Will global mitigation policy enhance or undermine local adaptation?[1]

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Introduction

Adapting to climate change combined with providing the policy frameworks that facilitate sound adaptation is essential for the survival of our agricultural sectors. Yet decision makers' research needs on both sides – practice and policy – are often neglected as their interests cross disciplinary and institutional divides. This can lead to maladaptation, as shown by some of the recent expansion of biofuel production in the wake of policies with unintended consequences. Bridging the practice – science – policy divide requires all three to adapt. Proactively designed and sustainable adaptation action will only occur if and when climate-related risks are treated holistically in conjunction with other drivers of risk (e.g., market, environment or social risks), supported by policies that take multiple domains and outcomes (e.g., sustainable development) into account. We call for adaptation science to provide integrated vulnerability assessments that are policy relevant and trigger regionally appropriate adaptation responses.

Results and discussion

Proactively designed adaptation does not come easily to a sector that values tradition and whose decision needs are rarely met by the climate change science community. Adaptation requires changed attitudes and practice by all participants, including the science and policy communities (Nelson *et al.*, 2009a, b) and the recognition that science will only ever provide partial answers to societal problems (Jasanoff, 2007). The insidious nature of ongoing climate variability and future change poses a particular challenge: climate is a widely acknowledged risk factor for most agricultural activities, but without being the sole or even dominant driver for most of them. Yet without due consideration of climatic impacts, the dual goals of agricultural production – profitability and sustainability – cannot be achieved. Further, the considerable opportunities that are created by good climatic conditions and new, climate-related policy measures often fail to translate into real benefits.

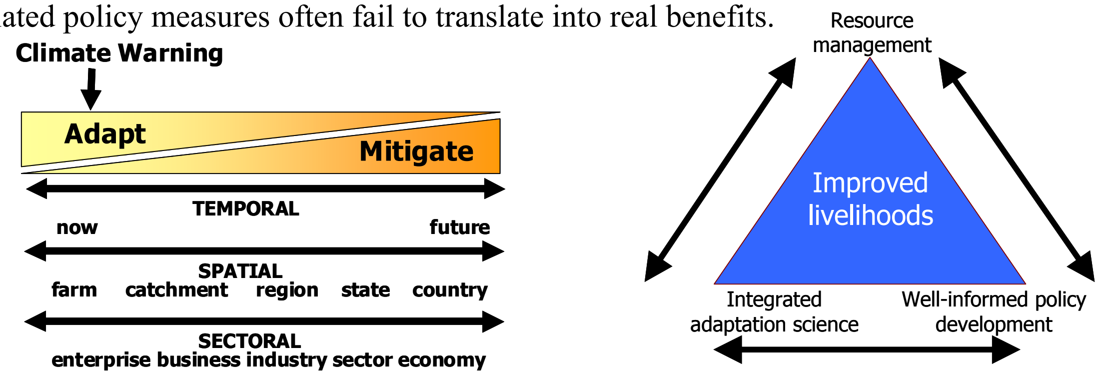

Figure 1. Temporal, spatial and sectoral dimensions of adaptation and mitigation (left) and the role of integrated adaptation science to inform policy as well as practice (right).

Garnaut (2008) states that *'Contemplating the adaptation challenges … helps to focus our minds on the more difficult dimensions of mitigation choices'*. This is a call for the proactive design of adaptation options backed by well-informed policies, an essential requirement for vibrant rural sectors in charge of their own destinies (Figure 1). Adaptation science (AS), a special form of sustainability science at the boundary between science and society, can build social networks that institutionally connect agricultural and climate science with decision

[1] Keynote presentation

makers, thus generating 'social capital' needed to create adaptive capacity. Through new 'boundary-spanning organizations' (Guston, 2001), AS provides novel applications that explicitly recognize science's ability to reduce, but not to eliminate uncertainty.

Australia, which only recently committed itself to the Kyoto targets, has a rich history of applied climate risk management (due mainly to its highly variable, semi-arid climate) and plays a key role in agricultural climate adaptation research (Howden *et al*., 2007; Meinke *et al*., 2007). Garnaut (2008) identified seasonal climate forecasts as a key technology in Australia's adaptation challenge. Yet their impact has been disappointing, a direct consequence of their low compatibility with decision making under uncertainty (Hayman *et al*., 2007). The insidious nature of climate results in highly variable co-limitations that cannot be overcome via single technological fixes. By defining forecast quality as the *characteristics of a forecast product and/or forecast service that enables action and satisfies identified and agreed needs of the user community*, the issue of co-limitations could be addressed. It is therefore paramount not to focus on single scientific measures of a forecast (e.g., skill or lead time). Instead, science is required to acknowledge co-limiting factors such as knowledge barriers, sound governance and the ability to compare choices, chances and consequences.

Based on a review of supply and demand for integrated vulnerability assessments, we conclude that our conceptual understanding of the issues has progressed to the point where it is no longer acceptable to substitute impact modelling for integrated vulnerability assessments when providing policy advice. For instance, confining an analysis to biophysical impacts suggests that inland Australia is most vulnerable due to high exposure to a variable climate. When farm incomes are used as a more integrative measure of exposure, the spatial vulnerability of agricultural communities becomes considerably more complex (Figure 2).

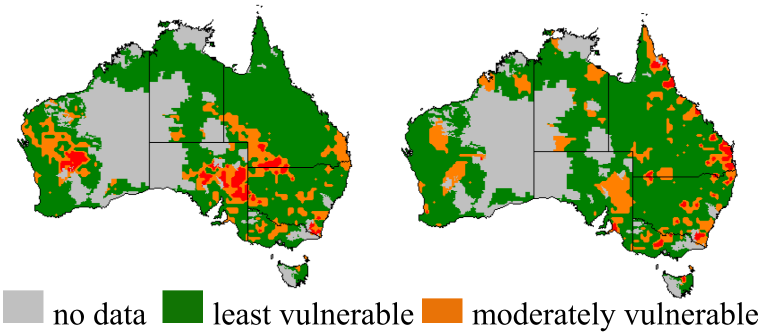

Figure 2. Vulnerability of rural Australia to climate variability: Pasture growth variability vs adaptive capacity (left) and farm income variability vs adaptive capacity (right).

We further conclude that policy relevant vulnerability assessments that support adaptation action flow from collaboration between scientists from diverse disciplines and agencies. Our work is an overt attempt to create policy relevant measures of vulnerability that trigger appropriate action by or on behalf of specific individuals, communities and governments to reduce it. We show how interdisciplinary collaboration can overcome methodological challenges to providing policy relevant vulnerability assessments while impact modelling can lead to entirely erroneous conclusions about the vulnerability of agricultural communities. Rural communities that are vulnerable to climate variability and change tend to be vulnerable for a complex set of interacting environmental, economic and social reasons.

References

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