



Building Climate Change Resilience

Maria Blair
The Rockefeller Foundation
Presentation at the China Planning Network
1st Urban Transportation Congress
2 August 2007

Overview

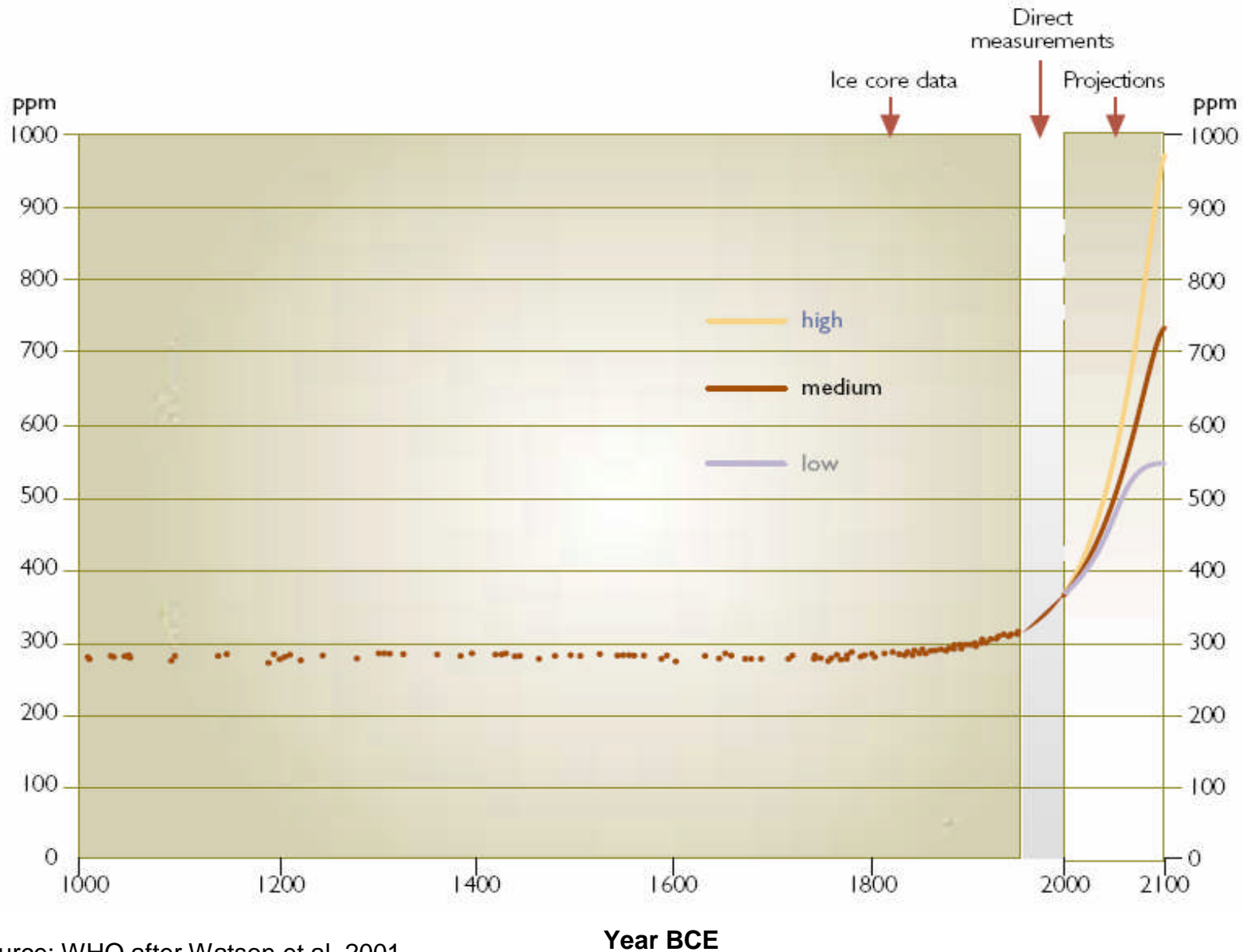
The Problem

- Over 50% of the world's population now lives in cities— 43% of China's population
- Climate change is happening now, and will be devastating for many cities

Potential Solutions

- Integrated approach to urban planning
- New flexible models of infrastructure, particularly transportation

Climate Change is happening



Source: WHO after Watson et al. 2001.

Mitigation is urgently required to reduce future climate change

- Revised urban planning practices can reduce energy demand
- “Green cities”, like Dongtang, can be models of environmental sustainability



The impacts of climate change are being felt across the world....



To Typhoon Kaemi that caused 500,000 to evacuate and killed over 500 people in Jiangxi province

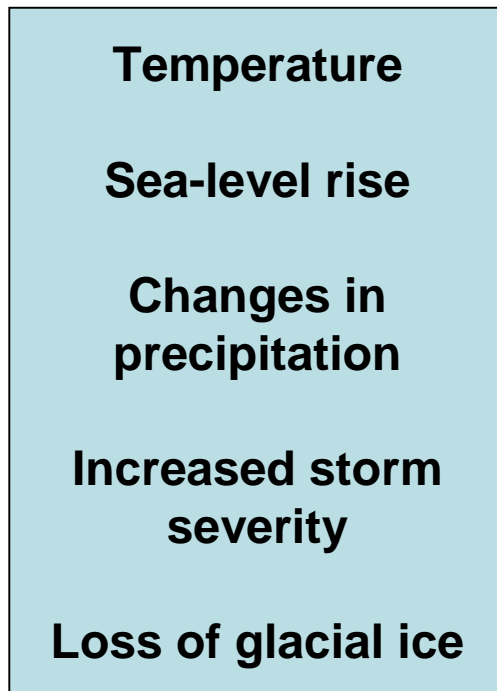
Climate change will hurt people and economies. It will hit poor and vulnerable people the hardest

Over an additional 50 million people at risk of hunger by 2020

- **1 in 5 people in the developing world live in places highly vulnerable to sea level rise and increased coastal storms**

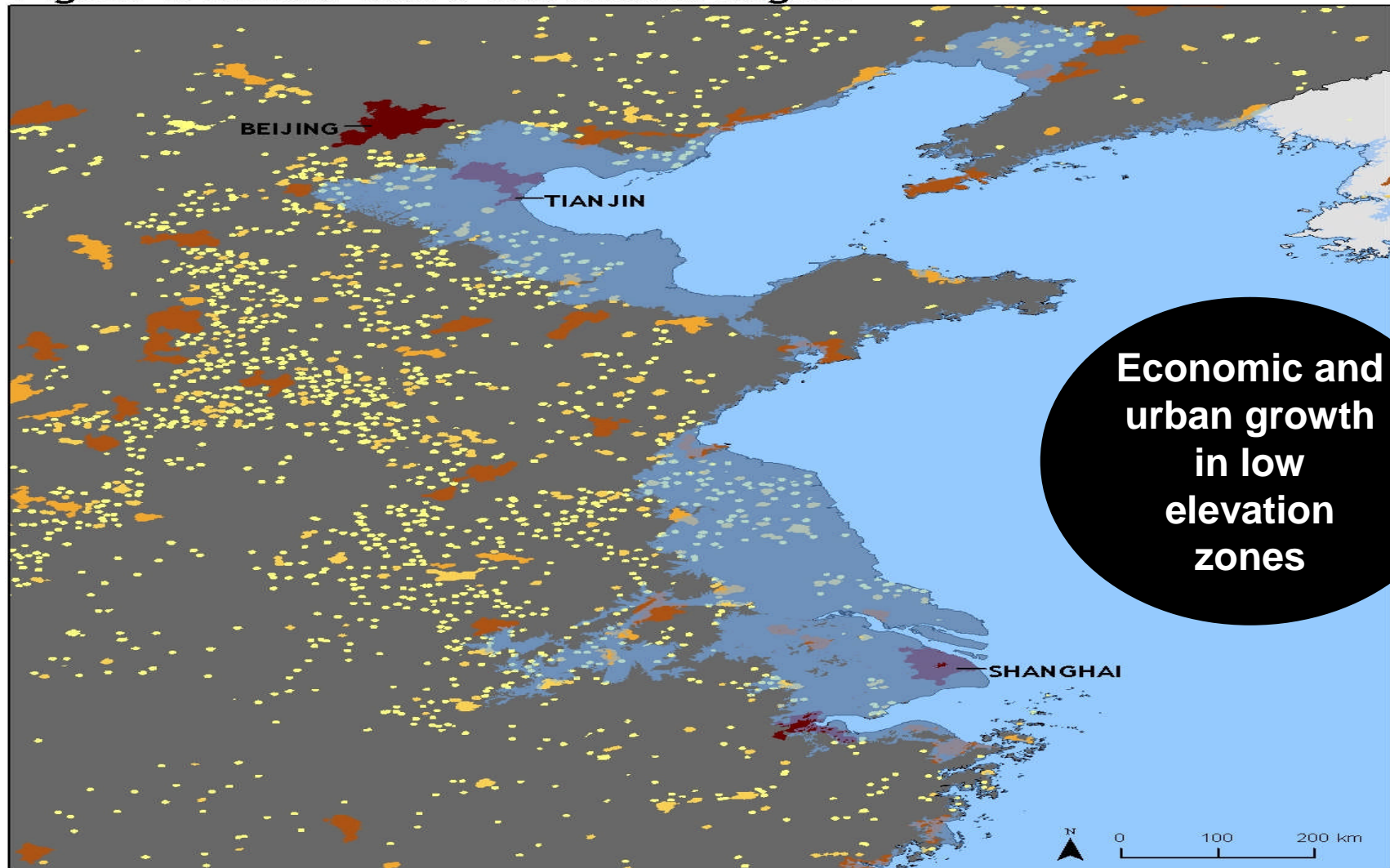


What are the impacts of climate change?



- Increase in heat-related disease
- Increased flooding
- Increased droughts
- Increased number and severity of storm disasters
- Loss of fresh-water supply
- Declining air quality

Figure 1. CHINA: Yellow Sea Coastal Region



Urban Extents, by Population Size, 2000



NOTE: LECZ layer has been made semi-transparent to show the underlying layers. Thus the blue color is not uniform.



What are the climate change impacts on China?

Sea level rise

- Damage to infrastructure
- Interrupt flow of goods and services
- Polluted water supplies

Pearl River Delta cities
Coastal cities

Storms

- Damage to infrastructure
- Destruction of economic centers

Huanzhou
Shanghai
Dongguan

Heat waves and drought

- Heat-related deaths
- Intense heat-island effects

Changchun
Quindao
Shenyang

What are the climate change impacts on China?



Vector-borne disease

- Spread of schistosomiasis

Jiangsu province



Air quality

- Air-quality related deaths

**Beijing
Chongqing
Nanjing**



Glacier melt

- Short-term flooding
- Long-term declining freshwater supply

**Chongqing
Wuhan, Nanjing,
and Jinan**

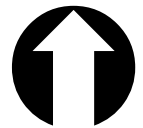
Climate change will have significant impact on transportation

- Severe flooding and destruction of roads
- Bridge scour
- Buckling of rail
- Island infrastructure very vulnerable
- New evacuation needs
- Increased runway lengths required
- Increased maintenance costs for all transportation systems

Reducing Vulnerability



Exposure: physical location plus surrounding/built environment

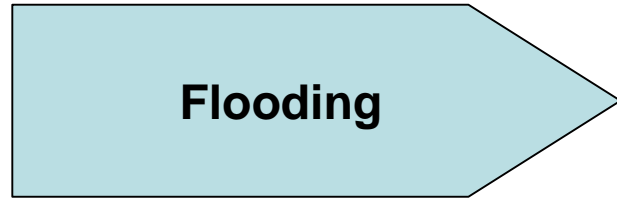


Resistance: economic, physical and psychological health

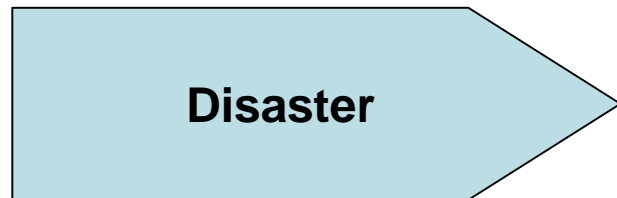


Resilience: capacity to cope with or adapt to hazard stress

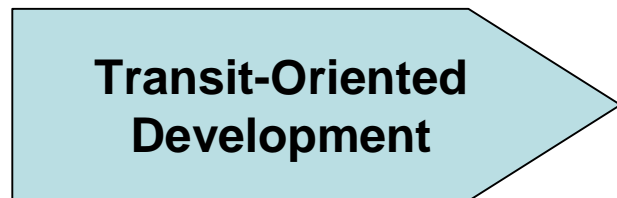
Transportation and Urban Planning Resilience



- **Systems need to be protected from flooding hazard**
- **Systems shouldn't exacerbate flooding hazard (e.g. impervious surfaces)**



- **Evacuation routes, flexible to handle multiple strategies**



- **Maintaining community social connections can increase resilience**

Transportation and Urban Planning Resilience

Risk assessment

- **Local risk assessment and hazard mapping at local scale; asset mapping**

Land use & watershed planning, CZM

- **Location in relation to hazards**
- **Anticipating informal settlements**
- **Flood reduction- retention ponds, water ways**
- **Vegetated buffers**

Building codes, zoning

- **Buildings and structures designed to withstand hazards**

Infrastructure

- **“Flexible infrastructure” models**

Resilience

- Not possible to be fully resilient to all of climate change impacts, long-term reductions in greenhouse gas are critical
- Resilience is required urgently to prevent great economic and human loss
- Cost of resilience is much lower than the cost of recovery