

# Impacts of measures to stimulate farmers to adapt to fresh water scarcity: how to improve measurement of relevant indicators

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## **(a) Purpose of study or research hypothesis**

For efficient policies on climate change adaptation, accurate estimations of water scarcity impacts on agriculture and the adaptation measures' effect are needed, including potential adverse effects. A well-known example of such a negative effect is the Jevon's paradox. The plausibility of the relation between the policy measure, the farmer's activities and their effects has to be determined quantitatively for policy advise. Also the hydrological and economic effects at higher spatial level have to be assessed (e.g. effect of return flow and prices).

## **(b) Key issue(s) or problem(s) addressed**

Fresh water scarcity is likely to increase due to climate change. On the one hand, farmers will face negative effects (lower production), as they are the largest water consumers. On the other hand, food production has to rise significantly to increase food security (SDG2). Policies are required that stimulate adoption of climate change adaptation measures to reduce water use at farm level and increase agricultural production. Policy makers need better insights in the consequences of their policies on water use and food production.

## **(c) Methodology or approach used**

This paper develops a logic model (theory of change) of different policy options to stimulate more efficient water use by farmers. The key element of this approach is the sequence of actions foreseen how a (policy) measure contributes towards the ultimate policy objective: SDG2 and SDG6. Indicators are developed for every step in the logic model (e.g. output and outcome indicators), and methods (relevant models and datasets) are identified to quantify these indicators. Literature is examined whether these indicators are already in use, and if not, the challenges for quantification of these indicators are elaborated.

## **(d) Results or conclusions derived from the project**

Adaptation pathways are developed that link policy measures to farm behaviour and describe the effect on water and food production at farm, water basin and nation level. A contribution to the literature is the methodology to improve precise estimation of future agricultural water use and food production by incorporating the effect of farmers' adaptation into economic (CGE-)models.

## **(e) Implications of the project relevant to congress themes**

This approach will better link the latest research results of adaptation measures at field level to CGE models at national level and provide a more precise estimation of future water use and food production. This paper contributes to the efficient development of resilient water users.

**Keywords** : SDGs, adaptation pathways, farm behaviour, water allocation