

Chapter 1.

Introduction to farmer management practices

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A broad range of factors are examined that drive farm-management decisions to improve the environment. It draws on the experiences of OECD member countries and selected non-OECD countries to identify the policy implications in different situations that would contribute to a sustainable and resilient agricultural sector. Understanding the factors that motivate farmer behaviour is complex and the impact will not only affect mitigation of greenhouse gases (GHGs) and adaptation to climate change, but a range of other economic and environmental outcomes as well.

The outline of the study is as follows. This chapter provides the background. Chapter 2 reviews the literature that has examined the determinants of farmers' behavioural change and key findings are synthesised. The results of these findings are then extended to the management of mitigation of GHG emissions, followed by a review of adaptation studies. Chapter 3 considers the drivers of and barriers to behavioural change in more depth, applying theory and recent findings from "behavioural economics". Chapter 3 also provides examples of recent activity in OECD countries to tackle farmer behaviour issues. Finally, the roles of government and policy implications are provided in Chapter 4.

Farmers have a long record in adapting to changes in rainfall and temperature over time. Future changes in the climate could have significant impacts on agriculture that will challenge farmers to adapt to changes in land use, commodity production, and its location. Moreover, agriculture is a major source of global greenhouse emissions, representing 10-12% of total global anthropogenic emissions of greenhouse gases (GHGs) (Wreford, Moran, and Adger, OECD, 2010). Agriculture will be expected to reduce its own greenhouse gas emissions, and offset emissions from other sectors through carbon storage. All of these actions are closely related to farmers' management practices. It is therefore important to understand the cultural and social (education, information, traditional local practices) factors and the incentives in place that can facilitate or hinder the implementation of adaptation and mitigation actions.

Climate change could have significant effects on farm-management practices as well as land use, commodity production, and its location. The UNFCCC (2008) pointed out that most of the current mitigation measures in agriculture are closely related to farmers' management practices and the main barriers to their implementation are cultural and social (education and

information gaps, incompatibility with traditional local practices) and lack of appropriate incentives.

Understanding farmers' decision-making processes and behaviour is critical. Too often, management practices that would be profitable to farmers and to the environment because they reduce GHGs emissions are not implemented (Wreford, Moran and Adger, 2010). It is necessary to identify the reasons for this, as well as how farmer behaviour could be influenced to encourage greater uptake of such options. In addition, farmers' decision making processes are more complex than in other sectors not only because of the different scales of economic activity, but also because agricultural activities depend on and have a very large impact on natural resources which will affect a farmer's behaviour. For example, when farmers are aware of how their own practices contributes to natural resource management and to their role within the local community (i.e. altruism and inequality aversion), the effect of this awareness on the financial incentives and disincentives will be more complex than in cases where profit maximisation is the principal motor of decision making.

An exploration of the role of behavioural factors in analysing linkages between policies (external drivers), farm-management decisions, farm practices, the environmental outcome, GHG emissions, and carbon sequestration will help to clarify the role of policy. It is important to recognise that policy measures addressing climate change alter the set of incentives and disincentives faced by farmers, and this will affect the actual mitigation and adaptation actions taken. Thus, factoring in farmer behaviour has the potential to improve the effectiveness of mitigation and adaptation policy.

Although a considerable amount of research focuses on financial incentives (such as better pricing and monetary compensation for additional efforts for mitigating GHG emissions), drivers and barriers to actual behavioural change complement or constrain the effects of incentives. In fact, studies have shown that the realistically achievable level of GHG mitigation is much lower than the biophysical potential due to non-price-determined limitations to implementation, including institutional, educational, social and political constraints. Financial and regulatory incentives and disincentives, education and information, and consistency with traditional local practices, all play a role in determining actual outcomes.

Regarding adaptation, possible instruments include market mechanisms, insurance measures, microfinance and R&D incentives. Behavioural studies in relation to climate change adaptation exist, but few focus specifically on the agricultural sector (Wreford, Moran and Adger, 2010). Risks to

agriculture, forestry and other economic activities can be greatly reduced by when farmers' adapt their actions appropriately. For example, Mendelsohn and Neumann (1999) estimated damages to agriculture from climate change using a cross-sectional empirical analysis of mid-western counties in the United States to measure the sensitivity of yields and profits to climate compared to agronomic models which did not include adaptation. The damages to agriculture were estimated to be 50% less as a result of farmer adaptation.

In addition to conventional field surveys which try to find possible universal socio-economic variables that explain farm-management behaviour, drivers of and barriers to behavioural change could be considered in more depth by applying theory and recent findings of behavioural economics (i.e. enriching economic theory by applying findings from the psychology literature).¹ Recently, several studies incorporated the findings of behavioural economics into climate change policies because it is widely considered that actual (not hypothesised) human behaviour needs to be taken into consideration to tackle climate change, and incentives should be thus adapted as appropriate. However, there are few such studies of agriculture and agricultural policy at present.

Findings from behavioural studies and behavioural economics could also play an important role on the links between current actions and the long-term goal at the forefront of policy. After the Stern review (Stern, 2007), economists have been tackling the problems of expected utility theory which is widely used for economic analysis on climate change (e.g. Weitzman, 1998; Quiggin, 2008). For example, individuals often apply a high discount rate to trade-offs between the present and the near future, but a low discount rate for trade-offs between the near and far future (termed hyperbolic discounting). At the same time, governments need to provide long-term policy signals that could help farmers find the incentives to change behaviour and investment. Humans are (according to some researchers) myopic decision-makers and underestimate cumulative probabilities. Gowdy and Erickson (2005) argue that these new theoretical and empirical findings on actual behaviour are largely ignored in applied work and policy applications.

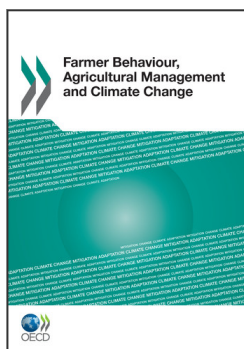
Farmer behaviour and how it can be changed or influenced is a challenge for policy makers (Wreford, Moran and Adger, 2010). Low-carbon agriculture relies on the contribution of farmers. Policy to induce action requires an understanding not just of science or economics, but also of political and behavioural/psychological factors to identify how to enhance the acceptability of policy (Ho, 2008).

Given this background and motivation, this study mainly focuses on the inter-related factors that influence farmer decision-making for mitigation and adaptation, with the aim to identify the following.

- The extent to which individual farmers make decisions in ways that may systematically deviate from traditional assumptions of profit maximisation.
- Given such deviation, how policies can help or hinder mitigation and adaptation efforts in the agricultural sectors in OECD countries.
- Whether governments should intervene to facilitate farmer mitigation actions and their adaptation to climate change and, if so, the appropriate policy measures to adopt, taking into consideration farmer behaviour.

Note

1. Behavioural economics combines the insight of psychology and economics to better understand human decision making. But the definition used in this study is wide. This study introduces key findings from recent developments in behavioural economics, and tries to apply them in the context of climate change and agriculture. Not all issues in behavioural economics are considered in this study.



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