

Causes and pathways of tropical deforestation

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Interannual variability in rates of deforestation

Evolution of the Mean Rate of Gross Deforestation in Amazon (km²/year)



Causes of tropical deforestation

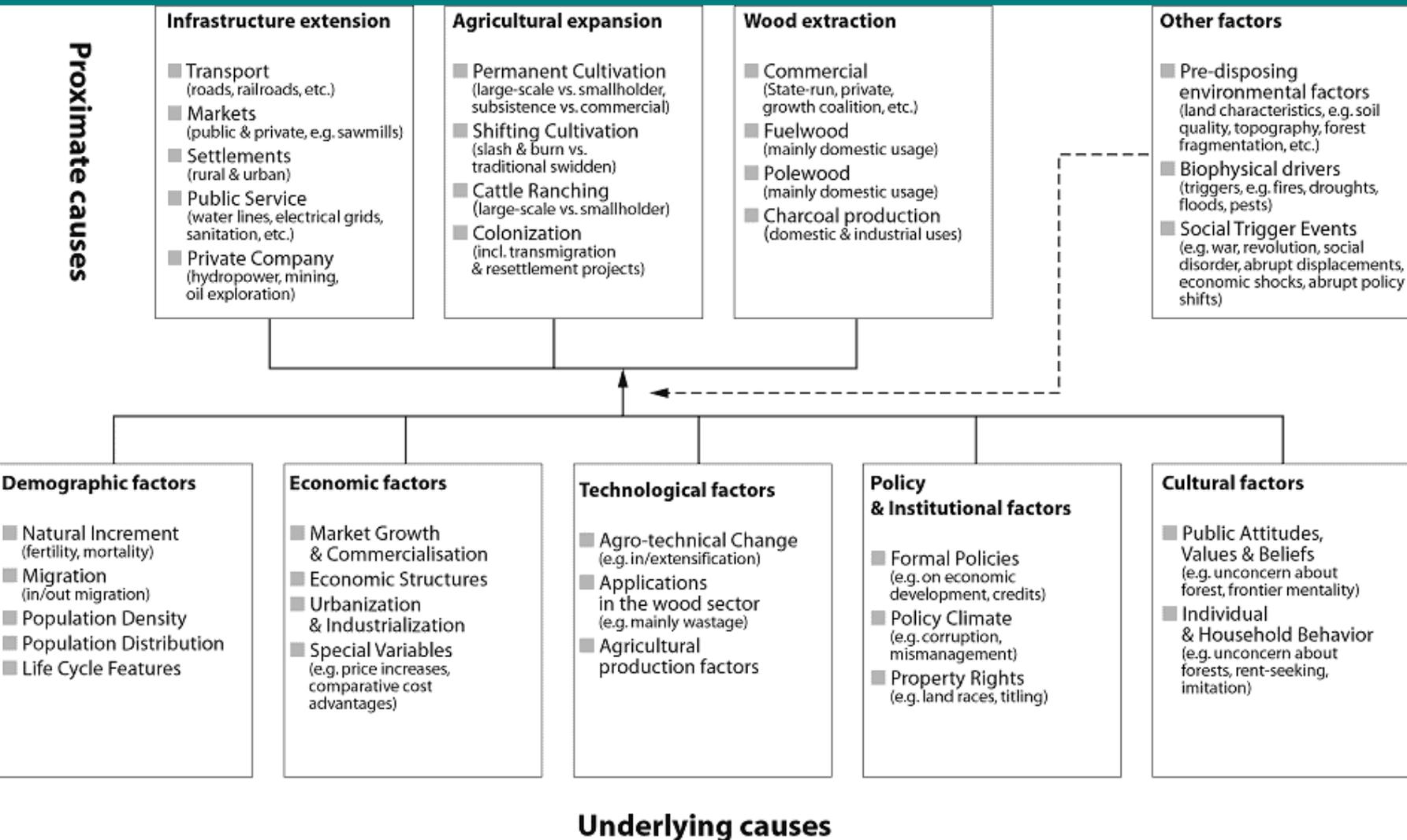
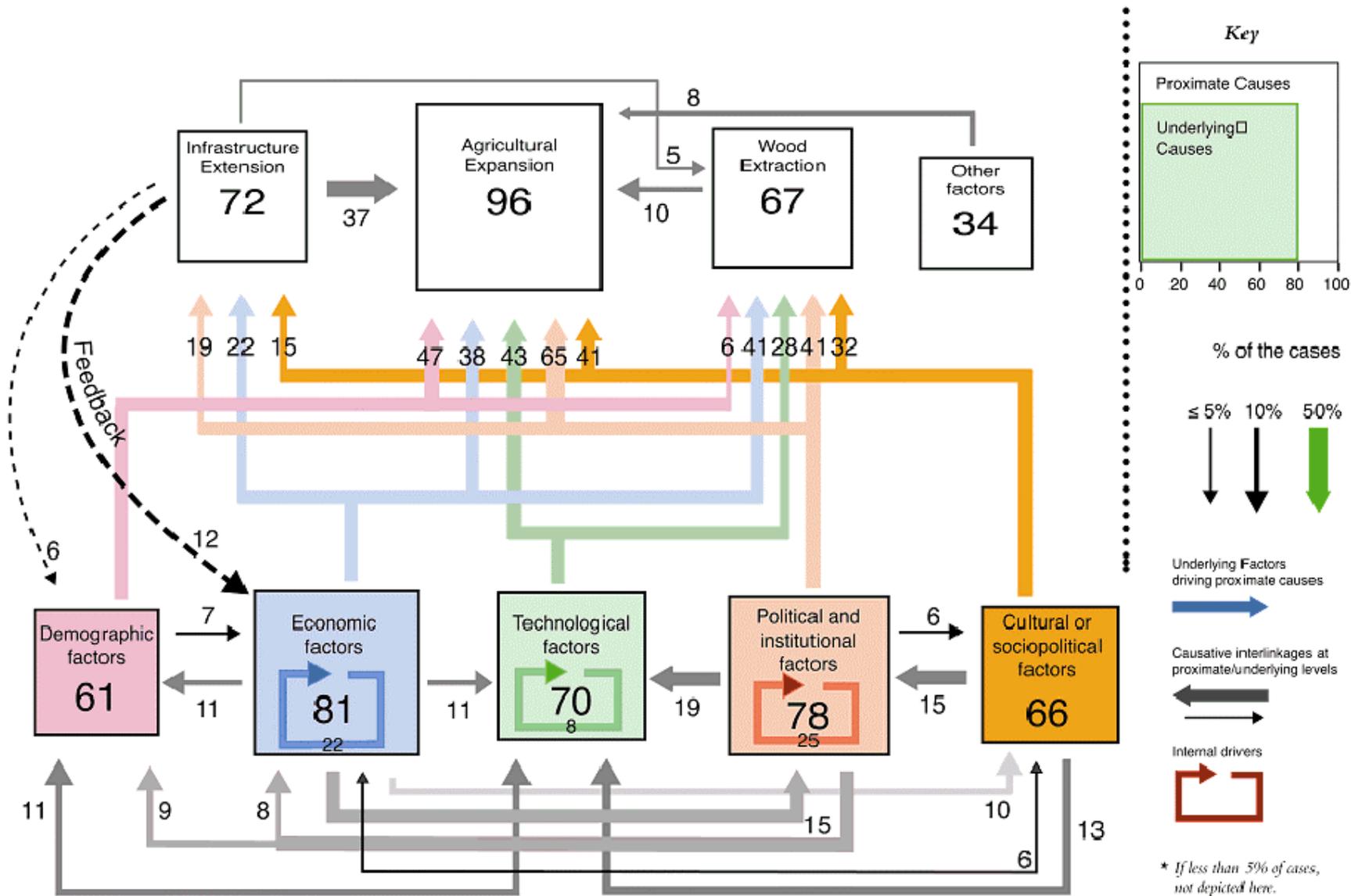


Figure 9 A systemic and generalized view upon the causative pattern of tropical deforestation (N = 152 cases)*



Meta-analyses of case studies:

- Synergetic combinations of multiple factors at different spatial & temporal scales.
- At short time scales: *mostly* individual and social responses to new opportunities and constraints created by markets and policies, and mediated by local institutional factors.
- At longer time scales: *also* demographic factors: population increase & decrease, breakdown of extended families, migration.

- development of the *forest frontiers* by weak state economies
- *institutions in transition* from communal to private land ownership
- *loss of entitlements* to environmental resources (e.g. due to *encroachment* by other land uses) leading to an ecological marginalisation of the poor
- *urbanization* followed by changes in consumption patterns and in income distribution
- *new economic opportunities* linked to new market outlets, changes in economic policies, or capital investments
- *inappropriate policy intervention*
- *macroeconomic shocks* and structural adjustment policies

Cluster of inter-related factors with direct or indirect, intended or unintended impacts on forests

- national demand for land
- policies to develop the forest frontier
- capital investments in logging and agricultural activities
- population movements
- the commodification of the economy
- development of urban markets
- infrastructure expansion

Driving forces of tropical deforestation by scale of influence

n = 152 cases

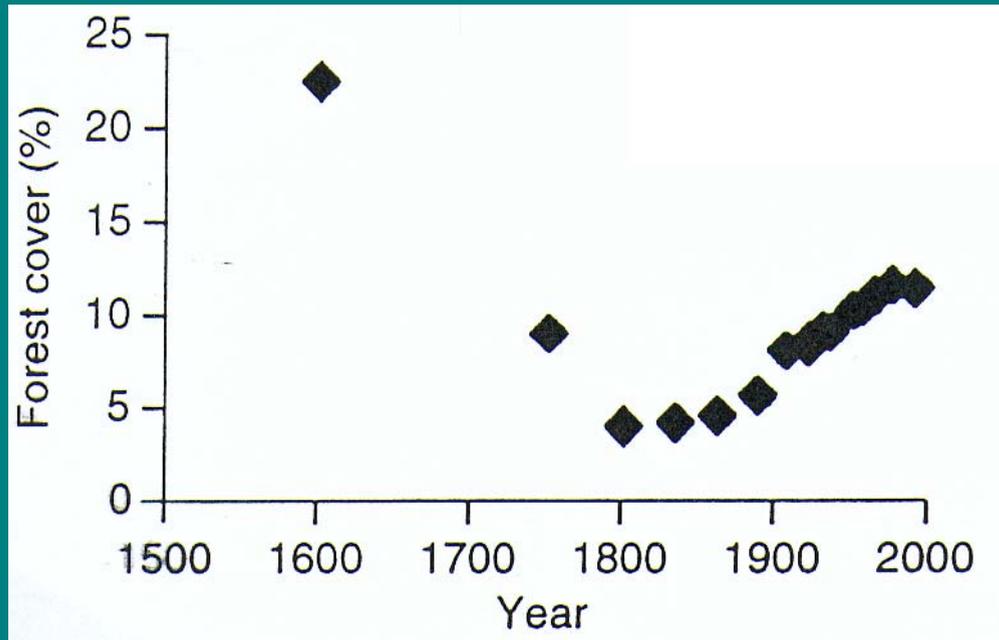
Scales	in % of all cases					
	All factors (range) (N=152 cases)	Demographic factors* (n=93)	Economic factors (n=123)	Technological factors (n=107)	Policy and institutional factors (n=119)	Cultural or socio-political factors (n=101)
Local	2 - 88%	88%	2%	23%	4%	16%
National	1-14%	1%	14%	3%	2%	7%
Global	0-1%	-	1%	-	-	-
Several scales: global to local interplays	11-94%	11%	82%	74%	94%	77%

* 6 cases of ‘population pressure’ (unspecified) could not be attributed to scales.

Latin American (especially Amazonia) pathway of deforestation

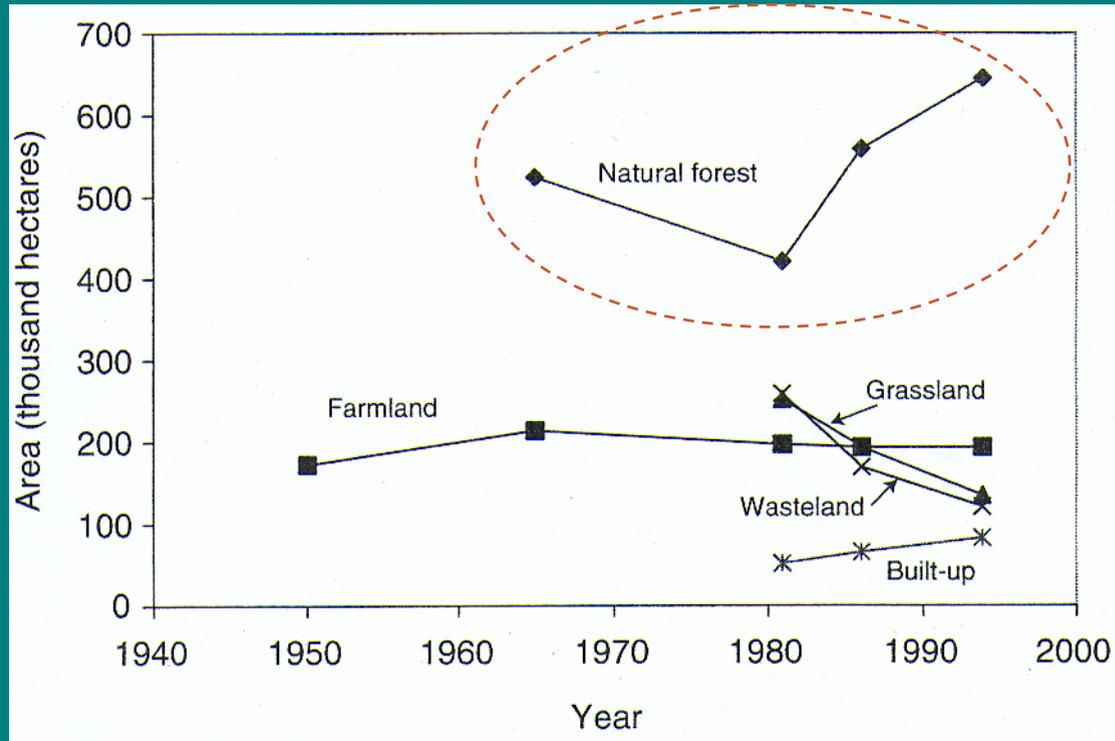
- a phase of extraction and harvesting of *timber* plus *initial colonization*,
- generally followed by the establishment of colonists with a greater access to *capital*,
- *competition* to define or redefine the rules of land and capital access takes place, frequently involving violent conflict,
- *winners and losers* : those increasing land holdings *and* those pushed/pulled onwards to expanding the agricultural frontier further, where land is still cheap,
- for the *winners* : large-scale land conversion to *pasture* follows since cattle provides the largest economic rewards, given market conditions and/or government subsidies,
- this, in turn, drives up *land prices*, leading to further land consolidation.

Forest transition in Denmark



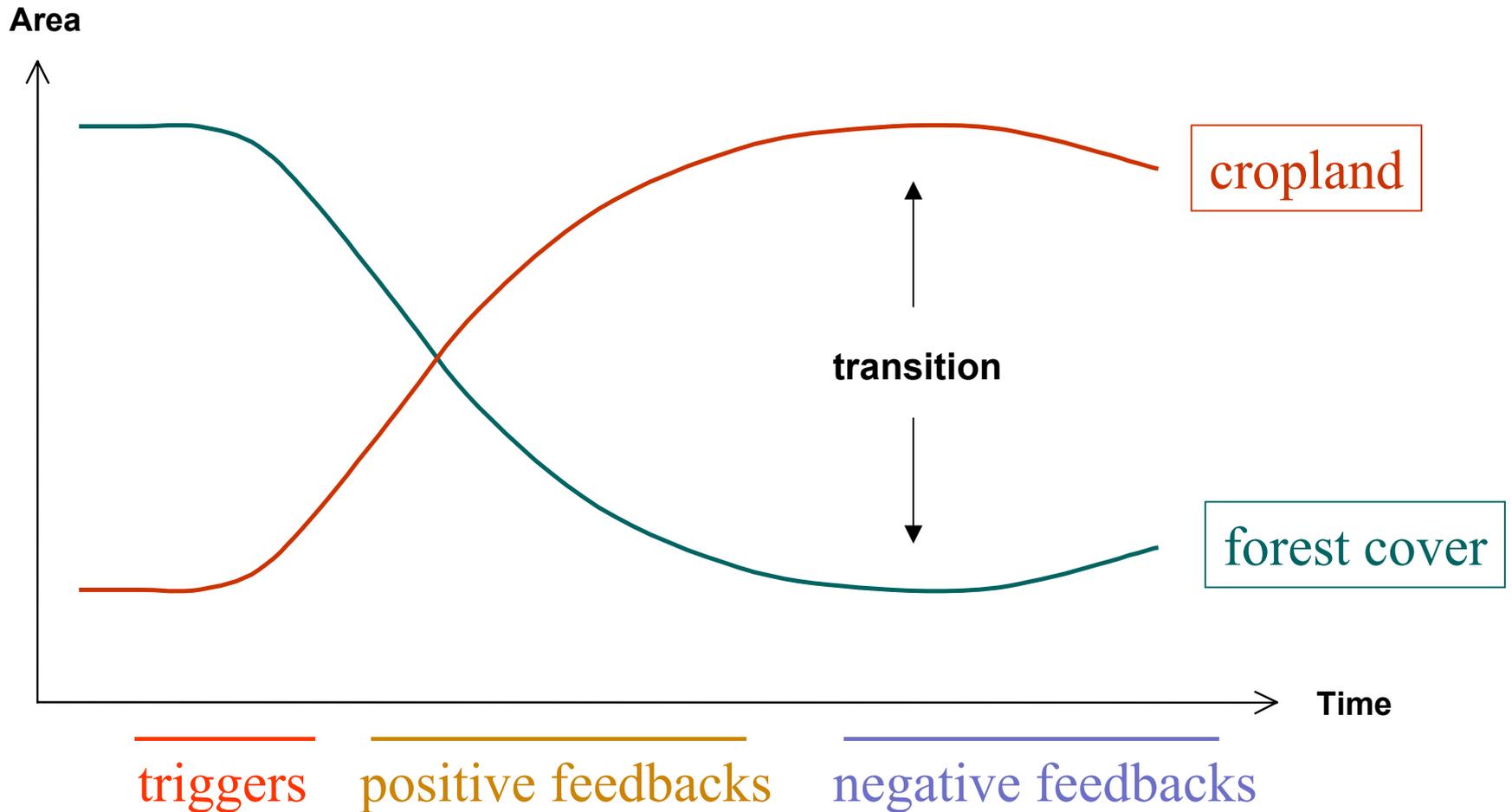
Source: Mather et al., 1998.

Forest cover trends, Jitai Basin / Jiangxi, SE China



Source: Zhao Shidong et al., 2001.

Forest transition

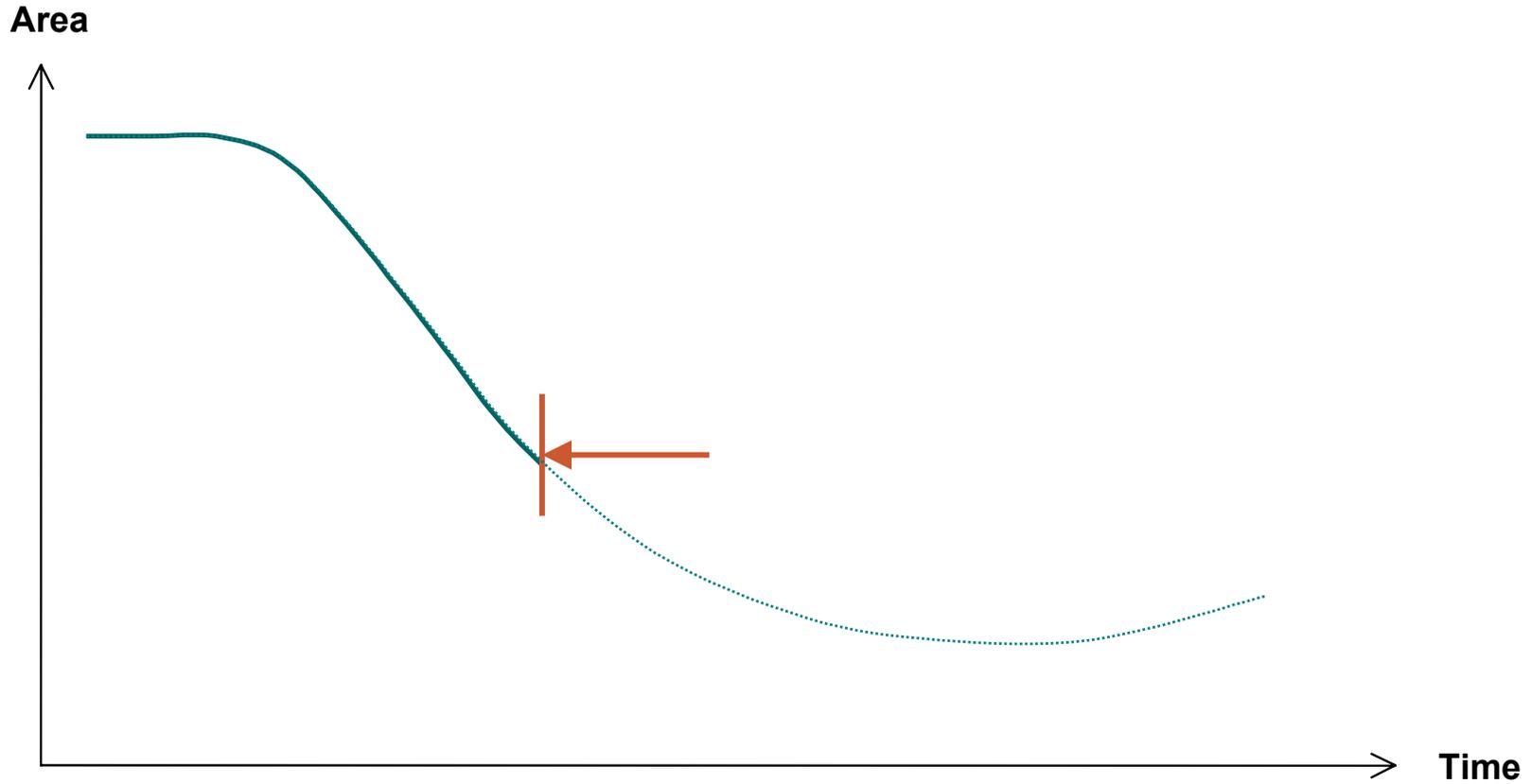


Two processes of forest transition

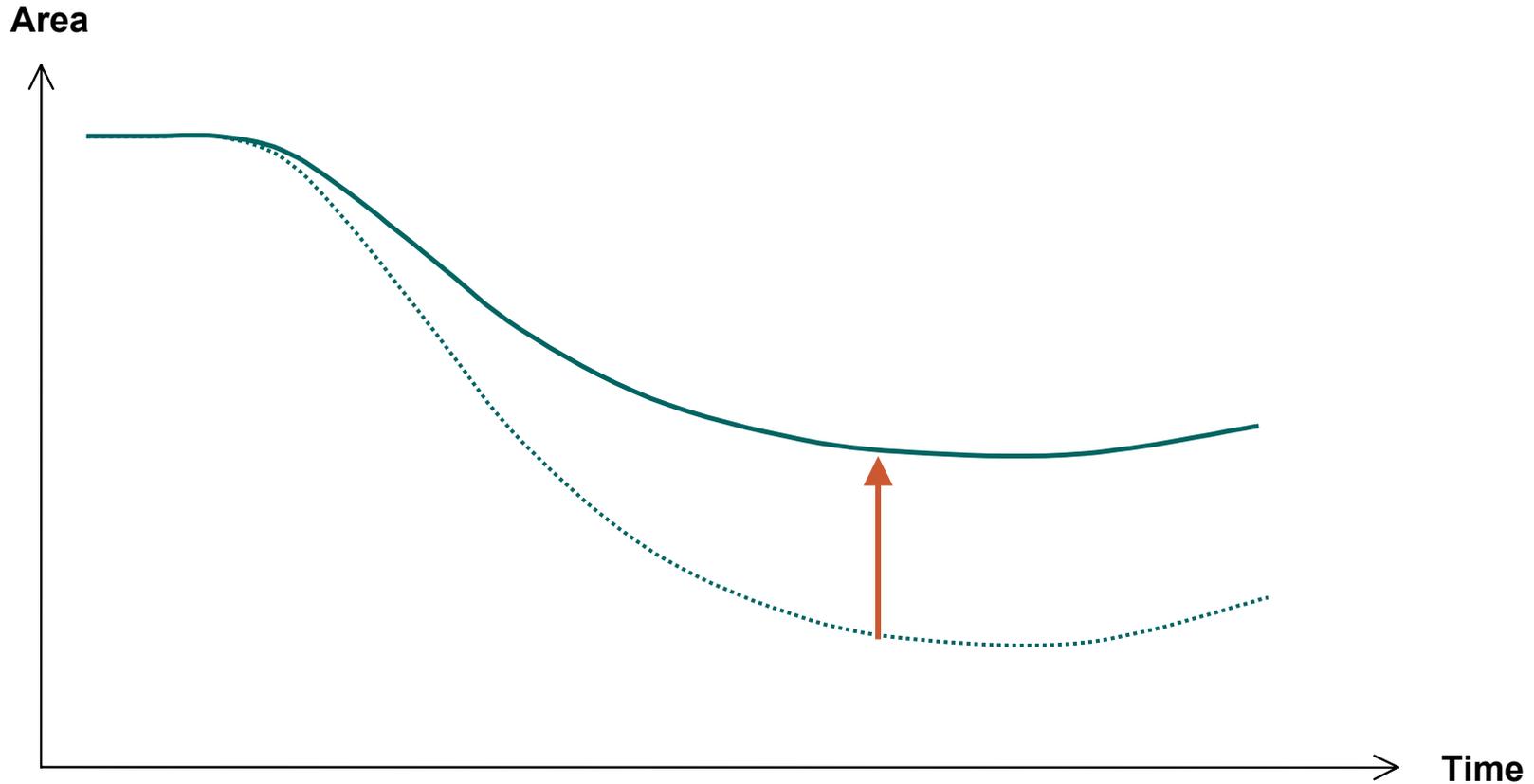
Economic development path: Economic development has created enough non-farm jobs to pull farmers off of the land, thereby inducing the spontaneous regeneration of forests in old fields

Forest scarcity path: A scarcity of forest products has prompted governments and landowners to plant trees

Halting deforestation?



... or accelerating the forest transition?



Policy implications

No universal policy for controlling tropical deforestation.

Find the right balance and the correct mix of factors most suitable for a particular region.

Many factors that are among the causes of deforestation are also part of the solution,

e.g., land-use policies, economic development, institutional arrangements, transportation infrastructure.

Policy packages should always include:

1. Improving **governance**, fighting corruption,
2. **Decentralizing** forest management with a concomitant increase in the local capacity to enforce law,
3. Developing **public participation** in environmental planning,
4. Designing creatively **new institutional instruments** (including market-based ones).

Difficulties

- Weak state **control** on forests: globalisation, economic priorities
- Difficult to **attribute** reduced deforestation to state policies: complex causal clusters, inter-annual variability, forest transition
- International **leakage**: international trade in forest and agricultural products
- **Permanence** of avoided deforestation: no quick fix to deforestation, forest transition linked to economic modernization
- **Multiple users** of forests: winners & losers, markets for forest services with *local* value
- Measurement **uncertainties**: consistency of time series, forest degradation & fragmentation