



Underlying farmers' storylines and behaviour on climate change to reinforce risk assessment in northern Italy

Lisa Ferrari¹, Sandra Ricart¹, Claudio Gandolfi², and Andrea Castelletti¹

¹Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milano, Italy

²Department of Agricultural and Environmental Sciences, University of Milan, Milano, Italy

Agriculture is one of the most vulnerable sectors to changes in climate patterns. Moreover, climate change is a complex and interdisciplinary problem, where natural processes are closely intertwined with socio-economic aspects, especially in areas where human activities are widespread. Thus, when planning for natural resources management, it becomes essential to consider how storylines, attitudes and behaviours can influence the decision-making towards adaptation measures. In particular, when considering an agricultural system, farmers are key agents that cannot be neglected, as the decision to adapt or to change their agricultural practice is ultimately in the hands of the individuals. Understanding the reasoning behind farmer adaptation can help create a sounder framework to recognize farmers' awareness and experiences regarding climate change, while reinforcing their resilience to face climate change scenarios. Consequently, finding patterns in attitudes and similarities between farmers is essential both to better share an overall picture of climate change effects and perspectives in a specific study area and to summarize the complex set of factors influencing farmers' behaviours to facilitate their modelling.

Different tools and methods have been provided by the literature in the last two decades to delve into farmers' attitudes and perspectives regarding climate change. One of the most used tools are structured surveys, mainly due to their strongly case-specific nature and the capacity to synthesize climate change scenarios in a standardized way. Here, we provide an overview of the results obtained through a survey of 460 farmers from northern Italy about climate change risk awareness, perceived impacts, and adaptive capacity. In addition to a descriptive statistical analysis to delve into farmers' profiles and farming characteristics, this triple-loop approach was analysed through Multiple Correspondence Analysis (MCA), an interesting data analysis technique that allows to highlight underlying structures in categorical data used to recap farmers' behaviours and define the association between dependent and independent variables. The resulting factor map allows for the identification of those variables that most explain the variance in the dataset and expected similarities and differences between respondents. The obtained results show how certain variables describing the agricultural practice of the respondents, such as farm extension or the preferred irrigation method, are key driving factors in differentiating and grouping individuals' behaviour. In general, farmers with the same *modus operandi* share similar behaviour with respect to other aspects of their activity (e.g., water source). Interestingly, and contradicting similar experiences from the literature, this pattern differs among farmers with comparable demographic

background, requiring more attention to farmers' heuristics. These results can be useful in multiple ways: from creating an informative picture of farmers' attitudes and concerns regarding climate change in a certain area, to its application in profiling farmers to identify common demands and shared worries; from helping with the creation of customized policies at the regional scale from a bottom-up approach, to the implementation of farmers' profiles into Agent-Based Models to reinforce the human dimension in decision-making processes.