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Theory and models of forest transition

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Topics Covered

- Research question
- Theory of land use change forest transition
- Approaches to identify factors for forest transition
- Models and data required
- Discussions for collaboration in international comparisons

Questions to be answered

- What factors drives land use change from forests to other land uses vise versa?
- Factors driving forest transitions can be different across continents, countries, and regions.

Variables to be considered

- Economic variables – productivity, competition with other land uses, in particular agriculture, competition with foreign suppliers
- Institutional variables – land tenure, land ownership, PES, subsidies, protected areas, etc.
- Ecological/cultural variables – populations, urbanization, cultural capital such as community spirits

Theory 1

- Economic theory can explain the land use change.
  - Not economical forestlands become unutilized.
  - Land productivity with higher productivity will be exploited first.
  - Easier access to market intensifies land use
  - Labor employment opportunity elsewhere will lead to forests nearby abandoned.

Theory 2

- Institutional theory suggests that lands with secured tenure will be managed sustainably with active participation of stakeholders.
- Market failures could be complemented by policy measures.
  - Payment for environmental services provided by forests.
  - Subsidies for forest products

Theory 3

- Ecological theory - There is a limit to an ecosystems which can support the users.
  - Carrying capacity
- Balance between vegetation and animals
  - Resilience nature

Socio-ecological resilience

- Forest land use is resilient when its services are valued enough to be conserved.

Forest Governance and the Role of Government and Market

- The land guardians' rights and benefits should be recognized and safeguarded by institutions including laws and bylaws.
- Relative prices and costs of forest production and conservation guide land users for their decisions of land use.
- The institutions and markets forces the forest land to be converted or conserved of which the influences vary according to the ecological and cultural setting.

Approach to identify the variables in effect

- Qualitative comparison of cases
  - Boolean method
  - Identifying the variables underlying the forest transition
- Quantitative methods
  - Measuring the impact of each variables influencing forest transition or forest cover change

Boolean method

- Presence of FT = f(X)
- X is a set of “binary or level” variables including:
  - Economic variables(wage/income, prices, accessibility, globalization, etc.)
  - Institutional variables(ownership, tenure, PES)
  - Ecological variables(slope, weather, population density)
  - Social/Cultural variables(urbanization, social capital)

Categorization Model for FT Cases

- to link FT with changes in explanatory variables
- Category: 1st , 2nd , 3rd , 4th divisions depending on the stage of FT in one side against the level of explanatory variable (EV) in question, e.g. income
- 1st division is the preferred state which could lead to sustainable society while 3rd division is considered not sustainable.
- 2nd and 4th divisions are uncertain and thus combined to become a group.

Ordered Logit Model

- To explain which variables could support preferred FT realized.
- Data required: land cover changes over time, values of explanatory variables (EV) over time
- Assumptions:
  - All cases of countries can be explained by the same set of explanatory variables.
  - The international forces affect the same to each countries studied.

Discussions

- We need to agree to the theoretical framework which explains forest transitions in Asia-Pacific countries.
- Data of forest cover and EV required for a period chosen.
  - 2000~2010: China, India, Indonesia, Japan, Korea, Laos, Malaysia, Philippines
  - 1990~1999: China, India, Indonesia, Japan, Korea, Laos, Malaysia, Philippines
  - 1980~1989: China, India, Indonesia, Japan, Korea, Laos, Malaysia, Philippines
  - 1970~1979: China, India, Indonesia, Japan, Korea, Laos, Malaysia, Philippines
  - 1960~1969: China, India, Indonesia, Japan, Korea, Laos, Malaysia, Philippines
  - 1950~1959: China, India, Indonesia, Japan, Korea, Laos, Malaysia, Philippines