Peter Waterman
University of the Sunshine Coast

Demonstrating 'Climate Proofing' for Coastal Local Government Authorities and Communities in the South East Queensland and Burnett-Mary Regions

Abstract

'Climate Proofing' is being promoted by SEQ Catchments and the Burnett Mary Regional Group in collaboration with Climate Change, Coasts and Catchments, at the Faculty of Science, Health and Education at the University of the Sunshine Coast (C4@USC). This is being done through the *SEQ 'Climate Proofing' Demonstration Project***,** which has been initiated as a practical response to the growing concerns of governments and communities over the vulnerability of coastal regions to the projected impacts of climate and associated environmental changes. To date, this joint initiative (which commenced in 2006) has encompassed demonstration activities at regional, local and community scales.

This paper has three purposes. First, to outline what the term means and how it is being actioned; second, to overview the work undertaken to date; and thirdly, to indicate how the project-work to date in SEQ can be built on and rolled-out to Local Government Authorities (LGA's) and communities.

1. Introduction

South East Queensland is the fastest growing region in Australia. The contiguous coastal area from the state border to the northern limits of the Burnett River catchment has been identified by the Australian Government (Allen Consulting 2005, DEH 2006) and the Intergovernmental Panel on Climate Change (IPCC 2007) as being at risk to adverse impacts from climate change. This contiguous area encompasses rapidly changing catchment and coastal regions that are already exposed to hazards and risks and are experiencing the impacts of short and long term climatically induced change.

Since the 1990's authors such as Kay et al (1996 a and b), Waterman (1996), May et al (1998), Eliot et al (2000), IPCC (2001), Kay et al (2005), Allen Consulting (2005) and Abuodha and Woodroffe (2006) have exhorted governments and communities to recognise that adapting to climate change was a critical issue for the coastal catchment regions of Australia. A strong case has been made that climatic variability and change has inter-linking biophysical, socio-economic and governance systems dimensions Waterman (1995) and White and Waterman (2006). By taking a proactive approach to adapting to climate change, Local Governments, regional organisations and communities of interest can be better equipped to develop and implement the policies and practices necessary to ensure that development and life-styles in coastal regions are biophysically, socially and economically sustainable.

Arguably, adaptive responses are needed at multiple scales (Hay et al 2004). Regional, local and community 'Climate Proofing' activities are one way of preparing governments and civil society in SEQ to meet the 'climate challenge' (White 2006).

'Climate Proofing' has been adopted by international bodies such as the Asian Development Bank (ADB), the World Bank (WB) and a range of European organisations as the term used to describe the suite of actions needed to make areas and assets resistant to climate variability and change and to make communities and people more resilient (Hay et al 2004, ADB 2006, WB 2006 and 2008a). Operationally, 'climate proofing' provides a proactive approach for raising governmental, industry and community awareness, and initiating 'no-regrets' actions to meet the challenges of changing climatic conditions and rising sea levels, by reducing risk (Hay et al 2004).

This paper seeks to achieve the following. First, set the scene for 'climate proofing' SEQ and how the approach is being applied internationally and nationally; second, outline the work undertaken by SEQC and BMRG and the success and key lessons learnt to date with respect to Local Governments and communities; third, indicate how the work to date could be further built on, and rolled-out to other coastal communities and Local Government Authorities in Australia and overseas.

2. Implementing Climate Proofing

Emerging Global Responses

Worldwide the requirements for and the dimensions of climate proofing vary nation to nation and region to region. At one scale, an innovative Climate Proofing Areas (CPA) project has been initiated by partners from Sweden, Germany, England, Belgium and the Netherlands with the aim of developing methods to make vulnerable areas climate proof. Pilot scale projects started in 2008 and will finish at the end of 2011. Currently, the lead partner in the CPA project is the climatically vulnerable province of Zeeland in the Netherlands.

At another scale and with a particular focus on economic dimensions, the 2007/2008 UNDP Human Development Report (HDR) on climate change states that the USA *has a unique responsibility to "climate-proof" its growth not only to protect Americans but also to prevent catastrophic reversals in health, education and poverty reduction for the world's poor* (UNDP 2007).

The prestigious Delft Hydraulics Institute (Delft University) reported in 2006 that climate proofing the coasts of the Netherlands is a major challenge, *but is achievable with the appropriate strategies, commitment and resources.* At the other end of the world, the inherent vulnerability of Pacific Island Countries to climatic changes has been recognised and is well documented. To meet this challenge the Asian Development Bank and the World Bank have supported initiatives to climate proof communities and infrastructure (ADB 2006, WB 2006 and 2008a and b).

For example: undertaking practical 'climate proofing' road and coastal development projects (ADB 2007); providing policy and practical guidance on the need to adopt 'climate proofing' as a risk reduction strategy (World Bank 2006); and ensuring that disaster risk reduction and climate change adaptation were better integrated, in order to 'climate proof' communities (World Bank 2008a and b).

Climate Proofing South East Queensland

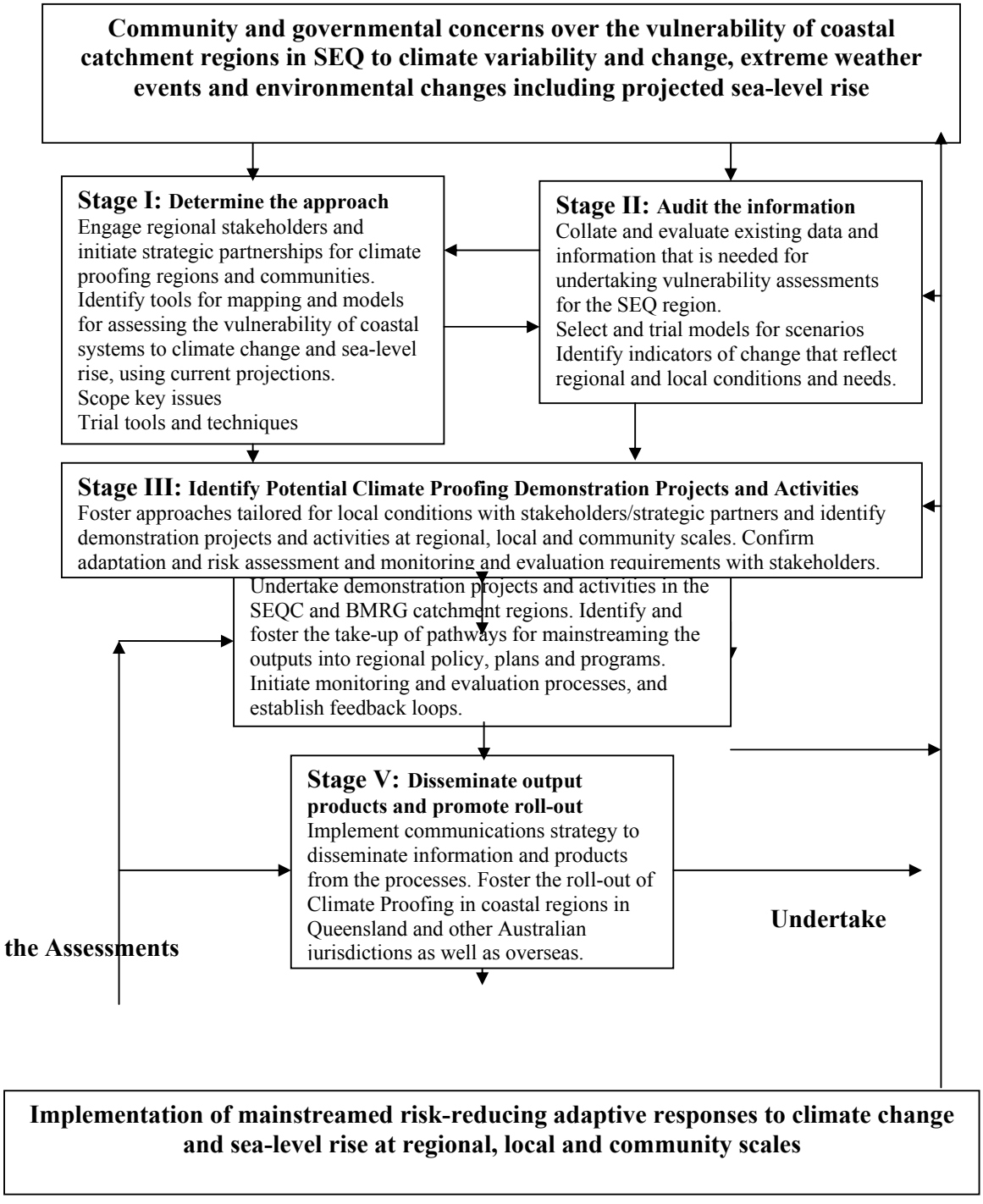
'Climate Proofing' is being promoted by South East Queensland Catchments (SEQC) and the Burnett Mary Regional Group (BMRG), in collaboration with *Climate Change, Coasts and Catchments* at the Faculty of Science, Health and Education at the University of the Sunshine Coast (C4@USC). This is being done through the *SEQ 'Climate Proofing' Demonstration Project.* This initiative commenced in 2006 and is a practical response to the growing public and private concerns over the vulnerability of coastal regions to the projected impacts of climatic and associated environmental changes. In particular, it is responding to a key question being asked by stakeholders from across industry sectors, communities of space and interest and members of the public: *What can we do to adapt to climate change?*

The *SEQ 'Climate Proofing'* Demonstration Project has three aims. First, to strengthen the essential links between *community perspectives and governmental policy* on adapting to climate and the available *tools and techniques* for reducing risks and impacts at local and regional scales. Second, to equip statutory land use and environmental planners, natural resources managers, primary producers and other industry sectors in the coastal regions, with the tools and techniques that will enable them to mainstream climate change adaptation into policy, plans and project implementation. Third, to raise community awareness on the challenges of climatic variability and extreme weather conditions, and the need to: foster improved response preparedness; and embed and enhance resilience.

The approach being followed for the *SEQ 'Climate Proofing' Demonstration Project,* has three components. First, fostering integrated approaches to climate change adaptation through *'risk reduction'*. Second, identifying and developing tools and techniques for integrated vulnerability assessment and management that address regional, local and site specific environmental conditions. Third, initiating and supporting community awareness and capacity building to equip local and regional stakeholders to deal with current climatic variability and projected climate change and sea-level rise. Vulnerability and adaptation assessment, together with the accompanying integrated environmental management, can be tailored to the geographic realities of specific regions and localities, including the capacities of communities.

The demonstration project is being undertaken using a staged approach, as illustrated in Figure 1. The vulnerability and risk reduction approach was initially developed for application in the more remote wet-dry tropical regions of northern Australia (Eliot et al 2005) and modified for application in the coastal regions of SEQ (White and Waterman 2006, White 2006).

Figure 1. Staged Approach for Climate Proofing Coastal Regions and Communities in SEQ



Community awareness and capacity building is an integral part of 'climate proofing' encompasses the communication strategies used for preparation and dissemination of information on climate change adaptation. As well, it encompasses running workshops, short courses and training programs for practitioners. Additionally, it includes the provision of accredited post-graduate programs in areas such as Climate Change Adaptation, Integrated Coastal Zone Management, Environmental Change Management that are currently being delivered by the University of the Sunshine Coast.

Tools and techniques available for capacity building for climate change adaptation and ICZM practitioners include the *SimCLIM* suite of models developed by the International Global Change Institute (IGCI) for climate proofing regions (Warrick et al 2005, Warrick and Cox 2007, Warrick 2009). These models project scenarios and allow practitioners to develop and cost risk reducing adaptive responses to climate-driven change. Other tools available include, for example, models developed by the Queensland Department of Primary Industry, the Australian National University and international bodies. The tool kit is rapidly expanding and new methods and techniques including modelling and field techniques should be incorporated into regional, local and community scale projects as they emerge.

3. Work Undertaken and Outcomes to Date

Work undertaken to date in the SEQ and Burnett Mary regions by SEQC and BMRG, as part of the SEQ Demonstration Project*,* is summarised in Table 1 (using the framework given in Figure 2). This brief overview of actions, activities, outcomes and products needs to be seen as 'work-in-progress' reflecting the successful initial steps of a long-term collaborative initiative.

Establishment of the *SEQ 'Climate Proofing' Demonstration Project* has provided a vehicle for strengthening the essential links between community perspectives and governmental policy on climate change adaptation. Additionally, it is helping to make stakeholders more aware of tools and techniques that are available for reducing climate related hazards and risks and reducing the impacts of climatic variability (including extreme events) at regional and local scales. Further, feedback from stakeholders confirms that the demonstration project is providing essential new information and an impetus for planners, natural resources managers, primary producers and other industry sectors to gain the professional skills necessary to meet the challenges of climatic variability and extreme storm and drought conditions.

At the community level, organisations and individuals have joined together to identify and prioritise actions needed to help them 'Climate Proof' Coochiemudlo and Bribie Islands. 'Climate Proofing Communities' is catching on and initiatives are starting to roll-out as part of the SEQ 'project as well as in other Australian locations. For example, the Goldfields Esperance Development Commission (GEDC) in Western Australia is exploring how they can climate proof an area which is some 25% of the land area of the State. As well, Conservation Volunteers Australia (CVA) are about to undertake 'climate proofing' workshops in a number of communities across Australia.

Table 1. Overview of Work Undertaken for SEQ Demonstration Project

Stage	Actions, Activities and Outcomes	Products and Comments
I	Project conceptualisation -Strategic partners frame and agree multiple approaches -Initial stakeholder engagement meetings held with community organisations and Local Governments in SEQ and Burnet Mary regions Phase I Climate Proofing initiated by SEQC -Successful awareness raising, issues scoping and capacity building workshops held in SEQ region by SEQC and C4@USC	-Concept flyers promoting climate proofing -Conference presentations and papers -Capacity building with hands-on use of SimCLIM -USC commenced professional development programs in climate change adaptation and Integrated Coastal Zone Management
II	-Auditing regional and local scale Digital Elevation Models (DEM) and meteorological data -Identifying key information requirements for vulnerability assessments and climate proofing activities	-Honours thesis on model selection and information auditing -SimCLIM trials at regional scale
III	Confirm approaches with stakeholders Phase II Climate Proofing initiated by SEQC Including climate proofing Coochiemudlo and Bribie Islands The *Building Local Government Resilience through Scenario Planning Project* initiated by the BMRG focus on Climate Change Implications for: • *Coastal vulnerability.* • *Water Security* • *Residential, Tourism and Recreational Pressures on Infrastructure* • *Plantation and farm forestry.*	Reports to SEQC on mapping climate change dimensions of ecosystem services and biodiversity corridors SimCLIM applied to regional climatic conditions in areas covered by SEQC and BMRG Regional scenarios Scoping Reports and Working Papers for scenario themes for BMRG
IV	-Climate proofing meetings and workshops on Coochiemudlo and Bribie Islands -Community groups on islands set priorities for actions to suit local conditions and needs -BMRG State and Local Government stakeholder focused workshops for coastal and catchment LGA's	Initial set of climate change projections for the SEQ-BMRG region. - observed climate change over the last 60 years is consistent with global predictions -trends are indicative of expected future changes.
V	-Running 'Climate Proofing Regions' workshops as part of annual SEGRA Conferences -Initiation of interstate activities(eg GEDC and CVA)	-Dissemination of SEQC and BMRG Working Papers and Scoping Reports -Conference papers and public presentation

4. Where to Next? Regional Local Government Scale Demonstration Activities

Under the terms of Queensland legislation Local Government Authorities (LGA's) have a mandated community governance role, regulatory and planning powers, responsibilities in relation to disaster management, ownership of local infrastructure, and a broad involement in environmental and health guardianship. In this context, the regional councils encompassing the contiguous SEQ-Burnett Mary Region are well positioned to facilitate a range of *'no regrets'* responses to climatic and associated environmental changes. Either initiating or participating in regional councli scale 'climate proofing' is one way of working towares the State's goal *"To enhance Queensland's resilience to the impacts of climate change"* (DNRMW 2005).

LGA scale '*Climate Proofing'* projects need to be collaboratively developed and initiated. These can be tailored to the geographic and demographic realities of the catchment framework of the contiguous Sunshine Coast and Burnett Mary region. This should be done through strategic partnerships with NRM groups and communities. As such, this is viewed as an essential next step in equipping Local Governments and their embedded communities to adapt to changing climatic and associated environmental conditions. Such an initiative would build on the success of work undertaken to date by SEQC and the BMRG. Activities could be undertaken at regional council scales to cover sectoral interests and at the community level to address the underpinning the publicly raised question: *What can 'we do' to adapt to climate change?*

Discussion and Concluding Remarks

Regional scale 'climate proofing' demonstration activities in SEQ by the BMRG have encompassed climate change scenario modelling, coastal vulnerability assessment, risks to settlements and infrastructure, and water security. SEQC have also undertaken regional scale assessment activities in relation to woody vegetation assemblages in biodiversity corridors, plantation forestry, and the provision of ecosystem services.

Over the past year, the demonstration project has a specific focus on climate proofing coastal communities. This is being demonstrated at the local scale through community based projects at Coochiemudlo Island and Bribie Island. In both locations, the communities of interest have come together to strengthen alliances, establish governance mechanisms suited to their circumstances, set priorities, and initiate a range of on-the-ground activities.

Understanding the biophysical, social and economic dimensions and responses for adapting to climatic variability and change is a critical issue for coastal catchment regions. Adaptation needs to be mainstreamed into local and regional development policy, plans, programs and projects of governments and business. 'Climate proofing' provides a framework to focus 'no-regrets' adaptive responses to current climatic variability and projected change, especially the increasing frequency of extreme events.

A case has been made by authors such as Hay et al (2004), and Warrick (2006) that 'Climate Proofing' is a cost effective approach for: making areas and assets resistant to climate variability and change; and to make communities and people more resilient. Further, it is an approach that can be readily applied by regional natural resources management bodies, as demonstrated by the informal collaboration between SEQC and the BMRG, to foster adaptive actions and activities at regional, local and community scales.

Initiating and supporting community awareness as well as capacity and resilience building to better equip local and regional stakeholders to deal with projected climate change and sea-level rise is essential. International experience has shown that climate change adaptation needs to be owned and implemented by a diverse suite of stakeholders at regional, local government and community levels (DEH 2006). As an ongoing collaborative initiative involving SEQC, BMRG and the University of the Sunshine Coast, the *SEQ Climate Proofing Demonstration Project* shows how this is being done and provides a model that can be readily applied elsewhere in Australia.

Acknowledgements

Special thanks are extended to the Simon Warner and David Brown, Chief Executive Officers of SEQC and BMRG respectively, and participating staff from each organisation. Very special thanks go to Suzie Chapman, Sean Galvan and Simon Brown from SEQC and Sue Sargent from the BMRG for their unstinting support and guidance. A very special acknowledgment is given to the contributions made to the project by colleagues and postgraduate students at C4@USC including Graham and Amanda Ashford, Ashton Berry, Gary Duffy, David James, Greg Laves, Amanda Tunbridge, Neil Tindale, Dick Warrick and Kathy Wood.

References

Abuodha, P and Woodroffe, C. 2006. *International Assessments of the vulnerability of the coastal zone to climate change, including an Australian perspective*. Report to the Australian Greenhouse Office. University of Wollongong.

Australian Greenhouse Office (AGO) 2002 *Living with Climate Change: An Overview of Potential Climate Change Impacts on Australia*. Australian Greenhouse Office. Canberra

Allen Consulting Group 2005. *Climate Change and Vulnerability: Promoting an efficient adaptation response in Australia*. Report to the AGO DEH, Canberra.

Department of Environment and Heritage (DEH) 2006 *National Climate Change Adaptation Programme.* Australian Government, Canberra.

Department of Natural Resources, Mines and Water (DNRMW) 2005. *Climate Smart Adaptation: What does Climate Change mean for you?* Queensland Government, Brisbane.

Eliot, I.G., Saynor, M.J., Eliot, M., Pfitzner, K., Waterman, P. and Woodward, E., 2005. *Assessment and development of tools for assessing the vulnerability of wetlands and rivers to climate change in the Gulf of Carpentaria, Australia*, Report prepared by the Environmental Research Institute of the Supervising Scientist and the National Centre for Tropical Wetland Research for the Australian Greenhouse Office, Canberra.

Hay J, Warrick R, Cheatham C, Mararuagi-Trott T, Konno J and Harvey p 2004 Climate Proofing: A risk based approach to adaptation. IGCI Research Report, University of Waikato. Hamilton. NZ

IPCC 2001. *Climate Change 2001: Impacts, adaptation, and vulnerability*. The IPCC Third Assessment Report, Working Group II Report, McCarthy JJ, Canziani OF, Leary NA, Dokken DJ and White KS (eds), Cambridge University Press, Cambridge.

Kay R, Eliot, I. Caton, B. Morvell, G. and Waterman P. 1996a. A Review of the Intergovernmental Panel on Climate Change's Common Methodology for Assessing the Vulnerability of Coastal Areas to Sea-Level Rise. In Hershman, M (ed) *Coastal Management: An International Journal of Marine Environment, Resources, Law and Society* Vol 24, No. 2 April – June

Kay RC, Eliot I, Caton B, Morvell G & Waterman P 1996b. A review of the Intergovernmental Panel on Climate Change's Common Methodology for assessing the vulnerability of coastal areas to sea-level rise. *Coastal Management*, 24: 165-188.

Kay, R.C., Crossland, C.J., Gardner, S., Waterman, P. and Woodroffe, C.D., 2005a. *Assessing and communicating vulnerability of the Australian coast to climate change: Strategic Discussion Paper*. Unpublished report to Australian Greenhouse Office.

Kay, R.C., Crossland, C.J., Gardner, S., Waterman, P. and Woodroffe, C.D., 2005b. *Assessing and communicating vulnerability of the Australian coast to climate change: Supporting Technical Paper*. Unpublished report to Australian Greenhouse Office.

May P, Waterman P and Eliot IG 1998. *Responding to Rising Seas and Climate Change: A Guide for Coastal Areas.* Coastal Monitoring Program. Coast and Clean Seas. Department of Environment. Canberra.

UNDP 2007, *Human Development Report (HDR) on climate change* United Nations Development Program, New York

Waterman P 1995. Assessing the Vulnerability of Coastlines of the Wet-Dry Tropics to Natural and Human Induced Change. In Finlayson PK (ed) *Wetland Research in the Wet-Dry Tropics of Australia.* Proceedings of Workshop Jabiru NT 22-24 March 1995. *Supervising Scientist Report* 101, 218-226.

Waterman P 1996. *Australian Coastal Vulnerability Assessment Project Report.* Climate Change Program. Commonwealth Coastal Action Program. Report Series 4b. Department of Environment, Sport and Territories. Canberra. May.

Warrick, R.A., W. Ye, P. Kouwenhoven, J.E. Hay & C. Cheatham (2005). New Developments of the SimCLIM Model for Simulating Adaptation to Risks Arising from Climate Variability and Change. In Zerger, A. and Argent, R.M. (eds) *MODSIM 2005.* International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, December 2005, pp. 170-176.

Warrick, R.A. (2006): Climate Change Impacts and Adaptation in the Pacific: Recent Breakthroughs in Concept and Practice. In Chapman, R., Boston, J. and Schwass, M. (eds) *Confronting Climate Change: Critical Issues for New Zealand*. Wellington: Victoria University Press.

Warrick, R.A. and G. Cox (2007): New developments of SimCLIM software tools for risk-based assessments of climate change impacts and adaptation in the water resource sector. In M. Heinonen (ed.), *Proceedings of the Third International Conference on Climate and Water*. Helsinki, Finland, 3-6 September 2007. SYKE, Helsinki, p. 518-524.

Warrick R 2009. From CLIMPACTS to SimCLIM: The development of an integrated model for assessing impacts and adaptation to climate change. In: C.G. Knight and J. Jaeger (eds.), *Integrated Regional Assessment: Challenges and Case Studies.* Cambridge University Press, Cambridge, UK

White A and Waterman P 2006 *Auditing Regional Information: Do we have appropriate and sufficient data, information and knowledge to assess and adapt to environmental change?* Proceedings SEGRA2006, Launceston. September

White A 2006 Climate Proofing Regions: Matching the information to the tools. Unpublished BSc Honours Thesis. University of the Sunshine Coast.

World Bank 2006. *Not if but when – Adapting to natural hazards in the Pacific Islands Region – A Policy Note.*

World Bank 2008 a. *Reducing the Risk of Disasters and Climate Variability in the Pacific Islands- Regional Stocktake,* A GFDRR Project

World Bank 2008 b. *Reducing the Risk of Disasters and Climate Variability in the Pacific Islands- Country Assessments,* A GFDRR Project