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Resilience of groundwater dependent farming systems in a global change context: conceptual framework and empirical study in Morocco

Jean-daniel RINAUDO [1], Aurélien CASTEL[2], Nicolas FAYSSE[3]

In Morocco, as in many other parts of the world, the development of new drilling and pumping technologies in the 1980's provided an opportunity for economic development to thousands of small farmers. The access to a reliable source of groundwater provided an insurance against climatic risk, allowed the development of cash crops such as fruits and vegetable and resulted in increased farm income and capital. However, farmers were progressively exposed to new risks as they integrated a more market oriented economy. Today, the economic viability of many farms can be threatened by output price fluctuations, hail storms, crop pest and disease affecting new crops, etc. This communication describes the new forms of vulnerability of farms which entered the groundwater economy. It proposes a conceptual framework to analyze farmers' ability to cope with new risks. We first look at the factors which determine farm buffer capacity (or reactive resilience), i.e. their short term ability to cope with the effects of unfavorable / disrupting climatic, agronomic or economic events. We then investigate factors determining their proactive resilience, i.e. their ability to develop and implement long term adaptation strategies.

The proposed analytical framework is applied to a case study located in the region of Meknes, in Northern Morocco. This region has witnessed a rapid development of vegetable (mainly onion) and fruit production, based on the use of traditional irrigation systems complemented with intensive groundwater exploitation. A series of semi-structured interviews were first conducted to identify the major sources of risk and structural constraints impeding farm development. This was followed by a quantitative survey consisting in face to face interviews with 160 farmers, conducted in June 2013. The questionnaire was organized in 5 main sections addressing i) the history of the farm; ii) constraints and iii) risks threatening the economic viability of the farm; iv) farmer's plans and projects in the short and medium term; and v) socio-economic characteristics of the farm household. The novelty of our approach consists in analyzing farmers' responses to constraints and risks, where the dominant literature (concerning agriculture) focuses on the assets farms require to cope with, or adapt to, increasing risks (e.g. livelihood asset approach).

This communication presents the preliminary results of the farm survey. We highlight very different perception of constraints to development and sources of risk. While some farmers identify and plan actions needed to enhance their resilience, others would only call for State intervention or even consider nothing can be done. We describe responses considered by farmers. We then investigate the factors determining buffer and adaptation capacity. A statistical classification is finally carried out to identify homogeneous farm groups in terms of resilience. This typology reveals that resilience is not correlated to farm structure characteristics.

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