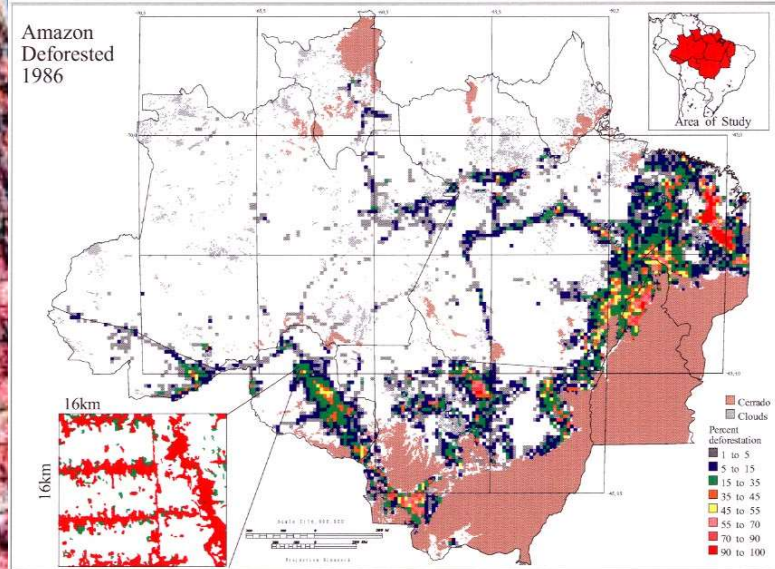
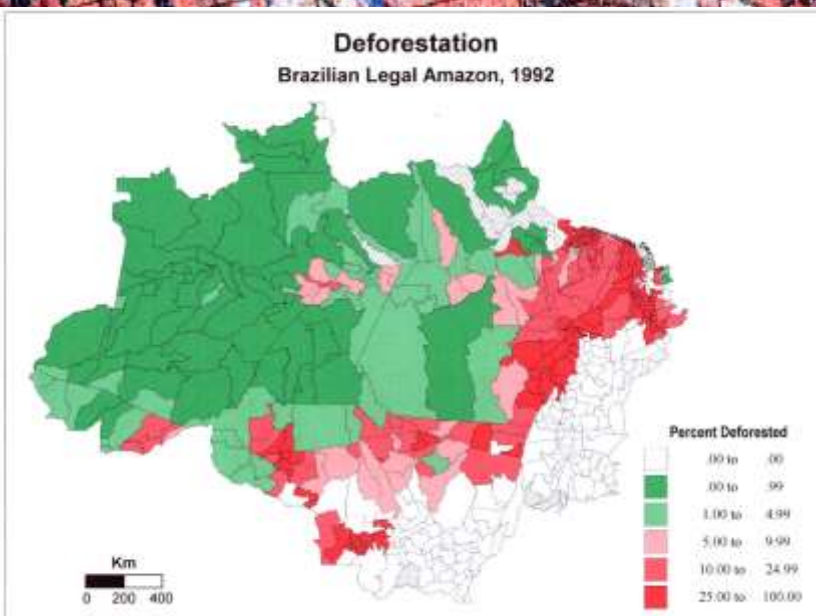


Amazon
Deforested
1986



Scaling Issues and Land Use/Land Cover Change

Deforestation
Brazilian Legal Amazon, 1992



Scaling Issues and LUCC

● Scale in biophysical systems

- Different biophysical processes operate on different spatial and temporal scales
 - Cellular functions: micro-scale, rapid processes
 - Predation: meso-scale, moderate processes
 - Continental drift: macro-scale, slow processes

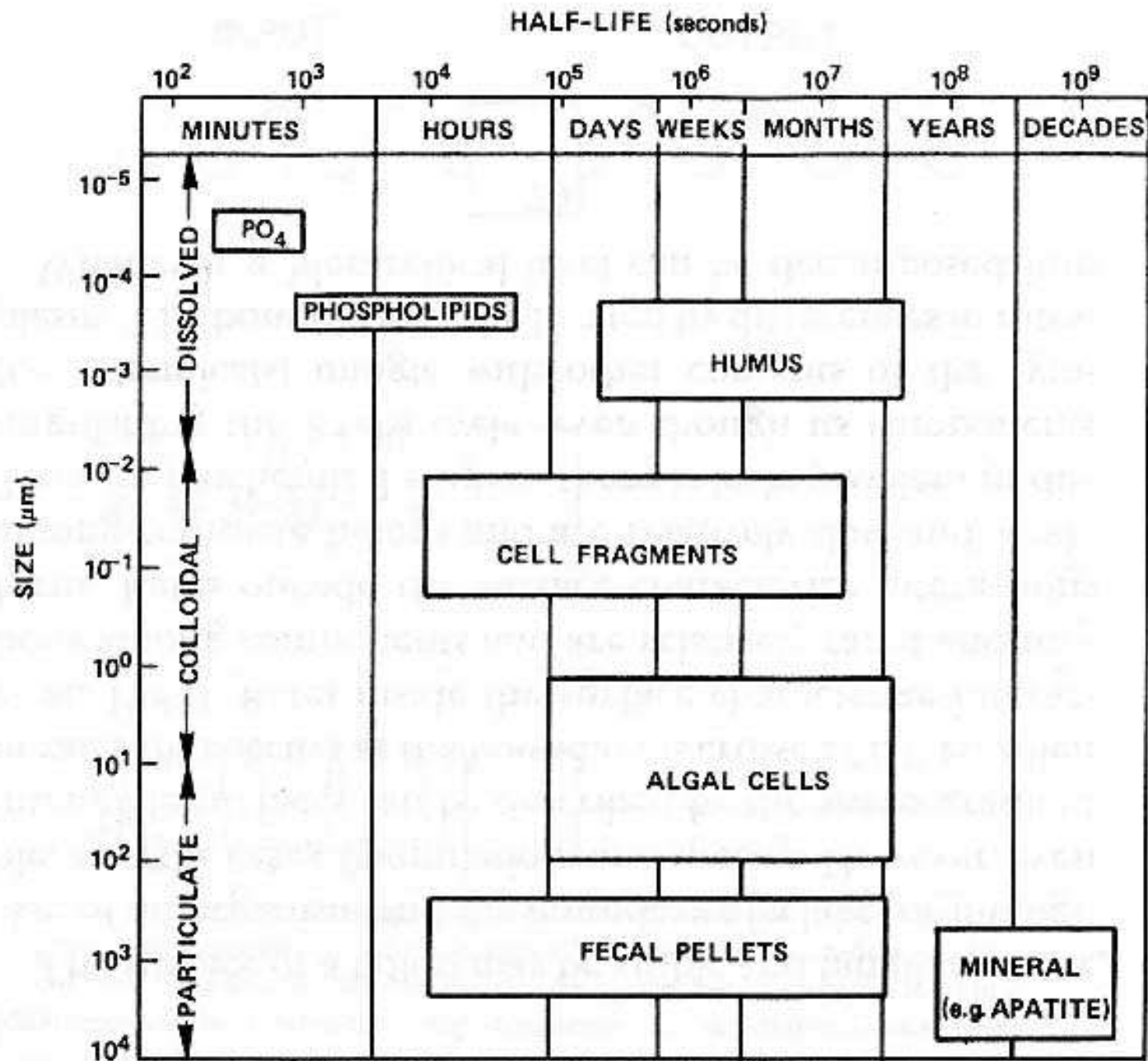


Fig. 5.2. The relationship between time and space scales in a plankton ecosystem (Scavia 1980).

Scaling Issues and LUCC

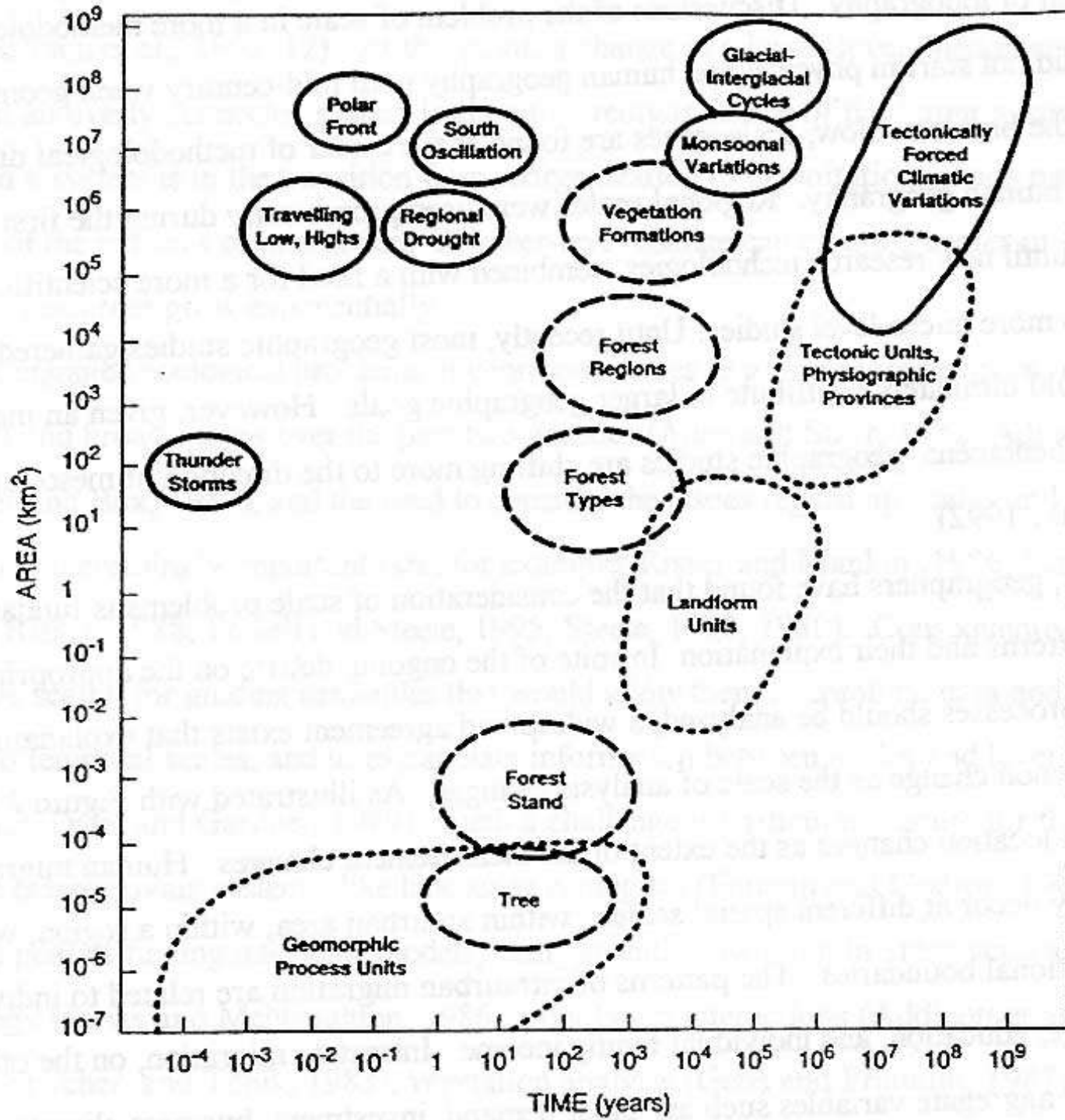
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Scaling Issues and LUCC

● Scale in biophysical systems

- The scale of observation of LUCC influences the pattern perceived
 - This applies to the temporal interval between observations...
 - ... and to the spatial resolution of LUCC

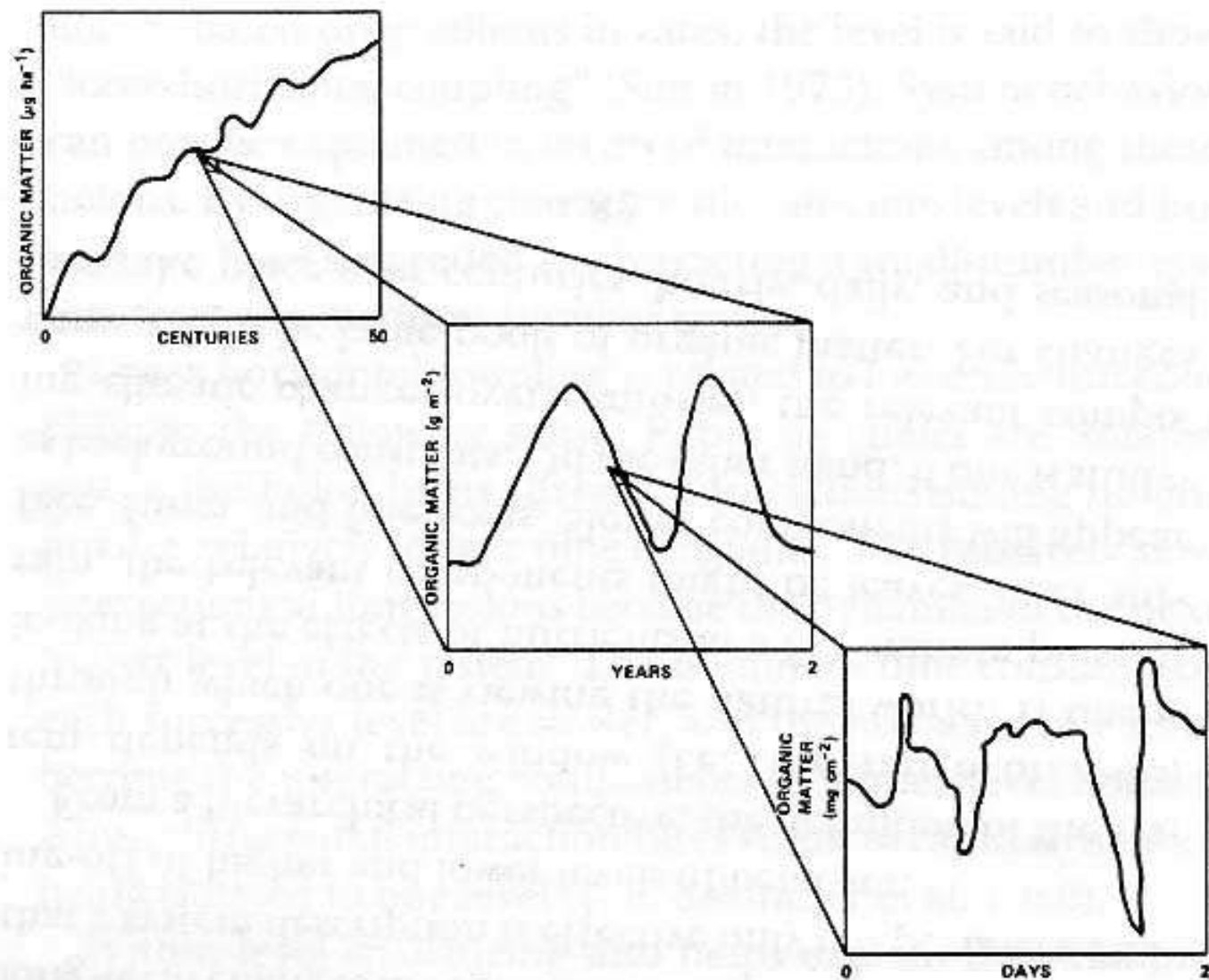
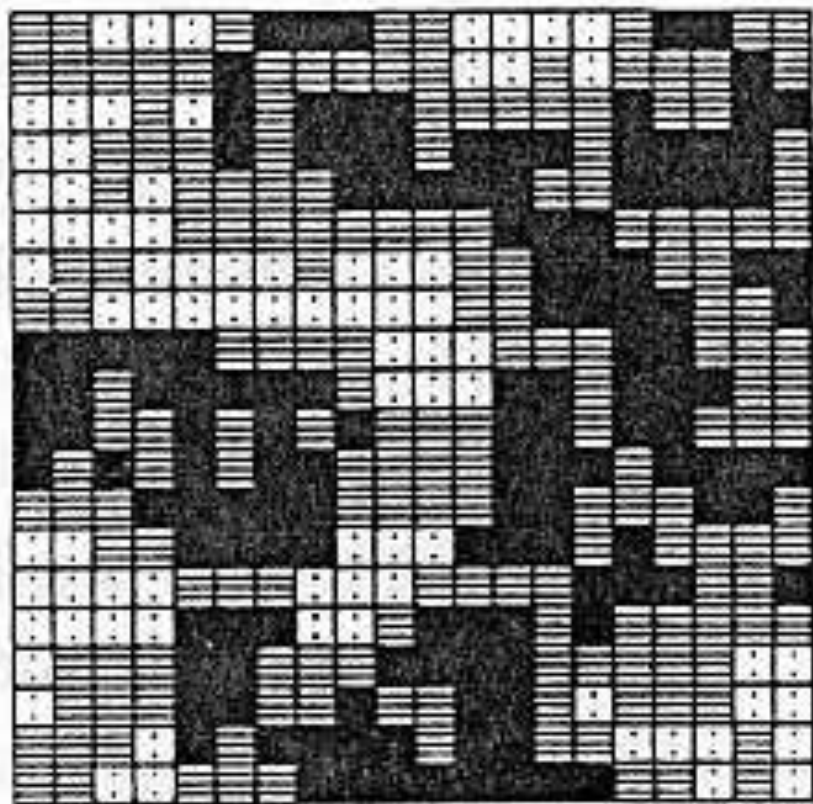
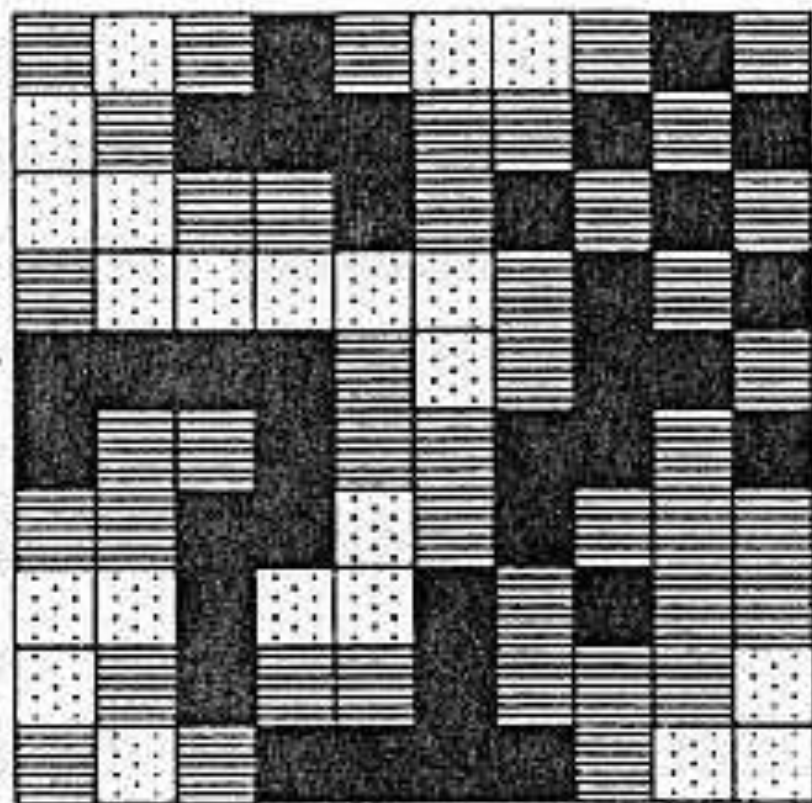


Fig. 5.3. Changes in apparent dynamics of a litter–soil system with a change in time and space scales. Slow dynamics over centuries show accumulation of organic matter with oscillations due to succession (Sollins et al. 1983). On a scale of years, seasonal decomposition processes are apparent, while an observation window of days reveals rapid fluctuations in litter due to wind and arthropods.

$n = 1$



$n = 4$



Scaling Issues and LUCC

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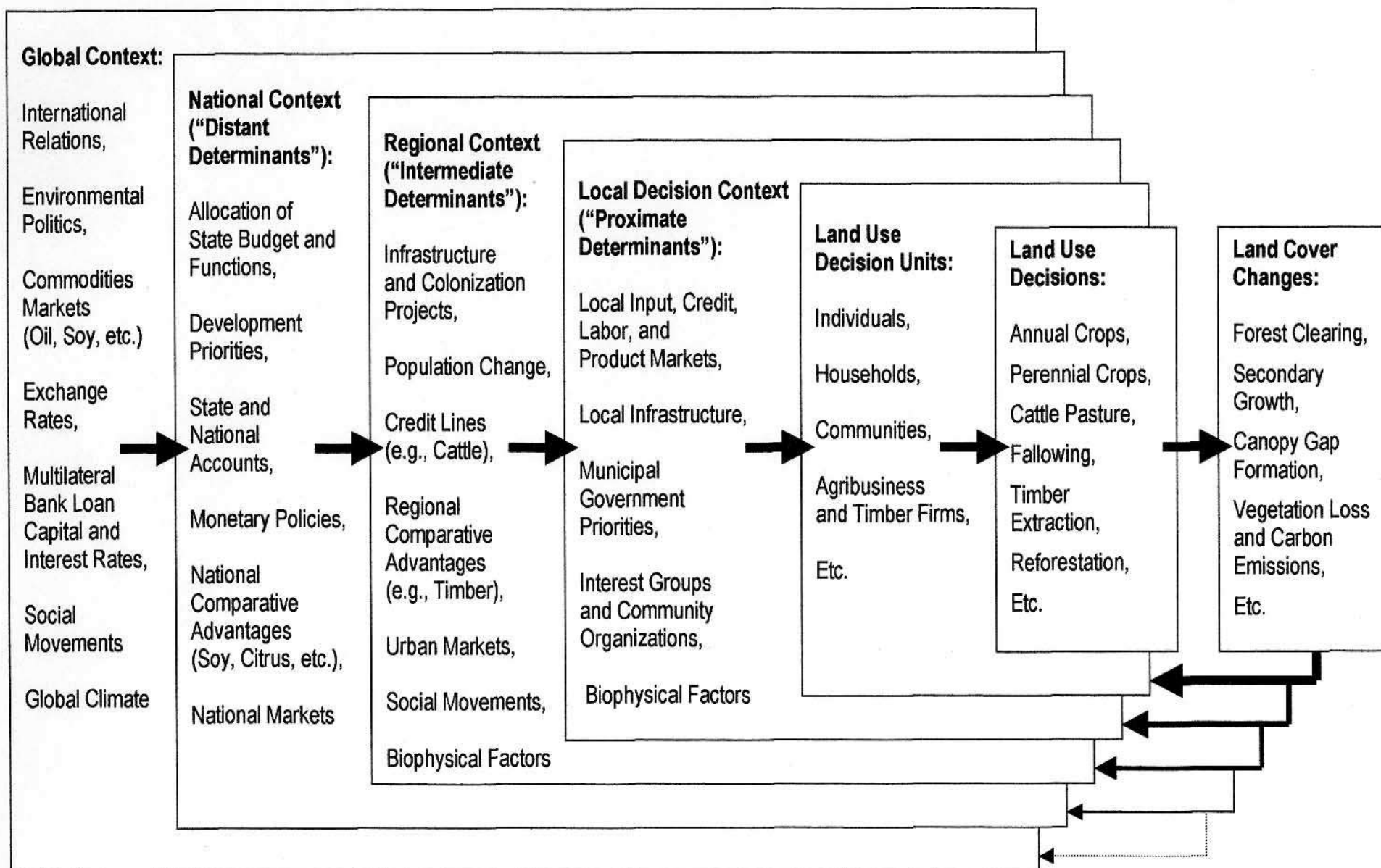
● Scale in human systems

Scaling Issues and LUCC

● Scale in social systems

- Social processes also operate on different scales
 - Individuals make land use decisions...
 - ...in a social context of households and firms...
 - ...which in turn face community circumstances and competitive markets...
 - ...in part influenced by nation-states and foreign interests

Figure 1. A Hierarchical Framework of Contexts and Decision Units that Determine Land Cover Change



Scaling Issues and LUCC

● Scale in social systems

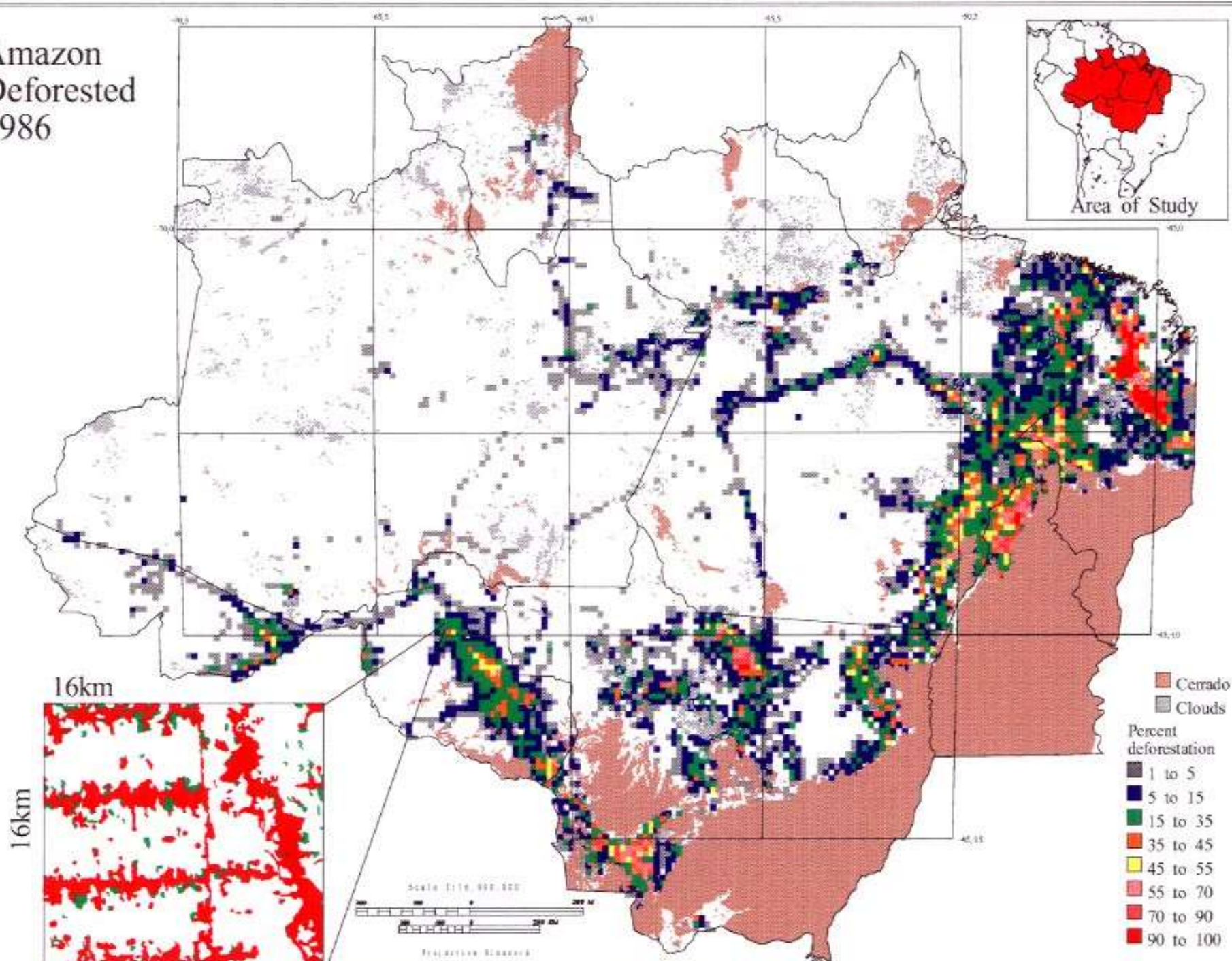
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Scaling Issues and LUCC

● Scale in social systems

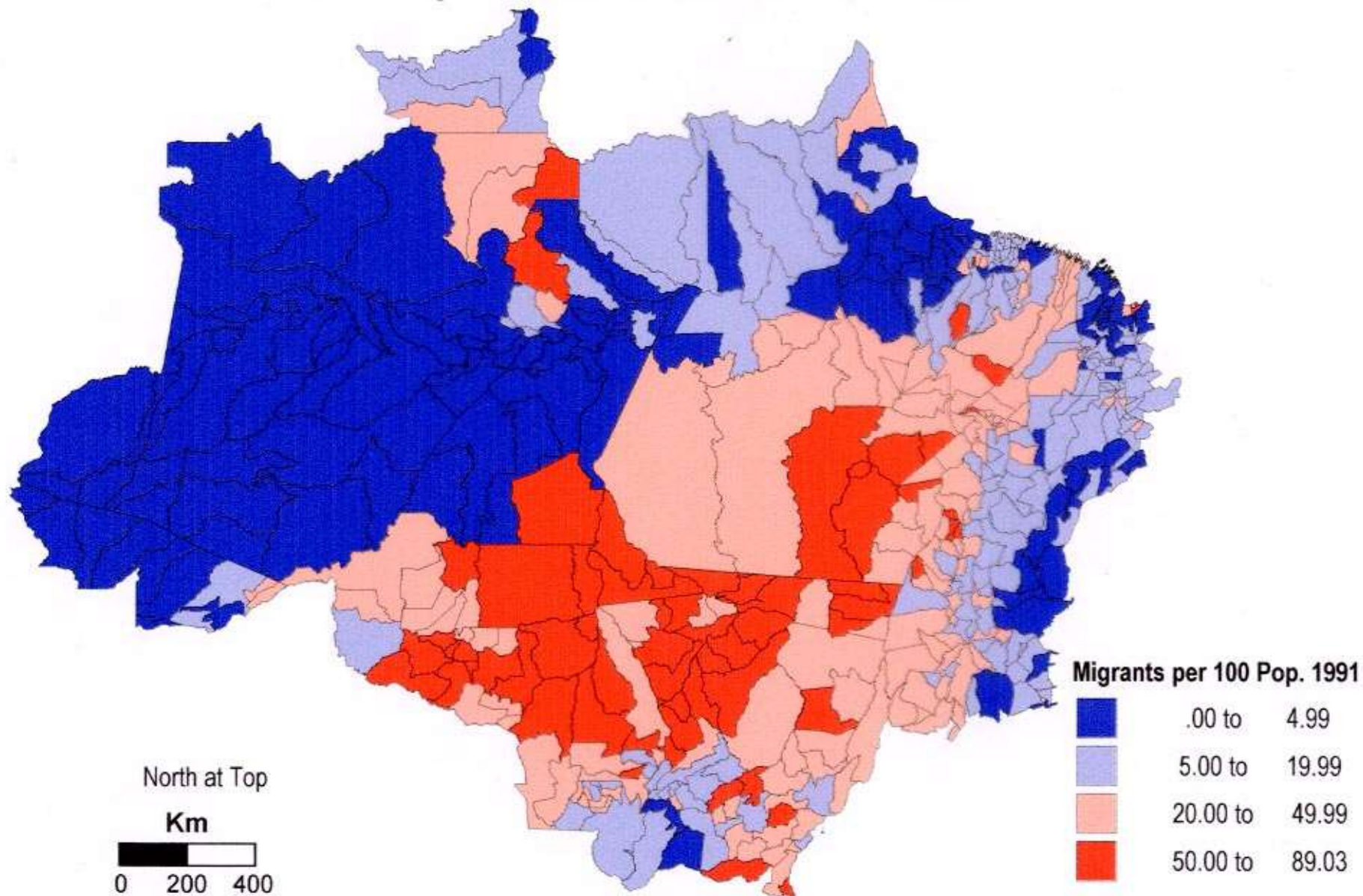
- Social processes also operate on different scales
 - Note that scales for specific social processes may not correspond to scales for key biophysical processes
 - Further, data for biophysical and social processes may not be available for the same units or time intervals

Amazon Deforested 1986



Rural In-migration

Municipios, Brazilian Amazon, 1980-1991



Scaling Issues and LUCC

● Scale in social systems

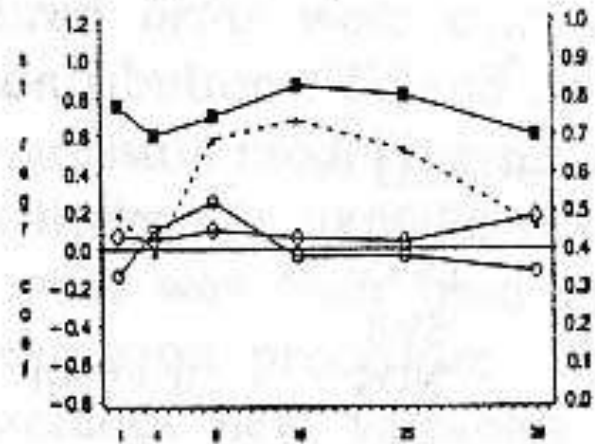
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Scaling Issues and LUCC

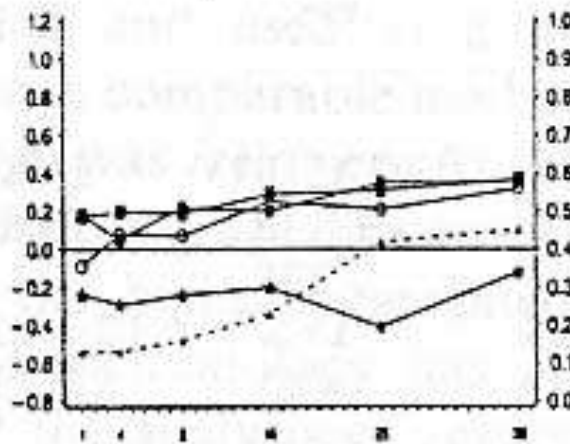
● Scale and Analysis of LUCC

- Scales of biophysical and social systems
 - Scale issues make LUCC analysis with biophysical and social data difficult
 - Even with the same units of analysis for biophysical and social data, scale affects conclusions about social forces influencing LUCC

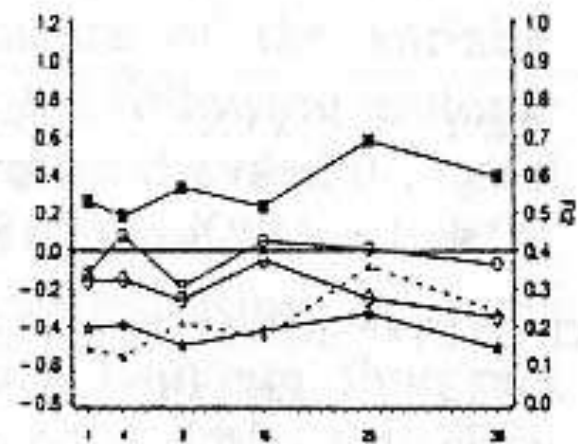
permanent crops 1973



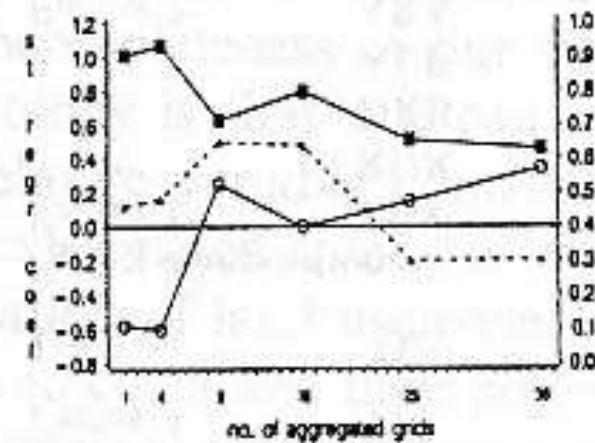
pasture 1973



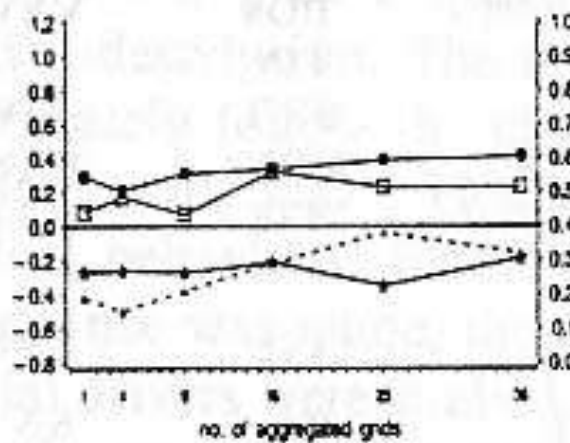
arable land 1973



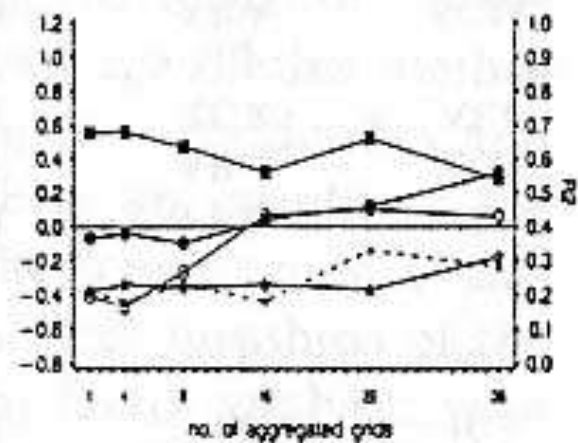
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pasture 1984



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Scaling Issues and LUCC

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Scaling Issues and LUCC

● Scale and LUCC Policies

- This raises questions about the scale for policy interventions
 - Individuals? Firms? Markets? Communities?
 - Watersheds? Plant communities? Rare species ranges?