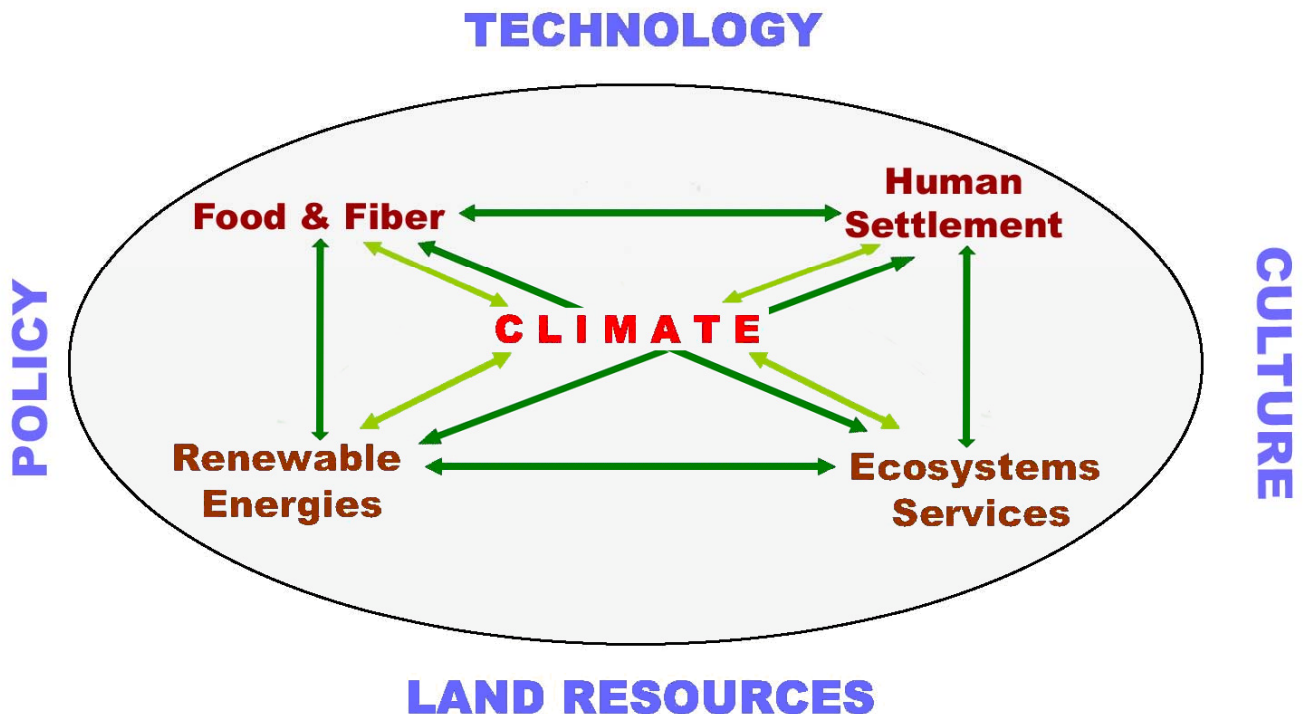


## Tough Choices – Land Use under a Changing Climate



Recent scientific achievements have clearly documented that the global climate is changing. The planet will continue to warm in the foreseeable future. Beyond the mounting evidence for a changing climate, scientific attention is now turning to a search for effective and efficient ways to cope with climate change.

Although global in origin, climate-change impacts vary strongly across regions. Coping with these changes, therefore, requires local action. In many cases, these actions may require regional, or even global, coordination. Mitigation of the causes of climate change and adaptation to its inevitable impacts will therefore have to take place at multiple scales and will have to take into account the different cultural, economic and ecological situations in each region. Therefore each region should be able to choose **mitigation** options from a sufficiently large portfolio of options in order to develop clever strategies for reducing CO<sub>2</sub> emissions, increasing the efficiency of energy use, and storing consumed carbon and make energy production sustainable. Organizations, communities and regions also need to be able to choose options for **adaptation** that will reduce vulnerability to climate-change impacts, increase capacity to adapt land-uses and livelihood strategies to a changing climate, and increase resilience in both managed and natural systems.

In this context, land resources (biosphere, soils and water) and their interaction with the climate system play an increasingly important role. Although clearly limited in overall areal extent, land resources are an important component of the global carbon cycle and they can be used to produce renewable energy and to sequester carbon. Additionally, changing land use and its associated livelihood systems can represent a means by which societies can adapt to changes in climate. This potential, however, is constrained by

existing demands on land resources to provide for human settlement, food and fiber production, and other ecosystem services (like maintenance of water quality), as well as broader societal and natural conditions that limit land-use options.

Bioenergy production, food and fiber production, ecosystem services, and human settlement of land all rely on the same limited land resources. Half of the planet's land surface is already altered in its metabolism through human activity, mostly agriculture, forestry, urbanisation and industry. At the same time, land-based activities are becoming increasingly stressed by increased climatic variability and uncertainty to which they must adapt. Even the choice to leave conserve or preserve land in some parts of the world is and will in the future increasingly be a deliberate decision.

Climate change itself will release large areas from permafrost, thus reducing a large natural carbon sink and at the same time offer new choices for human land use. On the other hand we will most likely lose large arable areas through desertification. With increasing utilization of global land resources, human settlement, food production, energy production and ecosystem service provision are in increasing conflict. Decisions in favor of one or the other inevitably affect climate, through changes in the interactions of the land surface with the atmosphere and society, through effects on the vulnerability and resilience of people to the inevitable climate changes that they face. Tough choices lay ahead of us.

Humans have a long experience and manifold technologies, policies, and traditions for managing land resources. These approaches are usually applied by local entities to make local and regional land use decisions, but never with a global scope. Today, the globalization of markets connects food, fiber and fuel markets through world market prices and trade linkages, but climate mitigation and adaptation are not significant considerations in these market processes.

We currently lack both the scientific basis and the proper management tools to analyse the trade offs of land-use alternatives for mitigation and adaptation and to achieve more beneficial allocation decisions and to use land resources for these purposes in more sustainable ways. This multi-objective research task goes far beyond the scope of a single discipline involved in global change research. New approaches of integrated science beyond disciplinary boundaries covering social, economic and natural science are needed to approach this complex field of research.

There are strong research communities already working on climate change and its impacts both the US and Germany. Nevertheless perceptions, backgrounds and approaches differ on the two sides of the Atlantic. Based on the strong belief that both sides can profit from a mutual exchange of ideas, we are organising a scientific conference dealing with "Land Use under a Changing Climate." It is the aim of the German-US conference to initiate the discussion, to identify where we stand, and to look for common research goals.