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Vulnerability and Risk Analysis of Climate Disaster - Two Cases in Guangdong

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Guangdong, a subtropics coastal province in South China, is heavily subjected to climate disaster

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- There are 40 types of natural disasters in Guangdong, including typhoons, precipitation, drought, and extreme low temperatures
- City drought is becoming more and more serious in Guangdong's cities in recent years

2010.5.7, The precipitation caused massive loss in Guangzhou, including 5 deaths and costing 5.4 billion RMB Yuan in damage repairs.

It's not a river, but a road in Jinan University

2011.10.14, the precipitation makes Guangzhou a "sea"

Guangzhou is not a special case in China

Such situations happen in more and more cities in China

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Wuhan

Zhejiang

Jiangxi

Wuzhou,Guangxi

Nanjing,Jiangsu

Beijing

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Building an Indicator System

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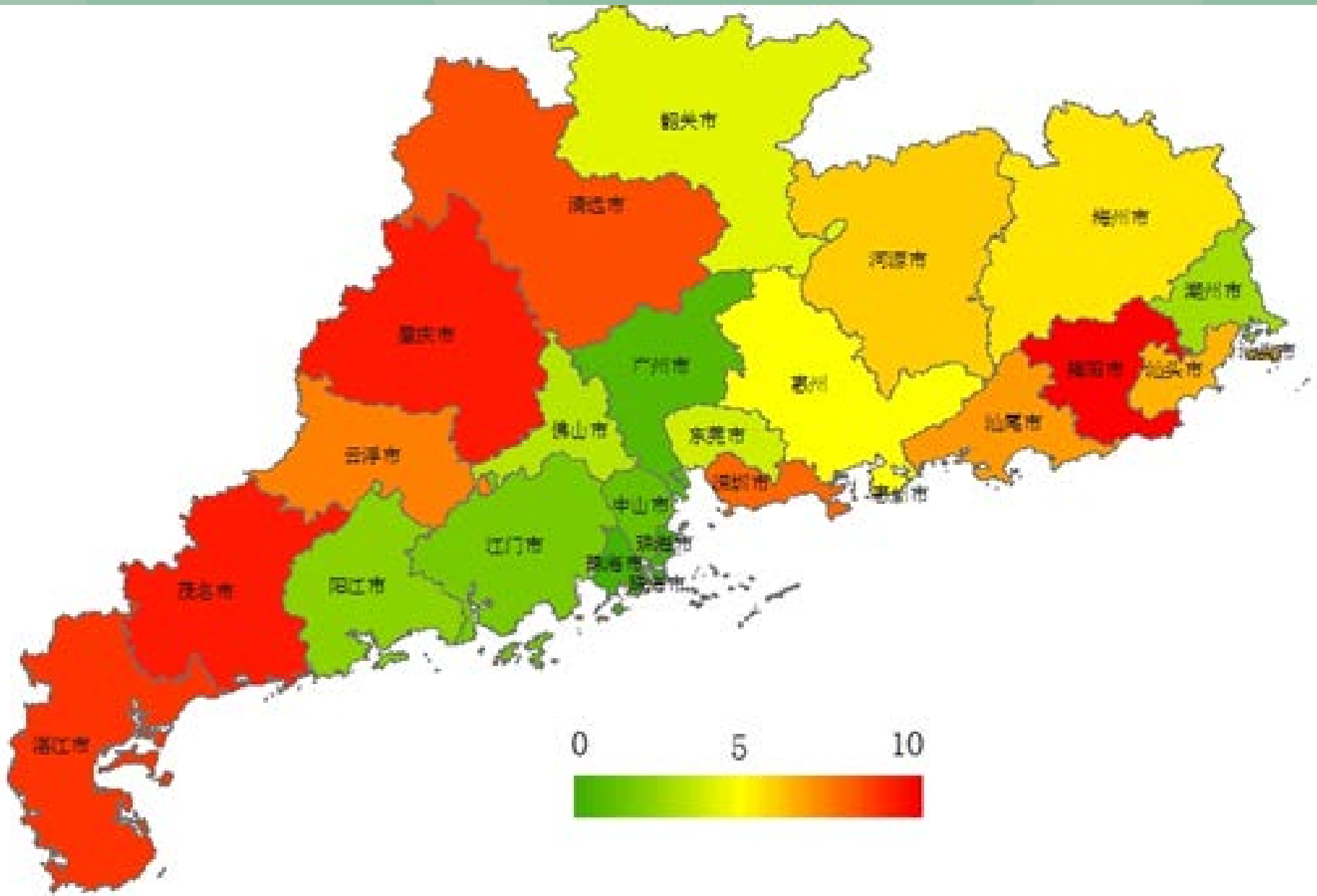
五个维度 from five aspects

- 经济 economic
- 人口 demology
- 生态与地理 ecological
- 物理 physical
- 制度与文化 institution and culture

三个属性 To reflect three characteristics

- 暴露性 exposure
- 敏感性 sensitivity
- 适应能力 adaptation

属性	指标	单位	反映内容
经济条件	地均GDP	亿元/平方公里	暴露程度
社会人口	人口密度	人/平方公里	暴露程度
社会人口	老年人比	65岁以上人口占比	敏感性
社会人口	幼儿比	14岁以下人口占比	敏感性
社会人口	人口流动性	常住人口/户籍人口	敏感性
经济条件	城乡人口分布	城镇人口/常住人口	适应能力
经济条件	人均可支配收入水平		适应能力
社会环境	森林覆盖率		适应能力
社会环境	建成区绿地率		适应能力
政策制度	社会保险平均参保率%	养老、失业、医疗保险平均参保人/从业人员数	适应能力
政策制度	每万人拥有医生数		适应能力
政策制度	商业保险发展水平	万元GDP的商业保险投保额	适应能力
政策制度	人身保险发展水平	单位人口人身保险投保额	适应能力
社会环境	排水管道密度	排水管道长度/建成区面积	适应能力


韶关市
清远市
肇庆市
广州市
河源市
梅州市
潮州市
云浮市
佛山市
东莞市
中山市
江门市
阳江市
茂名市
湛江市
0
5
10

Main Reason

- The fast growth of population and social wealth expose the city to disaster, but the adaptation capacity has not been enhanced
- The speed-lead ideas neglect disaster management
- Population density in the center is very high: 482,896 in 1978 to 7,841,695 in 2008
  - Non-agricultural population growth: 2,314,858 to 7,041,739
- Disaster management is not considered in city development planning

Forecast System

- Climate change has made precipitation forecast more difficult than ever
- Flood warning systems are still developing and no one can predict when drought will happen
- The forecast system broadcasts precipitation information too late

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The Drainage System

- Views “on the ground” as more important than “under the ground”
- Pipes and drains
- There are many underground parking lots designed with not enough consideration for floods
- Lack special drain facilities
- Drainage pumping stations have been neglected and do not do enough

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Risk Analysis of Climate Disaster

Typhoon Case Study of Zhanjiang City

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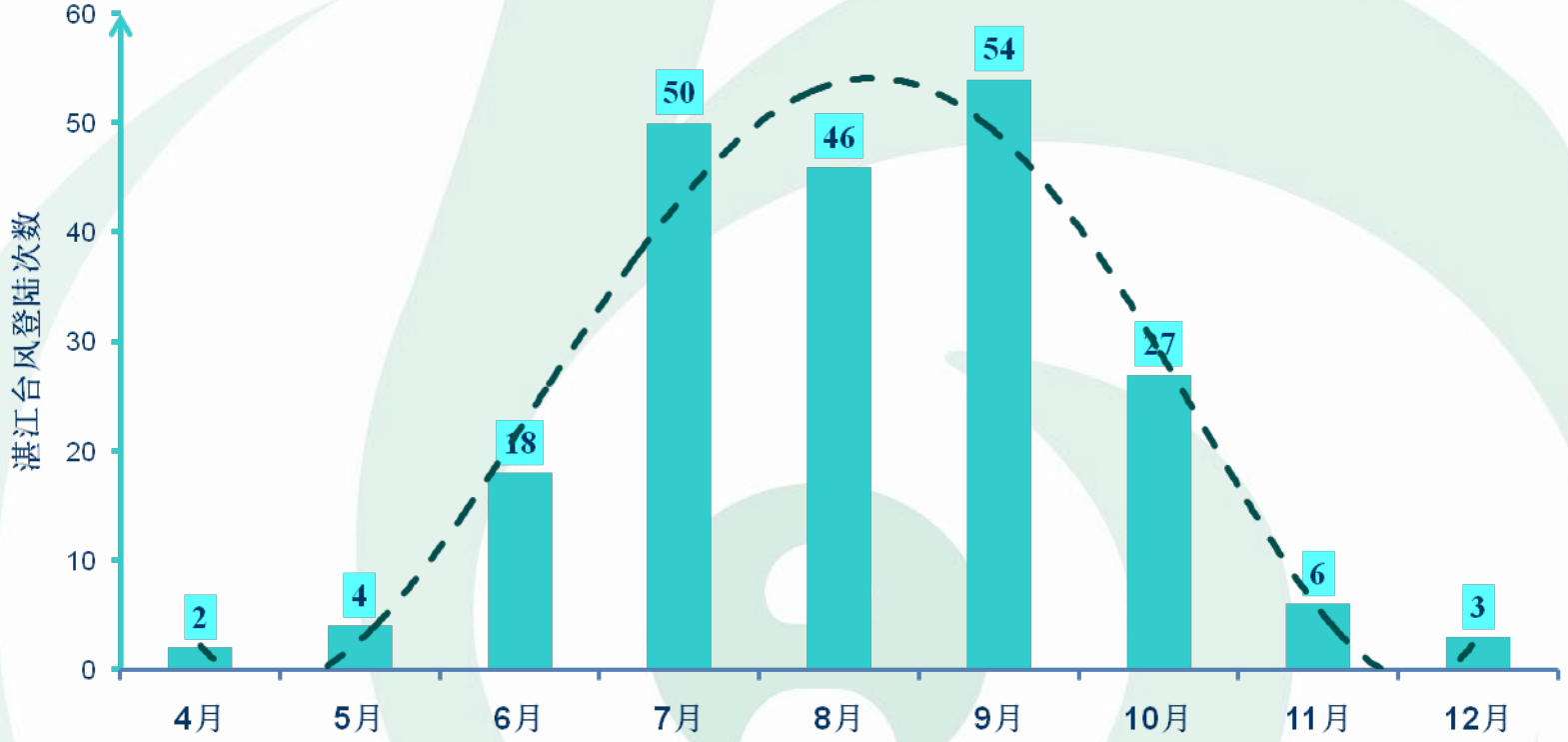
Typhoon Landed at Zhanjiang



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Agriculture Ruined

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Road Flooded

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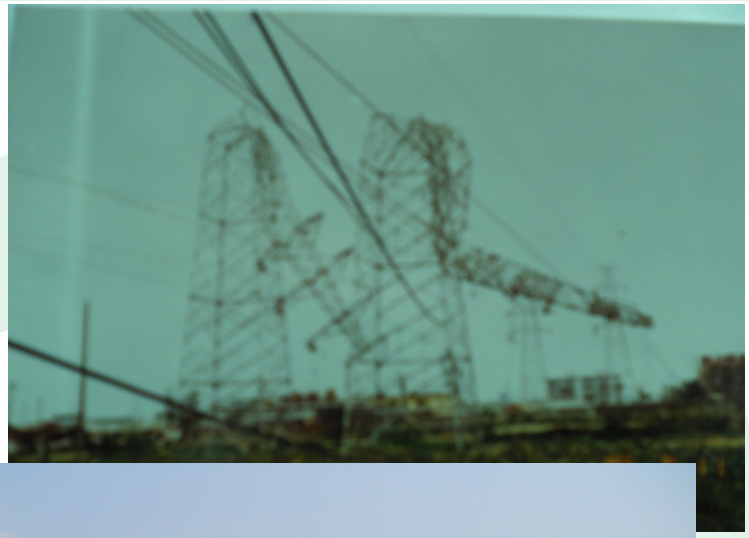
And other loss…



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Two Aspects to Consider

1. Death
2. Economic Loss
    1. Fishery
    2. Agriculture
    3. Transportation
    4. Water Conservancy
    5. Infrastructure

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Our Analysis Looks At:

- How and why the statistics of death and economic loss evolve over time
- Which groups and domains were, are, and will be seriously affected by the typhoon?
- How to enhance adaptive capacity
- What can be done in the future

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Some Findings

- Typhoon disaster has become more and more serious in the past several decades
- Typhoons result in significant economic losses but less death than ever before
- Economic development results in not only adaptive capacity enhancement (which reduces risk) but also increases the degree of exposure (which increases risk)

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- The fishing population (especially small aquaculture farmers) and peasants are the most at-risk population
- The small aquaculture farmers do not have the funding to invest in modern instruments that can withstand typhoons
- The peasants also do not have the funding to mitigate typhoon risk because of the lack of insurance mechanisms

- The Zhanjiang government has made great progress in the past decade but the social management system needs improvement
- One example of this is the approval procedure process for disseminating meteorological information which takes too long for the information to aid citizens in the midst of a typhoon

Local universities do basic research studies but an increase in localized and practical studies is needed.

The Program's Many Benefits

- Deepens understanding of climate disaster
- Teaches and uses analysis methodology from international experts
- Will allow for more policy suggestions via international experience sharing and many other mechanisms that the program creates