Title: An Integrated Australian Governance Framework in Response to Environmental Change

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Ecosystem approaches to community health and wellbeing: towards an integrated Australian governance framework in response to global environmental change

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Introduction

“Delay is a luxury that Australia... can no longer afford... the world is rapidly approaching points at which high risks of dangerous climate change are no longer avoidable... Our location makes us already a hot and dry country. We live in a region of developing countries, which are in a weaker position to adapt to climate change than wealthy countries, and their problems will become our[s]” (Garnaut, 2008a, p. 1).

The Garnaut Climate Change Report (2008b) identified Australia as the largest per capita emitter of greenhouse gases in the world. Climate change is associated with public health constraints and outcomes including uncertain socioeconomic conditions (Huang et al., 2011), impacts on human health resulting from heatwaves, floods, and droughts (Haines et al., 2006a,b), and ecological health issues (Strand et al., 2010). It is estimated that, by 2050 the health impacts of climate change could increase GDP spending by 0.08 per cent globally, having a catastrophic impact on health care sectors worldwide (Bosello et al. 2006). The direct relationship between global environmental change and public health is of substantial importance, but arguably not effectively addressed in research frameworks (for example in Australia, the distinction between environmental science funded by the Australian Research Council, and public health research, funded by the National Health and Medical Research Council) and public policy instruments, including the Millennium and Sustainable Development Goals (McMichael et al., 2008; Haines et al., 2010; Sachs, 2012; Rasul, 2015). Concerns associated with this issue in Australia have been highlighted by Strang (2009) who argues that Australia’s commitment to competitive economic growth must be questioned given the current ecological crisis.

The extent of health impacts of climate change may be greater than figures suggest. Strand and colleagues (2010) noted that climate change might have devastating consequences because of humans’ intrinsic biophilic connection to our environment. This is evident when looking at the links between Aboriginal and Torres Strait Islander peoples’ practices and knowledges becoming increasingly vulnerable with the increased risks of climate change (Green et al., 2009; McNamara & Westoby, 2011; Davis, 2013). Climate change therefore represents much more than a technical and economic challenge. Climate change is an issue of social and environmental justice that applies not only at national and regional scales, but has direct implications for community health and wellbeing outcomes at the local level. Climate change is but one example of how global environmental change challenges environmental and public health scholars and practitioners alike to respond to the question of how to best position integrated ecological and human health concerns with governance structures.

There is a clear need to pursue integrative approaches to sustainable development that recognise the direct associations between ecological and human health, and embed these understandings in policy and practice, particularly in development contexts.

The complex dynamics of social-ecological systems in Australia demand integrated approaches to environmental and human health and wellbeing, which are not yet embedded in national or State-level policy processes. Furthermore, the structural design of Australia's science funding frameworks can be seen as actively discouraging integrated approaches to social-ecological health research, inhibiting the interdisciplinary applied science that is needed in the dynamic, challenging context of a world undergoing rapid climate change. This article advocates for two specific priorities in governance reform: 1) a reshaping of governance institutions to be better able to engage in complex social-ecological health problems; and 2) recognition and promotion of Australia as an internationally relevant case study in how developed nations might tackle such reform.

Integrating wellbeing discourse

Wellbeing is a concept which is frequently used but hard to measure (Carlisle, et al., 2009; Nurse et al., 2010) because the concept is fluid, referring to multiple lived experiences, and encompassing factors including physical, social, psychological, economic, and spiritual health (Trewin, 2001; Jackson, 2008). Literature emphasises that ecosystem impairments have negative impacts on human wellbeing (Patrick et al., 2011; Clark et al., 2014). The quality of environmental conditions therefore affects livelihood opportunities, economic outcomes, and the wellbeing and resilience of communities. For Aboriginal peoples in the Oceania region socio-cultural, spiritual, and environmental context is critical to wellbeing (Panelli & Tipa, 2007). However, mainstream measures of wellbeing can struggle to adequately conceptualise the complexity of Aboriginal peoples' experiences, often boxing wellbeing into narrow categories (Dockery, 2010; Prout, 2011). Walker and colleagues (2003) explained that a more meaningful measure of Aboriginal 'worldviews' is to define 'cultural wellbeing', which identifies the centrality of factors like Country, cultural pride, and identity.

Integrated approaches to health and environmental research and management policies generally do not consider the dynamics of the relationships between ecosystems and underlying determinants of health (social, political, economic, cultural, and ecological) on which we depend (Parkes, 2010). Horwitz and Finlayson (2011) stated visions must stress the relationship humans have to ecosystems, going beyond traditional approaches by incorporating ecological and social science systems. Models exist that tackle public health holistically. These include the Ottawa Charter (1986), which identifies 'sustainable resources' and 'stable ecosystem' as prerequisites for health. There are numerous sustainability frameworks supporting this understanding, such as the Rio Declaration (1992) which notes "sustainable development can only be achieved in the absence of high prevalence of... diseases

and where populations can reach a state of physical, mental and social wellbeing” and an awareness that “human health and well-being are dependent upon ecosystems and effective management of which needs holistic and collaborative approaches and an understanding of complex relationship among humans and other biodiversity”. These definitions come some way to prioritising ecological problems but a new vision requires public health practitioners and researchers to accept that all living and non-living systems are central to wellbeing (Webb, 2010; Parkes, 2012).

Case studies from Australia

In Australia, the impacts of environmental change and ecosystem degradation on individual mental and physical health and community wellbeing are clear in a range of case studies. Environmental change in rural communities across Australia has been correlated with diminished community resilience, mental health effects, and higher rates of suicide (Horwitz et al., 2001; Hanigan et al., 2012). In the Hunter Valley in New South Wales, the loss of environmental assets as a result of infrastructure (power plant) development has been shown to negatively affect people’s sense of place, wellbeing, and personal control over their lives (Connor et al., 2004). The economic impacts of climate change on fishing communities in Western Australia has included stress and depression, domestic violence, suicide, and alcohol and drug abuse (Shaw et al., 2015).

The biophysical impacts of anthropogenic environmental change in Australia are diverse and substantial. Disturbance of acid sulphate soils affects a range of ecosystem services including water quality and agricultural productivity, and has been shown to influence the prevalence of mosquito-borne diseases such as Ross River virus (Ljung et al., 2009). Increased rainfall, more intense storm activity, rising sea levels, and temperature increases have been identified as factors in the increased breeding and survival of vector mosquito species in disease outbreaks in the Leschenault estuary in Western Australia (Lindsay et al., 1996; Vally et al., 2012). Algal blooms resulting from unusual nutrient loads and terrestrial agriculture, and microbial and chemical contamination of marine and coastal environments (and therefore seafood), have clear implications for human health (Fleming et al. 2006).

Perhaps the most prominent example of the complex and interconnected relationships between anthropogenic environmental change and ecological and human health outcomes is Australia’s Murray-Darling Basin, an area of more than a million square kilometres including a river system that stretches over 5000 km that provides more than 40% of Australia’s agricultural production and one third of its food supply (Pittock & Connell, 2010). The Millennium Drought (2001-2009) in southeast Australia had severe impacts on environmental conditions in the Murray-Darling Basin, and on the social and economic systems relying on them. The rural communities of this area experienced significant job losses and reductions in income, which in combination with extreme weather and

landscape conditions affected mental health, creating problems such as depression, substance abuse, and suicide (Pittock & Connell, 2010; van Dijk et al., 2013).

Conclusion

The challenges of the 21st Century are real and significant, but above all complex and dynamic, and demand interdisciplinary systems-based approaches to optimise the wellbeing and resilience of natural and human communities. We argue that Australia could offer important global leadership in establishing research methodologies to understand environment-human health relationships, building modelling systems to predict future scenarios, and developing robust protocols for planning and management. These three key areas could guide a genuinely innovative and world-leading applied research agenda, creating knowledge, tools, and processes that could be exported across the Oceania region, to support sustainable development and long-term social-ecological resilience.

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