

Contribution of changes in land management, land use change and bioenergy to climate change mitigation : a global framework with different land and time scales for quick integrated assessments

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To assess the global effect on greenhouse gas (GHG) emissions and other environmental aspects of changes in land management and land use as well as substitution of various products from products derived from agricultural and forest land five space levels can be considered; the field level, the farm level, the small region level, the national level and the international level.

At each space level various ratios such as (1) the amount of land (S) initially needed per unit of products for the main crop with a production system A, (2) the amount of land (S') needed to produce the same unit of the same or comparable crop (or service) with a production system B, (3) the amount of biomass as a co-product on S and S', (4) changes in carbon storage biomass when going from A to B, (5) changes in GHG emissions and (6) changes in carbon stocks per hectare by switching from system A to B, (7) changes in GHG emission from inputs per unit of main product, (8) changes in land needed for the inputs and outputs at each level, from the field up to the global scale, (9) potential decrease or increase of GHG emissions on these lands outside of the level considered, (10) potential increase or decrease in greenhouse gas emissions due to fossil fuel substitution and other changes, including transportation.

The time scale must also be considered at each of these levels and in particular at the field level. How does the increase rate or decrease rate of carbon stocks changes, how quickly can this storage be reversed.. Different conclusions can be drawn when considering time horizons of 5, 10, 50 or 100 years. Examples of these approaches will be given. Some general recommendations are also drawn from this approach for quick assessments related to possible changes in land use or land management which may be considered by specialized research workers.