

# The Current Status of Resilient Urban Development in China



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# 1. Impacts of Climate Change on Urban Areas

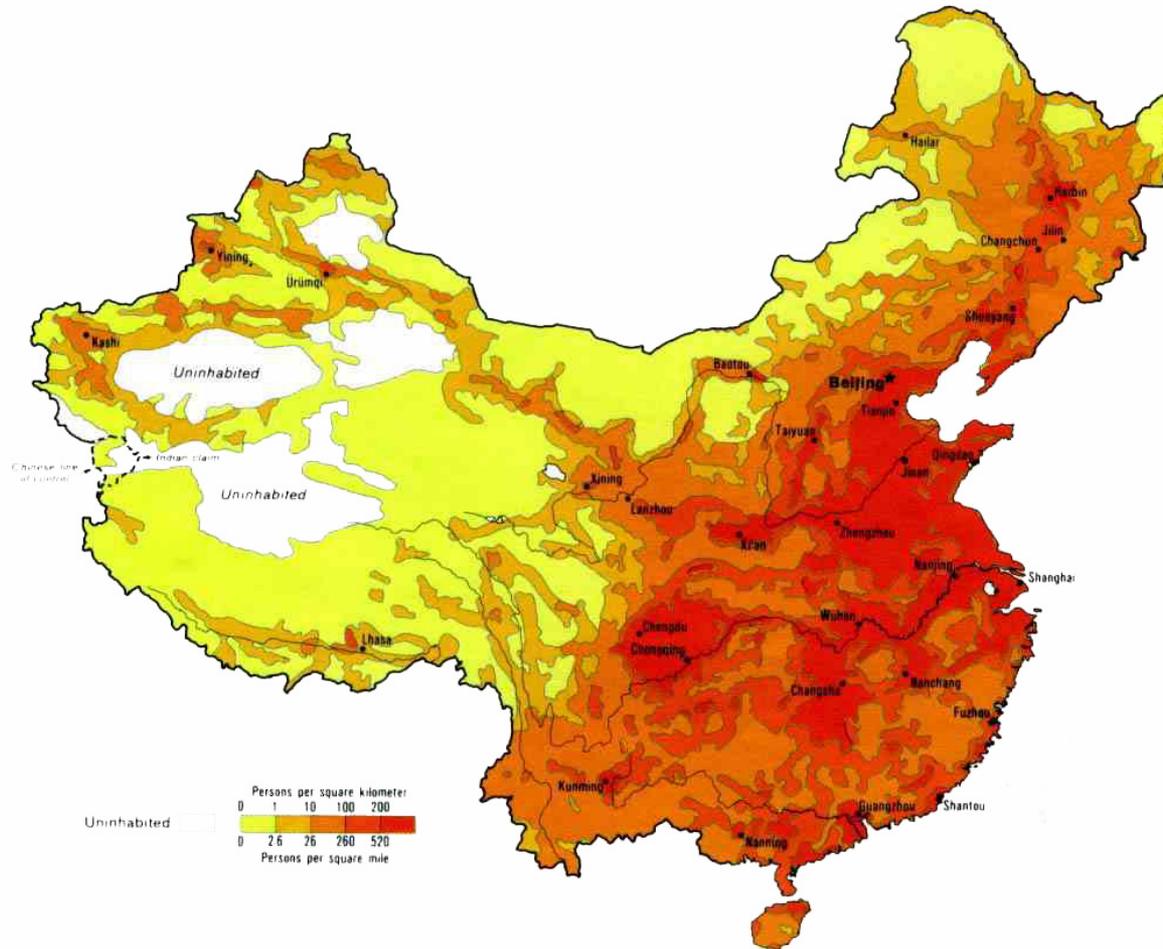


- **China** is one of the countries that are highly vulnerable to the impacts of climate change
- Population, industry and infrastructure are highly concentrated in **urban areas**
- **Coastal cities** have the strongest economic strength and are important engines for driving the national economic and social development, but they are most threatened by climate change
- **Inland cities** could also be affected by climate change-induced flooding

# 1. Impacts of Climate Change on Urban Areas



China: Population Density



China's population is concentrated in the eastern part of the country, especially the coastal provinces

# 1. Impacts of Climate Change on Urban Areas



China's urbanization rate reached **54.7%** in 2014, and it is expected to reach 60% in 2020 and 70% in 2030



# 1. Impacts of Climate Change on Urban Areas

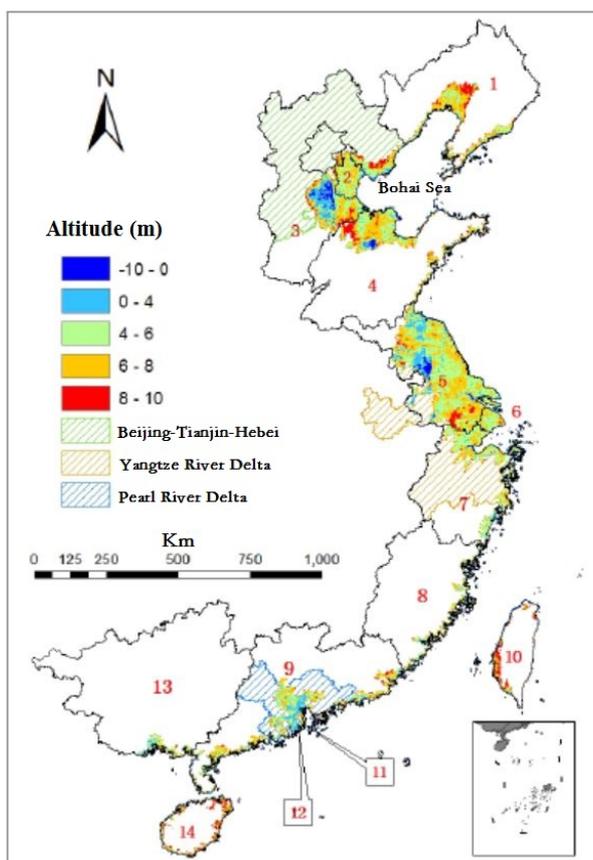


- **Low Elevation Coastal Zone (LECZ):**  
Defined as the contiguous area along the coast which is less than 10 meters above sea level. It is vulnerable to flooding and storm surge

# 1. Impacts of Climate Change on Urban Areas



The total area of LECZ in China is **193,938 Km<sup>2</sup>**, which accounts for **2 %** of China's land area, and **14.6 %** of all land area in China's coastal provinces



China's LECZ spatial distribution

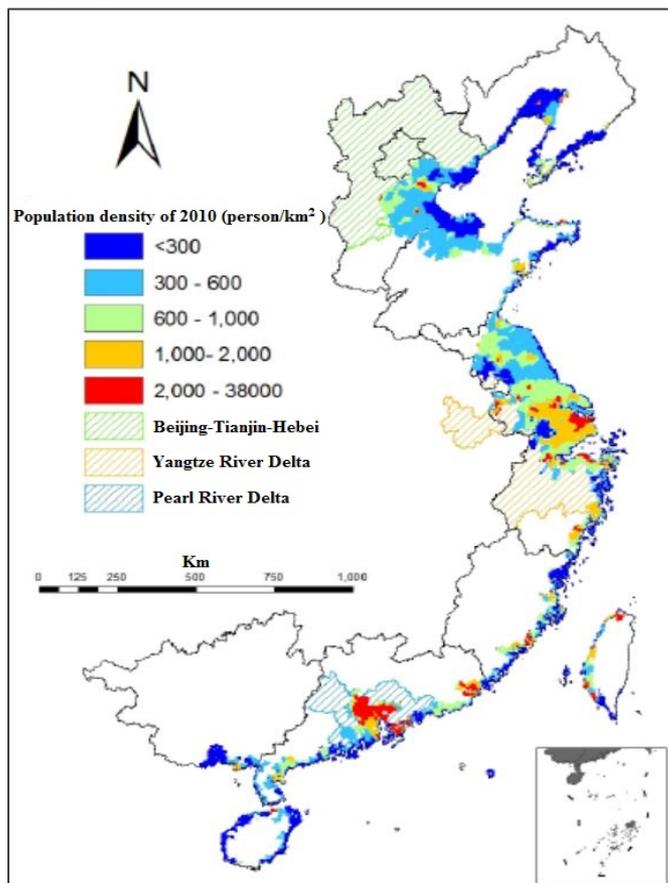
LECZ area distribution at the provincial level administrative region			
Administrative Region	Administrative area (km <sup>2</sup> )	LECZ area (km <sup>2</sup> )	percentage (%)
Liaoning	145558	12835	8.8
Tianjin	11620	9717	83.6
Hebei	187292	26312	14.0
Shandong	154227	23298	15.1
Jiangsu	100929	67548	66.9
Shanghai	6242	5861	93.9
Zhejiang	101953	16315	16.0
Fujian	121661	3716	3.1
Guangdong	177335	19467	11.0
Taiwan	36054	3063	8.5
Xianggang	1101	229	20.8
Macao	26	12	46.2
Guangxi	236196	2397	1.0
Hainan	29817	3168	6.4
Total	1330009	193938	14.6

Source :Minqi Shi,2012. The master degree thesis of Shanghai Normal University

# 1. Impacts of Climate Change on Urban Areas



There are more than **164 million** people living in the LECZ, covering **27.1 %** of the total population in coastal China and **12.0 %** of the total population in China



China's LECZ population distribution

LECZ population distribution at the provincial level administrative region				
Administrative Region	Total population of the Administrative region (person)	Population of LECZ (person)	Population density of LECZ (person/km <sup>2</sup> )	percentage (%)
Liaoning	41291376	45435901	354	11.0
Tianjin	11161037	8337186	858	74.7
Hebei	67519608	12471888	474	18.5
Shandong	93164984	10647186	457	11.4
Jiangsu	77393512	51944412	769	67.1
Shanghai	22588499	21879113	4744	96.9
Zhejiang	52475182	17359160	1064	33.1
Fujian	38228600	2564040	690	6.7
Guangdong	110904847	27448470	1410	24.7
Taiwan	22888196	4024782	1314	17.6
Xianggang	6469695	1368733	5977	21.2
Macao	128830	65652	5471	51.0
Guangxi	53863209	824568	344	1.5
Hainan	8413124	833184	263	9.9
Total	606490698	164311964	847	27.1

Source :Minqi Shi,2012. The master degree thesis of Shanghai Normal University

# 1. Impacts of Climate Change on Urban Areas



## Main challenges that China's coastal cities are facing

 Submergence of low-lying cities by rising sea level



 More intensive hurricane and flooding

 Salt water intrusion and contamination of fresh water and soil

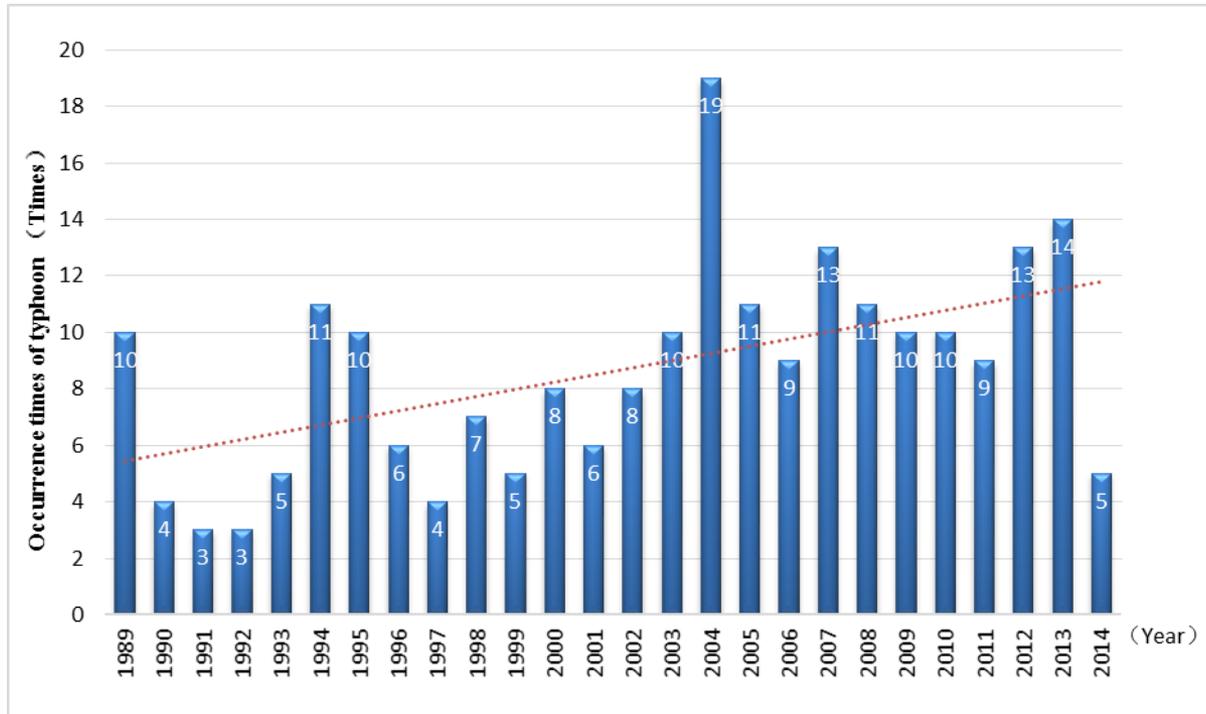
 Weakened drainage of the coastal cities

# 1. Impacts of Climate Change on Urban Areas



## More intensive hurricane and flooding

According to relevant statistics, China's coastal typhoon storm occurred **151 times** between 1989 and 2014, causing billions or even tens of billions Yuan(RMB) each year.

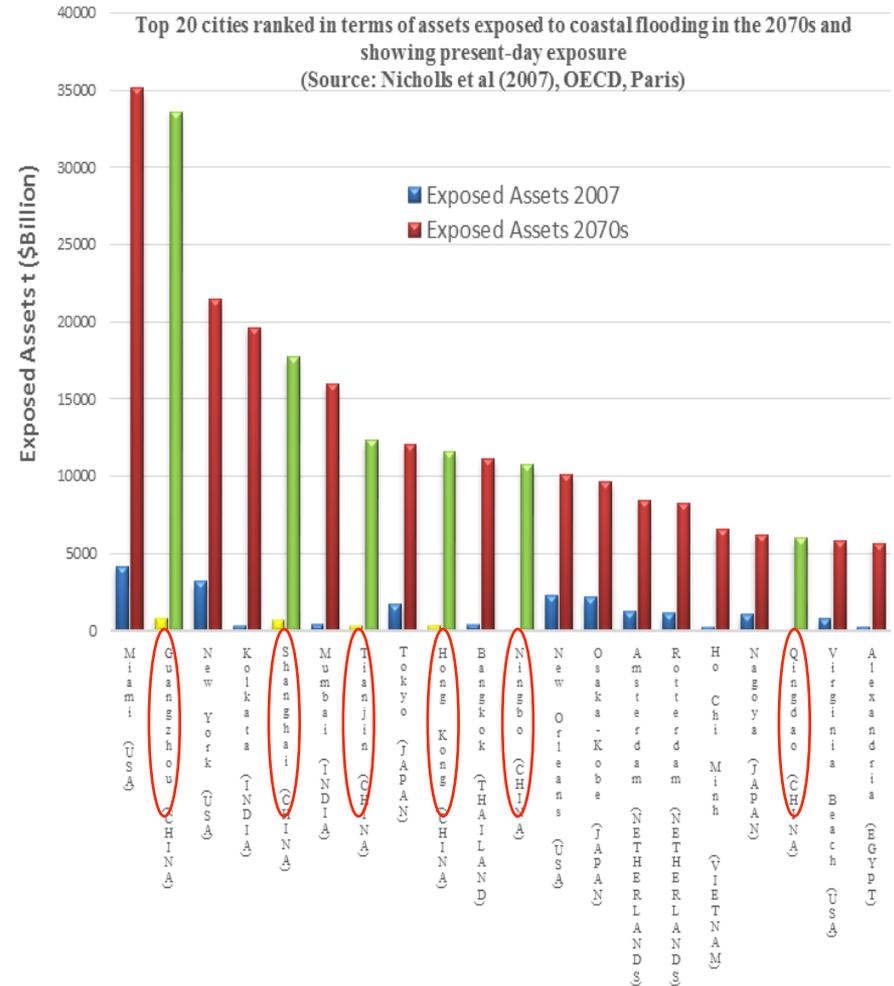
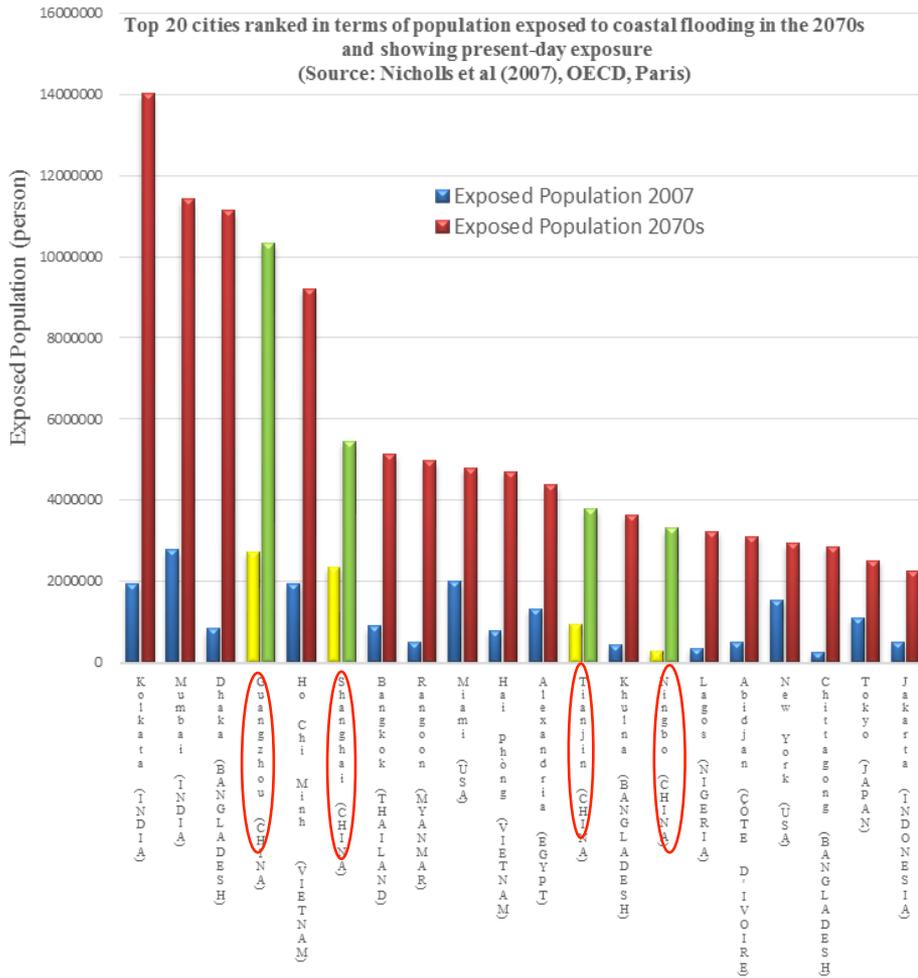


Occurrence times of typhoon in the coastal area of China during 1989–2014

Data source: State Oceanic Administration People's Republic Of China  
<http://www.soa.gov.cn/zwgk/hygb/zghyzhgb/>



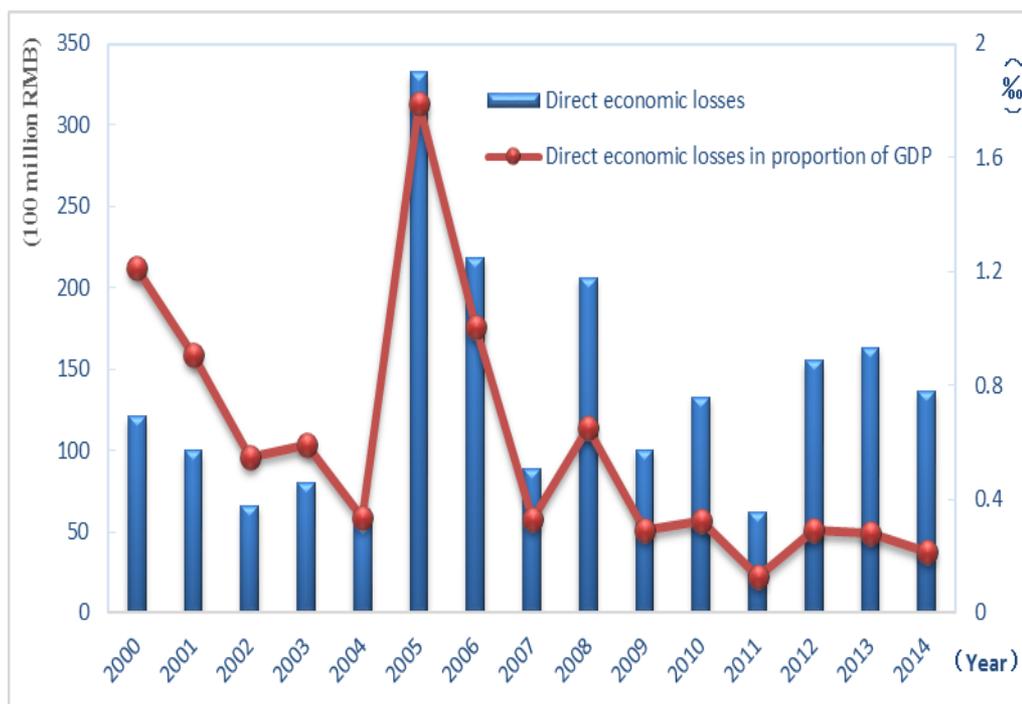
# 1. Impacts of Climate Change on Urban Areas



# 1. Impacts of Climate Change on Urban Areas



Climate change is a growing risk to the cities. These calamities normally trigger other formidable natural disasters, and cause immense casualties and economic loss



Economic losses caused by marine disasters in China during 2000-2014 and its comparison with GDP

Data source:  
State Oceanic Administration People's Republic Of China: <http://www.soa.gov.cn/zwgk/hygb/zghyzhgb/>  
National Bureau of Statistics of China: <http://data.stats.gov.cn/easyquery.htm?cn=C01>

There is an urgent need to help cities and regions to build resilient, livable, and thriving communities.

# 1. Impacts of Climate Change on Urban Areas



## Air Pollution and Catastrophic Flooding in Sichuan

- A team of scientists believes that air pollution from industries and traffic could have caused the extreme floods that devastated southwest China in 2013
- There might be a linkage between the lingering cap of soot and the heavy rainfall

Source: “How Air Pollution May Have Caused Catastrophic Flooding In China,” <http://www.npr.org/sections/goatsandsoda/2015/07/16/421815633/how-air-pollution-may-have-caused-catastrophic-flooding-in-china>

## 2. China's Policies for Addressing Climate Change



The Chinese government issued a series of plans to help the country and cities become more resilient



## 2. China's Policy for Addressing Climate Change



Policy type	Filename	department	time
Carbon emission trading	Notice on carrying out the pilot work of carbon emission right trading	NDRC	2011.10
	"Interim Measures for the administration of voluntary emission reduction transactions of greenhouse gases"	NDRC	2012.6
Low carbon industry	Decision of the State Council on accelerating the cultivation and development of strategic emerging industries	the State Council	2010.10
	"12th Five-Year" national strategic emerging industry development plan	the State Council	2012.7
Greenhouse gas list	Notice on the relevant matters concerning the establishment of the provincial greenhouse gas emission inventory	NDRC	2010.9
Sponge city	Guiding opinions on promoting the construction of sponge City	the State Council	2015.10
Urban and rural planning	Action plan for urban adaptation to climate change	NDRC、MoHURD	2016.3

## 2. China's Policy for Addressing Climate Change



Government policy focuses on 7 aspects:

### I. Adjusting Industrial Structure

- Transforming and upgrading traditional industries
- Supporting the development of strategic and newly emerging industries
- Vigorously developing the service industry
- Speeding up the elimination of backward production capacity

### II. Conserving Energy and Improving Energy Efficiency

- Enhancing the assessment and management of energy conservation
- Improving standards of energy efficiency
- Promoting energy conservative technologies and products
- Carrying out key energy-saving projects
- Developing a circular economy

## 2. China's Policy for Addressing Climate Change



- Promoting of energy performance contracting
- Implementing fiscal and tax incentives

### III. Optimizing Energy Structure

- Accelerating the development of non-fossil fuel
- Promoting the clean utilization of fossil fuel

### IV. Increasing Carbon Sinks

- Enhancing forest carbon sinks
- Enhancing grassland carbon sinks
- Enhancing carbon sinks in other fields

### V. Controlling Emissions in Other Areas

## 2. China's Policy for Addressing Climate Change



### VI. Developing Pilot Projects

#### ➤ Developing Low-carbon Pilot Projects

—Promoting Low-carbon Pilot Projects in Provinces and Cities

—Pushing Forward Carbon Emissions Trading Pilot Programs

—Carrying out Low-carbon Pilot Programs in Relevant Areas

- Studying and starting trials of low-carbon industry park, communities and commerce.
- Beginning trials of low-carbon products.
- Selecting cities to pilot low-carbon transport systems.
- Carrying out green and low-carbon pilot and demonstration projects in key small towns.

## 2. China's Policy for Addressing Climate Change



### VII. Capacity Building

- Strengthening Top-level Planning of Low-carbon Development
  - Formulating and implementing the Work Plan for Greenhouse Gases Emission control During the 12<sup>th</sup> Five-Year Plan Period
  - Improving the legal system for addressing climate change
  - Launching major strategic studies and formulating plans
- Gradually Establishing Statistical and Accounting Systems for Greenhouse Gas Emissions
  - Launching and improving a basic statistical system for measuring greenhouse gas emissions
  - Vigorously advancing greenhouse gas inventory compilation and emission accounting
- Fueling Support for Science and Technology
  - Strengthening basic scientific research
  - Enhancing R&D, application and promotion of low-carbon technology



## 2. China's Policy for Addressing Climate Change



“Urban Action Plan for Climate Change Adaptation,” issued by NDRC and MoHURD in February 2, 2016

**Target:** 30 pilot cities where 50% buildings are “green” by 2020

### Actions

- Introduce CC adaptation into city planning
- Raise urban infrastructure standards
- Raise the CC adaptation ability of urban buildings
- Enable urban ecological and greenery functions
- Ensure urban water safety
- Establish urban disaster risk management system
- Develop scientific and technological capacity of urban CC adaptation

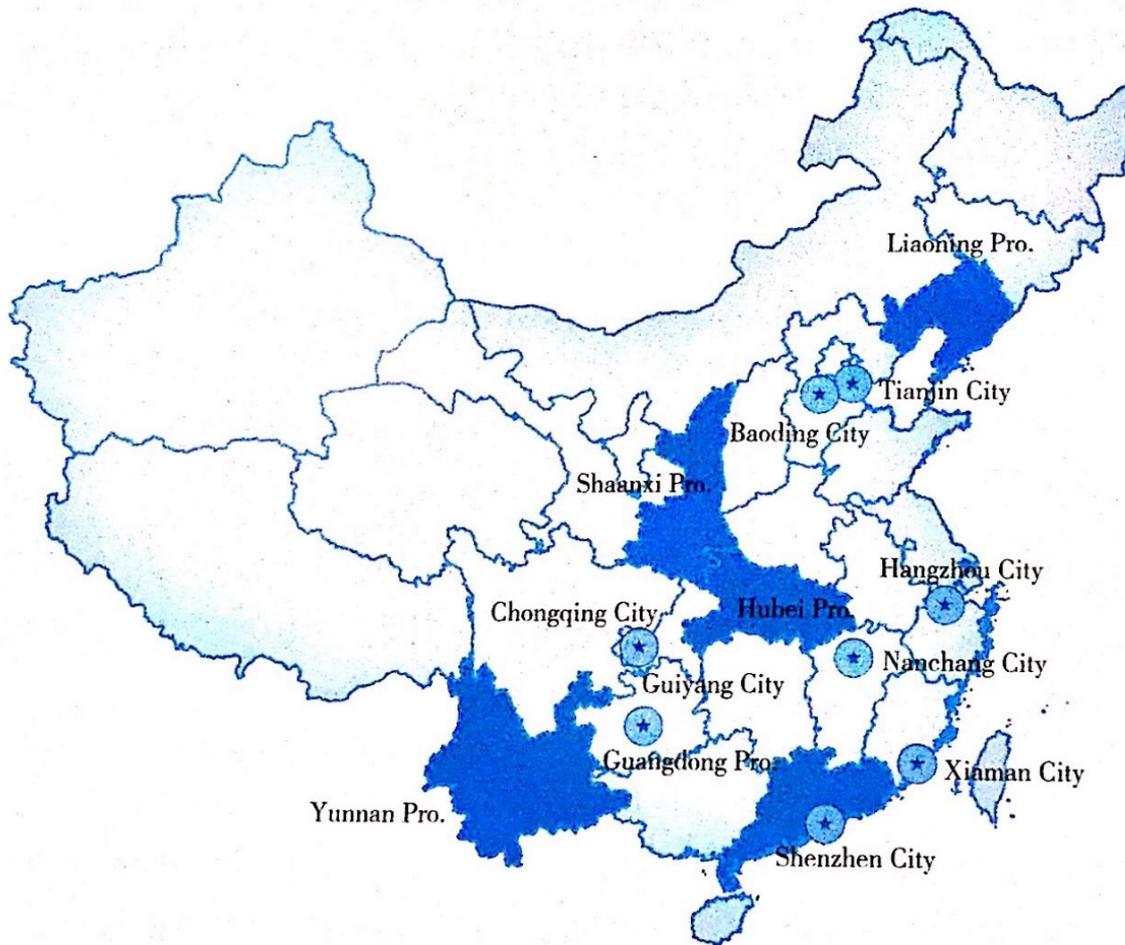
# 3. Practices



## 3.1 Low-carbon Pilot Projects

- In July 2010, NDRC initiated a pilot program of national-level low-carbon provinces and cities, in order to materialize the 2020 target of China in controlling greenhouse gas emission
- Five provinces and eight cities were chosen as the first batch for the program.

# 3. Practices



National Low Carbon Demonstration in Five Provinces and Eight Cities

# 3. Practices



## Project Activities

The national-level low-carbon provinces and cities carry out the following main tasks:

- ① Compile low-carbon development plans
- ② Formulate corresponding policies that support low-carbon and green development
- ③ Accelerate the establishment of an industrial system characterized by low carbon emissions
- ④ Establish a system for the statistics and management of greenhouse gas emissions data
- ⑤ Advocate low-carbon and green life styles and consumption patterns

# 3. Practices



## 3.2 Carbon Emissions Trading Pilot Program

### Project introduction

In 2011, the NDRC initiated a pilot program for carbon emissions trading in Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen.

### Project objective

To develop a support system for the pilot program, including regulatory, registration, and recording systems.

### Project progress

- Since 2012, these pilots have witnessed positive progress
- By August 2015, the total trading volume has reached 56 million tons and the transaction amount, 2 billion RMB
- The government recently announced the roll-out of the trading system to cover the whole country

# 3. Practices



## 3.3 The Sponge City Pilot Projects

### Project history

- In December 2014, MOF, MOHURD and MOWR decided to initiated the Sponge City Pilot Projects
- In April 2015, 16 cities were chosen as the pilot cities, such as Jinan (Shandong Province), Zhenjiang (Jiangsu Province), and Xiamen (Fujian Province)
- In October 2015, General Office of the State Council issued a Guidance for Promoting the Development of Sponge Cities

### Project objectives

- Mainly focusing on urban rainwater and flood management, the project aims to reduce the effect of urban development on ecological environment by preserving 70% of the rainfall. It is expected that by 2020, more than 20% of the built-up areas will reach the target, and by 2030, more than 80% will reach the target

# 3. Practices



## 3.3 The Sponge City Pilot Projects

### Project components

- Recycle the use of urban water
- Reduce urban water pollution
- Protect water eco-system around the city (system of lakes, ponds, rivers, and underground water)

### Three levels of project interventions:

- Green buildings as the basic cells of the sponge city: recycling water and collecting rain water
- Green infrastructure
- Sponge city

### Linkage with Smart City Development

- Smart city for energy and water saving through the use of big data

# 3. Practices



## 3.4 Conservation for Cities

- **Partnership:** TNC and LILP forming partnership to support the eco-city, green city, and sponge city agenda of the MoHURD
- **Objective:** Help cities harness nature's power to build resilient, livable, thriving communities
- **Knowledge dissemination and pilot experiment:** likely in the technical areas of watershed management for cities, the use of Green Acre as accounting unit, and innovative financing mechanisms such as storm water trading schemes and rainwater tax
- **Co-publication:** China Urban Water Blueprint
- **Pilot demonstration project:** with selected pilot cities

## 4. Issues and Recommendations



### Issues

- Lack of integrated management systems at the urban level
  - Lack of overall planning for resilient urban development
  - Most of the relevant actions are strongly sector-oriented
  - Inadequate coordination among various municipal departments
  - Information sharing between different departments is very limited
  
- Insufficient funds, inadequate financing mechanisms
  - The main sources of funds for the pilot cities include the city budget, the central government grants, and commercial bank loans
  - Need for capital investment is far greater than funding resources available

## 4. Issues and Recommendations



### Recommendations

- Establish inter-governmental coordination mechanism for watershed management for cities
- Establish accountability of municipal leadership
- Establish inter-departmental coordination mechanism and break institutional silos at the city level
- Mainstream resilience into city planning practices
- Set priorities for resilience in municipal capital improvement plan
- Mobilize carbon financing
- Explore innovative financing mechanisms such as storm water trading schemes and rainwater tax



# Thank You!

