Modelling the Coupled Effects of Climate Change and Management Approaches on Plantations in Southern China

Presenter: Xiaofan WANG

China Land Surveying and Planning Institute

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Outline

- WHY DO WE DO TIHS STUDY?
- WHAT DO WE WANT TO FIGURE OUT?
- HOW TO GET THERE?
- QUESTIONS FOR FUTUER STUDY…

Background

Global Climate Change

- exchanges of energy, water, carbon dioxide and other chemical species within the atmosphere

- Forest composition
- Spatial distribution
- Forest biomass
- Carbon storage
- Abundance of tree species

Forest Ecosystems

Background

Land use management policy

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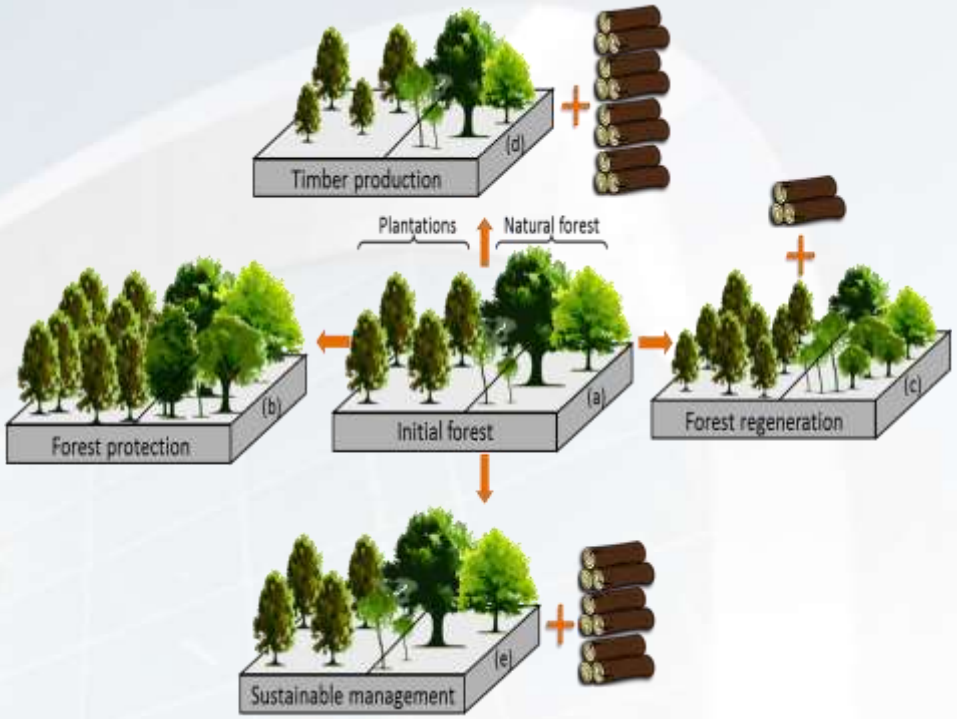
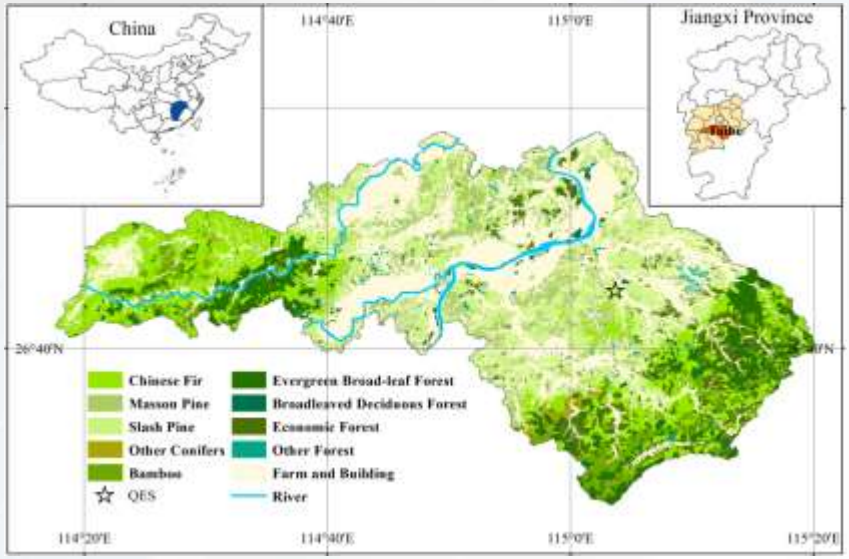
Forest management



- maintain carbon storage
- improve the capacity to adapt to climate change

Plantations in China

- 62 million ha plantations in China (2011)
- extensive management
- low productivity
- single structured
- unsustainable ecological and production functions



Objectives

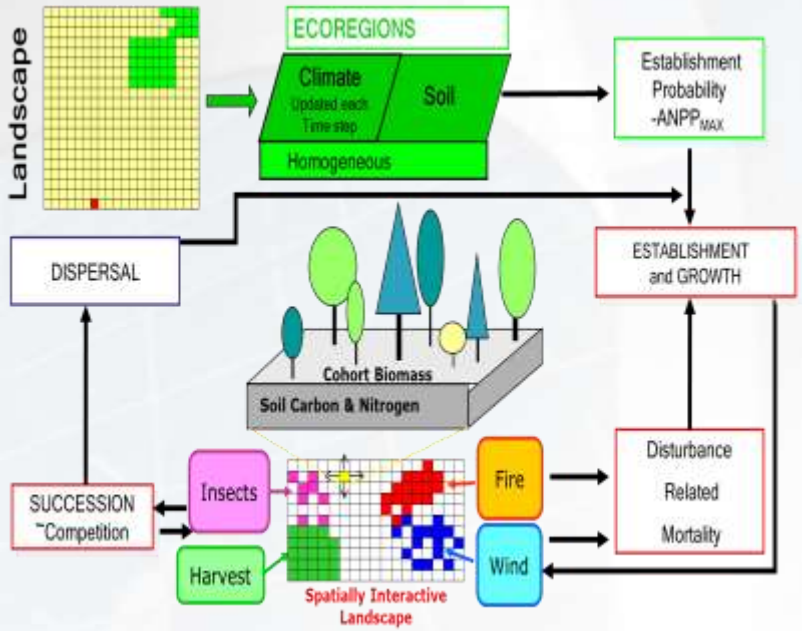
•Investigate the landscape scale effects of forest management and climate change on the plantations in Southern China.

•Understand the trade-offs between forest biomass and timber production.

•Compare simulations incorporating four climate scenarios and four forest management alternatives.

Model : LANDIS-II

- LANDIS-II simulates dynamics in forest landscape structure, succession process and AGB of each tree species under disturbances (fire, wind, insects and harvest).
- **First designed by University of Wisconsin-Madison**

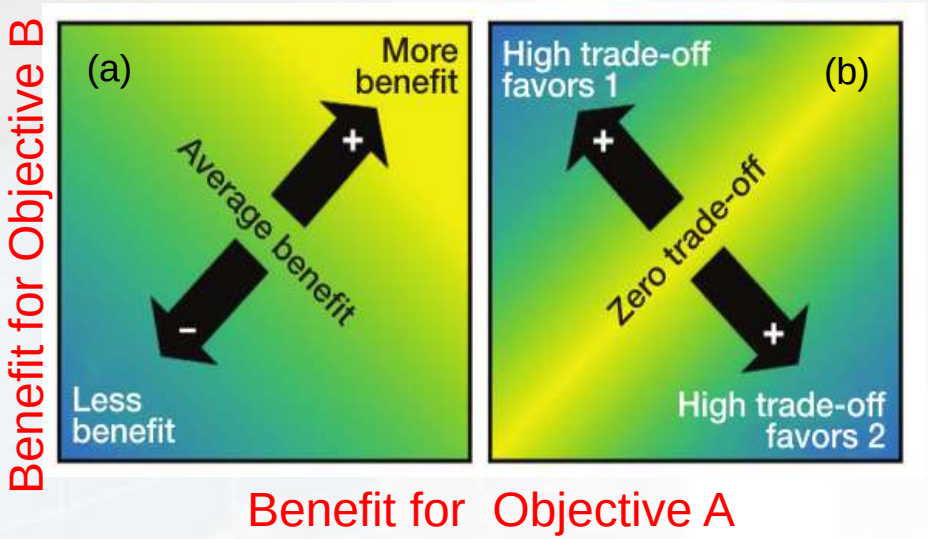


Quantifying trade-offs

- The magnitude of benefit for objective *A*:

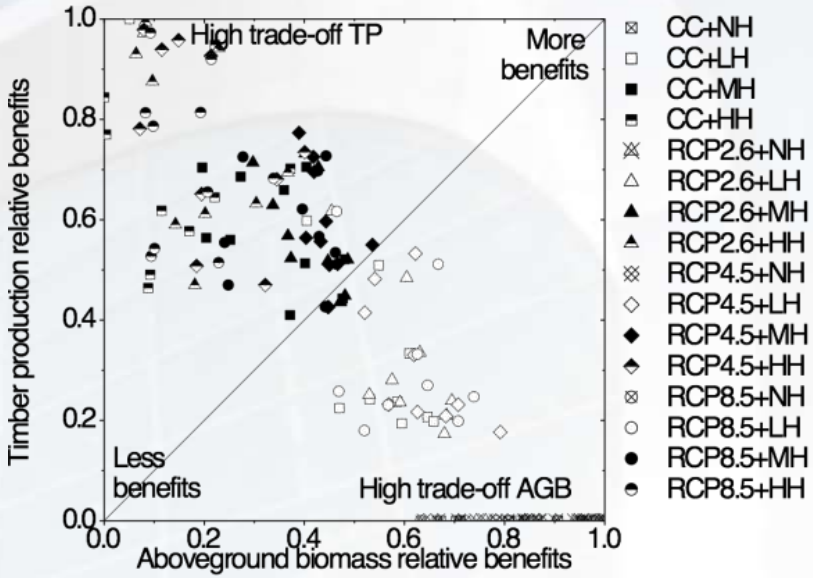
$$B_A = \frac{A_{OBS} - A_{MIN}}{A_{MAX} - A_{MIN}}$$

- Overall benefit for the two objectives: the mean of individual benefits
- Trade-offs: the root mean squared error (RMSE) of the individual benefits



Results & Discussions

- The scatter plot depicts the relationship between timber production and AGB for a long-term forest management and climate experiment.
- Overall benefit increases from low benefit in the lower left to greater benefit in the upper right.
- Trade-off increases with distance from the diagonal of x=y.



Results & Discussions

- Uncertainties of climate change, …
- Model limitations, …

Future study:

- **Optimize forest management approaches**
- **Trade-offs between economic benefits and ecological benefits**
- **Combine with remote sensing technology**
- **Consider the impacts of land policy**

THANK YOU FOR LISTENING !

E-mail: wangxiaofan@mails.clspi.org.cn