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Key note

New Integrative Modalities for Connecting Policy Makers, Farmers and Scientists for Adaptive Farming Management in a Climate Changing World

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Introduzione

Over the past 20 years the context for agriculture has changed rapidly, sometimes radically. For example, a recent World Bank report highlighted significant changes in the following six areas (World Bank, 2006): (i) markets, not production, increasingly drive agricultural development; (ii) the production, trade, and consumption environment for agriculture and agricultural products is growing more dynamic and evolving in unpredictable ways; (iii) knowledge, information, and technology are increasingly generated, diffused, and applied through the private sector; (iv) exponential growth in information and communications technology has transformed the ability to take advantage of knowledge developed in other places or for other purposes; (v) the knowledge structure of the agricultural sector in many countries is changing markedly; and (vi) agricultural development increasingly takes place in a globalized setting. To these we can also add two other significant areas of change: (vii) in many parts of the world we have already reached the limits of ecosystem capacity, with ecological degradation becoming an increasingly limiting factor for agricultural development (CAWMA, 2007); and (viii) anthropogenic climate change is already impacting on agricultural practices, and these impacts are likely to have increasingly significant social and economic consequences in the absence of a well-orchestrated global response (Stern, 2009).

EU policy has attempted to respond to these changes. The current trajectory of EU agricultural and rural policy reform is towards pathways of rural development that are not just more efficient and effective in social and economic terms, but are also capable of adapting to significant environmental challenges in terms of ecosystem and climate change. In the EU's agricultural policy 2007 – 2013 there was an emphasis on 'decoupling' in order to encourage environmentally sustainable practices among farmers, while in the EU rural development policy framework for 2013 – 2020, specifically through the CAP Health Check, more money is coming on-stream to support adaptation to climate change (http://ec.europa.eu/agriculture/healthcheck/index_en.htm). However in many parts of Europe, uptake of funding for decoupling has been low (15% in Italy) and there is evidence that the predominant 'command and control' approach to policy implementation both at EU, national and regional levels has been limited in its effectiveness (Holling and Meffe, 1996). It would appear that despite some progressive development in policy thinking, the traditional model of policy *implementation*, based on a linear and hierarchical model of knowledge transfer (so-called 'mode 1': Gibbons *et al*, 1994), has been slow to adapt to the changes highlighted above. Thus adaptation to climate and other environmental changes, requires adaptation not only in policy making but also in modalities of policy implementation, as a means of catalyzing and supporting adaptive innovations in agricultural practices.

The word 'adaptation' has always been important in scientific fields associated with evolution, ecology and environmental change (Smith et al., 2000). We adopt the metaphor suggested by Collins and Ison (2009) of 'adaptation as a good pair of shoes', to illustrate the need for social processes of co-evolution between human practices and the dynamics of environmental change. This metaphor has profound implications for thinking about connectivity between, for example, policy makers, farmers and scientists. Within this metaphor it makes little sense to understand the shoes in isolation from the feet – or more importantly – it is the dynamic relationship between the two that is important. Adaptation as co-evolution calls for 'mode 2' knowledge production, based on an iterative model of knowledge co-production and entrepreneurship (RELU 2010). A

good example of this is the approach taken by the South African government in the development of its Long Term Mitigation Scenarios (LTMS) report (DEAT, 2007), followed by the translation of this report into the Government's Vision, Strategic Direction and Framework for Climate Policy (DEAT, 2008). The innovative process of convening the LTMS in dialogue with science, policy and civil society was experienced by all participants as an "exceptionally important learning activity", which then made a significant difference when government subsequently came to develop its Vision, Strategic Direction and Framework for Climate Policy, which was approved by Cabinet in record time (9 months after publication of the LTMS) (Lukey, personal communication).

In the 1980s, the "*national agricultural research system" (NARS) concept* focused development efforts on strengthening research supply by providing infrastructure, capacity, management, and policy support at the national level. In the 1990s, the "*agricultural knowledge and information system" (AKIS) concept* recognized that research was not the only means of generating or gaining access to knowledge. The AKIS concept still focused on research supply but gave much more attention to links between research, education, and extension and to identifying farmers' demand for new technologies. In the 2000s, attention has focused on the demand for research and technology and on the development of *innovation systems*, because strengthened research systems may increase the supply of new knowledge and technology, but they may not necessarily improve the capacity for innovation throughout the agricultural sector.

By innovation, we mean new ways of doing things. This includes not only science and technology, but – crucially – the related array of new ideas, institutions, practices, behaviors and social relations that shape scientific and technological patterns, purposes, applications and outcomes (STEPS Centre, 2010). An innovation *system* can be defined as a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behavior and performance. *The innovation systems concept embraces not only the science suppliers but the totality and interaction of actors involved in innovation.* It extends beyond the creation of knowledge to encompass the factors affecting demand for and use of knowledge in novel and useful ways (Hall *et al*, 2004).

This has significant implications for the way that policy makers, policy implementers, farmers and scientists as well as other stakeholders work together. Drawing on case studies from South Africa, France, the Netherlands, and the UK and from a recent project on the climate change adaptation of Italian agriculture (www.agroscenari.it), we provide a range of examples of how new and more 'integrative' modalities are being developed as a means of connecting these different actors in new relationships of knowledge co-production and innovation. We conclude with some reflections on how such approaches might best be upscaled.

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