Climate Change Adaptation and Mitigation in Ecosystems - Benefits, Barriers and Decision-Making - DTU Orbit (03/01/2019)

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Ecosystems are central to the livelihoods of many people and at the same time highly vulnerable to climate change. This research, which focuses on ecosystems and land use, investigates how households dependent on ecosystems can benefit from climate change adaptation and mitigation. Adaptation and mitigation are two different approaches to minimising the impact and extent of climate change. The possible synergy between adaptation and mitigation is a topic that is currently attracting increasing attention, but which remains relatively understudied in the academic literature. The thesis consists of four peer-reviewed papers, each of which considers a subject that contributes with increased knowledge as to how decision-makers prioritise their choices to fight climate change, to maximise welfare and to secure better decisions when facing uncertainty and incomplete information.

Paper 1 Joint Adaptation and Mitigation in Agriculture and Forestry takes a general approach to synergies and trade-offs between adaptation and mitigation of climate change within forestry and agriculture in developing countries and considers previous experiences described in the literature. The paper offers a summary of the described barriers and opportunities for achieving synergy. This is treated in more detail in each of the following papers:

- Empirical welfare economic benefits of climate change adaptation leading to mitigation (Paper 2. Estimating the Benefits of the Interrelationship Between Climate Change Adaptation and Mitigation – A Case Study of Replanting Mangrove Forests in Cambodia)

- Choice of coping strategy when rural households dependent on agricultural production experience substantial, unexpected shocks (Paper 3. Empirically Based Analysis of Households Coping with Unexpected Shocks in the Central Himalayas)

- Simulation of decision and reaction patterns in relation to the belief in future climate changes and trajectory of decisions when knowledge about future climate is gradually increased (Paper 4. Simulation of Optimal Decision-Making under the Impacts of Climate Change)

Overall, the PhD thesis concludes that the opportunities to achieve synergies between adaptation and mitigation of climate change are good, especially from a landscape perspective. Paper 1 concludes that there is a need for more empirical knowledge on synergy, cost-efficiency, risk and uncertainty as well as the complexity of combining adaptation and mitigation. Joint adaptation and mitigation hold significant advantages especially from a landscape perspective.

Paper 2 considers such empirical knowledge and suggests how incentives to increase adaptation action can be achieved through carbon payments and a carbon credit scheme. Paper 2 highlights the importance of considering the strategies and options for tackling climate change, and how these may change over time. An important aspect hereof is the freedom of action and possible choices by those who feel the impact of climate change. There is great uncertainty about the scale which increases the uncertainty about the actual benefits of adaptation and mitigation of climate change and complicates the process of deciding how to act.

Paper 3 provides a more in-depth empirical analysis of actual decision-making, considering rural Nepalese households dependent on agricultural production. Paper 3 finds that households that experience substantial, unexpected shocks choose coping strategies that give them access to cash to overcome the shocks. Paper 4 exemplifies how freedom of action and optimal decisions can change over time, as knowledge increases.

A policy recommendation of the PhD thesis is that when striving to achieve synergies between climate change adaptation and mitigation it is necessary to understand that those who are hit the hardest typically are those with the least resources. Thus, these people have limited resources and freedom of action to manage possible crises and do not have resources to consider long-term strategies. This underlines the importance of linking development with the fight against climate change in order to secure increased freedom of action for the world’s poorest, thereby increasing their ability to adapt and make optimal decisions for the future. Because climate change is a global issue, mitigation should be included in decisions to maximise global welfare and the PhD thesis exemplifies situation of this.

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