



## Informed adaptation: Ethical considerations for adaptation researchers and decision-makers



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### ARTICLE INFO

#### Article history:

Received 28 July 2014

Received in revised form 15 February 2015

Accepted 27 March 2015

#### Keywords:

Ethics

Climate

Communication

Risk

Knowledge exchange

Agriculture

### ABSTRACT

Given the significant and irreversible impacts of climate change on communities and the environment, there is increasing focus on how to best support decision-makers to adapt to climate change. Generally, the research on this tends to focus on assessing how decision-makers navigate elements of risk and uncertainty in deciding to what extent they should adapt their practice if at all, however, scientific researchers also have a key role to play in supporting these adaptation decisions. Given the applied nature of adaptation research, we argue that an examination of the roles and responsibilities of researchers is critical to understanding the ethical aspects of professional research practice in the adaptation context. This includes identifying how researchers can best support adaptation, and exploring the responsibilities that researchers have, not only to decision-makers but also to the broader membership of the adaptation community. In this paper we examine the ethical responsibility of researchers in supporting decision-makers to adapt to climate change, using agricultural producers as a case-study and focal group. Specifically, in undertaking this examination of risk and responsibility in adaptation research and decision-making, we use the lens of professional ethics to outline how research might better contribute to informed adaptation. We argue that clarifying the distinction between the research and operational aspects of agricultural adaptation, and how the interface between the two is disclosed, is critical. We also describe and explore the ethical considerations of researchers associated with stakeholder engagement in relation to adaptation science, and identify the need for institutional innovation for more effective engagement. In doing so, we seek to demonstrate how ethical research practice can support greater alignment of science and public values in agricultural adaptation, thus increasing the likely success of decisions.

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## 1. Introduction

Since the emergence of human-influenced trends in climate and the recognition of the current and future potential impacts of these shifts on agriculture, there has been an urgent call to address agricultural adaptation in a coherent way (e.g. Easterling et al., 2007; Meinke et al., 2009; Porter et al., 2014). This has been accompanied by increasing research effort dedicated to understanding how best to support adaptation decision-making among agricultural producers (Adger, 2003; NRC, 2009; Stokes and Howden, 2011). Agriculture is the most significant human land use throughout the world (FAO, 2002), and climate

adaptation research in the agricultural sector has been examined from the soil, plant and animal level through to the farming systems level and the community and landscape levels (Adger et al., 2005; Hayman et al., 2012). Climate change is broadly recognised as being one of the defining factors affecting the future success of agriculture (e.g. Easterling et al., 2007) and this has important implications for both environmentally sound land management and the security of global food supplies (Rosenzweig and Parry, 1994; Easterling, 1996; Parry et al., 2004). In recognising the significant impact climate change is likely to have on agricultural production, a number of researchers have also identified that it is therefore likely the agricultural sector will need to make varying levels of adaptive change in order to remain viable under increasingly variable and changing climate conditions (Howden et al., 2007; O'Brien, 2011; Pelling, 2011; Rickards and Howden, 2012).

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**Fig. 1.** Spectrum of adaptation change. Adapted from Rickards and Howden (2012).

In terms of determining the nature and extent of the impacts of climate change on the agricultural sector, there is a substantial degree of uncertainty at play arising from more than just divergent trajectories associated with anthropogenic greenhouse gas emissions (Meyer, 2012; Vermeulen et al., 2013; Waters et al., 2014). While we have witnessed advances in our scientific understanding of the potential impacts of climate change over time, there remain key climate systems like the El Niño–Southern Oscillation (ENSO) system, the inter-tropical convergence zone, the sub-tropical convergence zone, the Western Pacific warm pool, the southern annular mode and others that remain poorly represented in global climate models (Grose et al., 2014; IPCC, 2014a), and with relatively minor progress in resolving overall climate projection uncertainty for key developing country agricultural regions between the Coupled Model Intercomparison Project phase 3 (CMIP3) and phase 5 (CMIP5) models (Ramirez-Villegas et al., 2013). There is also substantial uncertainty from the choice and application of different climate downscaling methods (Hewitson et al., 2014) and application models (Piontek et al., 2013). This means that while making adaptation recommendations and decisions with the best science and knowledge available at the time, the uncertainties and knowledge gaps that exist should be acknowledged early in stakeholder discussions (Hewitson et al., 2014). This environment of uncertainty applies to both biophysical and socio-economic researchers working on climate impacts and adaptation, and to the agricultural producers who they work with, who are or may be affected by climate change.

Our interest in ethical practice therefore lies at the interface between adaptation researchers, the uncertain information they deal with, and those who apply this (and other) information through the decisions they make about adapting their agricultural production systems and businesses. While a focus on ethics in the climate change literature is not new, for the most part discussions of climate ethics have tended to adopt a broader and much higher-level focus on issues such as global equity, justice and the role of societal systems (Jamieson, 1992; Gardiner, 2004; Adger et al., 2006, 2009; Broome, 2008; Brown, 2013). For example, the question, ‘*what is humanity’s ethical responsibility to adapt to climate change?*’ has often been addressed in terms of emissions reductions in the climate ethics literature (Jamieson, 1996; Garvey, 2008; Brown et al., 2009; Gardiner, 2011; Harris, 2011; Schroeder et al., 2012). In response, a number of claims have been made to justify action on ethical grounds such as the need to reduce harm to humans and natural ecosystems and to increase equitable social outcomes, because it is considered a core responsibility of nation states in a global economy, and to ensure a positive legacy to future generations. While these are significant and important issues that demand broad attention, such high level discussions of climate ethics have tended not to focus on the nature of the direct interactions that take place between individuals or small groups. Although recent analysis by Hewitson et al. (2014) has examined the ethical responsibilities of researchers with respect to their methodological choices in climate downscaling, and the potential consequences of these choices, the nature of risk and responsibility at the interface of the research and operational aspects of adaptation requires further examination. For this reason, we seek to address explicitly the ethical issues that arise for researchers and practitioners in the agricultural adaptation context by posing

the following question: ‘*What is our ethical responsibility as researchers in supporting others to adapt to climate change?*’ We regard the role of ethics in structuring, implementing and delivering agricultural adaptation research as broadly relevant to all fields of adaptation research. However, we have chosen to use agricultural adaptation as an illustrative context within which to explore these issues in adaptation research and practice because of the more mature literature and practice when compared to many other sectors.

The need to undertake an ethical examination of adaptation research and practice emerges as a result of the variable, and in some cases conflicting, research recommendations about how agricultural producers could adapt their businesses being reported in the science literature. These recommendations broadly range from suggesting that no adaptation action should be taken by agricultural producers (Asseng and Pannell, 2013) through to suggesting that complete transformation of agricultural production is needed (Hoffmann, 2011). Like Hewitson et al. (2014), we are concerned that the variability of these recommendations in the science literature has the potential to increase the level of risk to decision-makers seeking to make an informed choice about how best to adapt their businesses. We argue that making informed adaptation decisions applies not only to being informed about the science itself and the related uncertainties surrounding the science, but also to being transparent and accountable about the choices of what science is being undertaken and how it is funded, and how adaptation research is communicated with those making adaptation decisions. This requires clarifying the distinction and interface between the research and operational aspects of agricultural adaptation. In doing so, we also seek to demonstrate how ethical research practice can support greater alignment of science values with public values in agricultural adaptation (Meyer, 2011).

## 2. Defining change in agricultural adaptation

In this section, we outline what we mean by adaptation in the agricultural context. Adaptation is defined by the IPCC (2014b) as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities”. Adaptation necessarily requires a response to managing the emergent risks, threats and opportunities posed by climate changes interacting with other, uncertain changes. In relation to agriculture and food security, there is a growing literature that suggests that incremental changes alone to existing systems may not be sufficient (Vermeulen et al., 2013). One way of conceptualising the nature of these adaptive changes is to consider the scales at which change may take place (Rickards and Howden, 2012). Fig. 1 illustrates three scales of adaptive change beyond the ‘business as usual’ position, where it is anticipated there might also be increasing costs, complexity and risks involved as we move up these scales.<sup>1</sup>

<sup>1</sup> For the purposes of this discussion, we have included a situation where no change is made. Although the decision not to act is not generally considered within the adaptation research literature or alternatively considered as a form of maladaptation (Barnett and O’Neill, 2010), we include it here in order to recognise the full range of adaptation options that decision-makers might consider as part of their decision-making process.

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