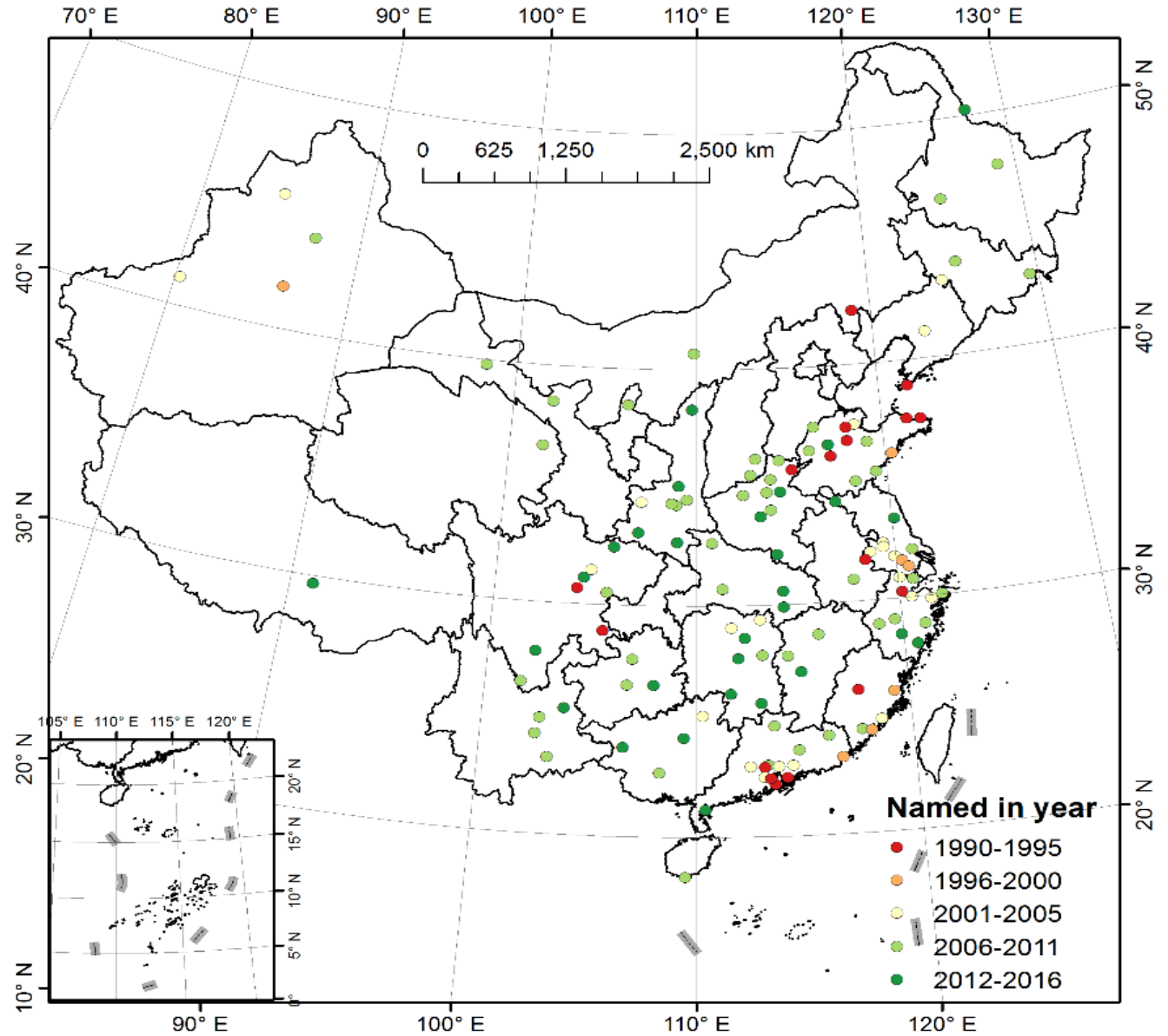


# Major actions

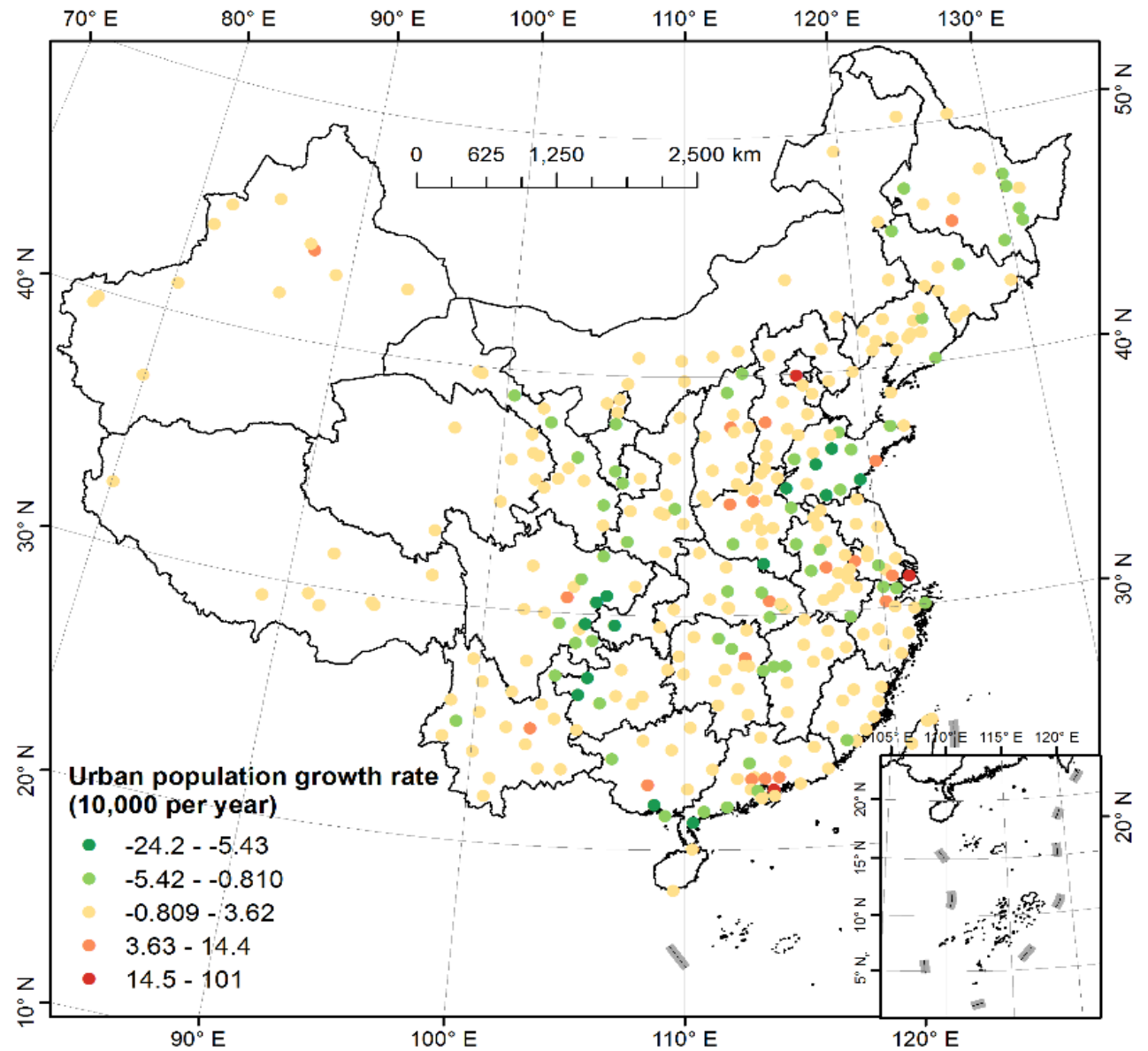
- Control environmental pollution
- Improve livability of cities
- Enhance disease prevention and control
- Reform health sector
- Pilot program of healthy cities



# Hygienic city development since 1990



1999-2014  
Urban  
population  
change  
among  
different cities



# Five recommendations on healthy cities development in China

- Integrate health into all policy making – urban planning as the starting point
- Engage participation from the entire society
- Joint force by all governmental sectors
- Assessment and evaluation
- Education and research

# We must adopt the new research paradigm – planetary health, to solve global problems

## Lessons learnt

- Research with changes, globalization, people and population dynamics in mind
- Anything local needs to be put under a global context for research

## Remaining challenges

- Not certain about the impact of the joint interactions of multiple environmental changes on human health
- Understanding planetary health needs better data and quantitative tools and the strongest computing power – more than just climate change modeling
- Provide planning and decision support tools to developing countries and avoid mistakes made elsewhere