

# Strategic planning for collaborative practice: the potential for inter-organisational cooperation to overcome constraints to climate adaptation<sup>1</sup>

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## Introduction

The need for action on climate change issues across multiple jurisdictional and economic levels has long been recognised both in Australia and globally (Adger et al., 2007, Preston et al., 2010). The adoption of concerted climate adaptation practices is imperative and overdue. At this stage, adaptive actions by individual households, organisations and other sectors are at best ad hoc and uncoordinated. However, addressing the implications of climate change is clearly a collective action issue (Adger, 2003, Paavola and Adger, 2006). A coordinated and effective approach could be developed through examining the role of institutions and networks. In this paper we explore the significance of relationships between institutions, networks and climate change.

One might reasonably expect that evidence of coordinated policy and climate change action frameworks would be most evident at governmental levels. However, there is little to support this contention in the scientific literature. In an effort to coordinate planning and local government actions, the Australian Local Government Association (ALGA) developed a draft strategic plan including outcomes that local governments aspire to achieve by 2014. This plan was ratified in 2010 (ALGA, 2010). The strategy calls for all sectors such as government, business and community, to engage in collaborative efforts to address climate change issues. Organisations within multiple sectors represent a significant proportion of the regional economy. Knowledge of the extent of strategic planning for climate change conducted by Australian organisations and the factors affecting implementation of these plans within regions is relatively sparse. Furthermore, there is little understanding of the way the complex array of interactions between organisations and other sectors of society might influence the development of climate adaptation responses. Expending effort on the formation of partnerships is perhaps the best way to address this challenge, offering significant opportunities for learning and leadership amongst the diversity of players within a region.

We have identified four primary features with interacting dynamics that influence organisations at the regional level. These factors have the potential to influence the collaborative behaviour of organisations and their motivation to engage in climate change adaptation planning and implementation and include:

- The level of adaptive capacity and associated adaptive practice.
- The extent to which formal and informal institutional arrangements constrain and or inhibit individual organisational action and collaborative efforts.
- The role of networks of relationships among organisations and whether the structure of these networks influences the efficacy and utility of the adaptive practices undertaken.
- The influence of regional forums and the multi-level processes that operate within them on organisational processes, strategies and commitment to climate adaptation.

The aim of this paper is to provide a brief overview of the literature on these four aspects that we contend affect organisational commitment to and action on climate adaptation. In our presentation we will also demonstrate how our research contributes to knowledge on regional preparedness for climate change. Before we address these factors, some consideration of key contextual material is presented.

## Definitions of specific relevance

Various definitions have been presented in the literature to describe what is meant by climate adaptation and adaptive capacity (Jakku and Lynam, 2010, Levina and Turpak, 2006). In this study we align with the definition provided by the Intergovernmental Panel on Climate Change (IPCC) which describes adaptation as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation” (McCarthy et al., 2001 pp982). When referring to adaptive capacity we use the definition proposed by Jakku and Lynam based on their review of the literature: “adaptive capacity comprises the properties of a system that enable it to modify itself in order to maintain or achieve a desired state in the face of perceived or actual stress” (*op cit* pp10). Further these authors note that while there are variations in the definition of adaptive capacity there are broad themes emerging in the literature that apply, such that adaptive capacity:

- Is dependent on access to resources.
- Is dynamic and context specific.
- Exists at and is shaped by interdependent scales.
- Is latent or potential adaptation.
- Goes beyond coping ability.

Adaptive practices refer to “actual adjustments, or changes in decision environments, which might ultimately enhance resilience or reduce vulnerability to observed or expected changes in climate (Adger et al., 2007 *op cit* pp720). How widespread the above themes are and the role they play in organisational adaptation to climate change is being explored in our project.

## Overview of knowledge about current organisational responses to climate change

A series of benchmarking surveys by Gardner et al (2009) assess the current level of adaptation planning by Australian organisations, their understanding of terms like vulnerability, adaptation and mitigation and likely barriers and drivers of adaptation activity. This study is focussed on the national scale and results indicate a need for further research. Factors acting as drivers for climate adaptation planning by organisations included greater awareness of climate change, a perception that the organisation was vulnerable to the impacts of climate change and a need to respond to stakeholder pressure. Insufficiency of resources, information about potential impacts, clear policy or regulatory guidance, climate change scepticism or a culture of conservatism in some organisations tended to act as barriers to adaptation planning. Ernst & Young (2010) commissioned a study of 300 executives from companies with revenues in excess of US\$ 1B/annum across 16 countries and 18 industry sectors. They found that most companies feel that climate change strategies can be profitable and mitigate risk. Furthermore, it was found that:

- The complexity of issues demands strong governance.
- Key performance indicators need to include specific climate change related metrics.
- Drivers include the need to reduce energy costs, meet consumer demand, and take advantage of new revenue opportunities.
- Companies must invest in climate change initiatives like new products and improved corporate transparency.

- Companies need to face the challenge of implementing their plans, recruit labour and develop internal capacity to drive behavioural change (Ernst and Young *ibid*).

Overall however, knowledge of organisational responses at the local and regional levels, and of the degree of interaction between organisations of different types, is lacking. This situation is not unique to Australia. As Delmas and Toffel (2004) suggest, little is known about the specific combinations of organisational characteristics and external pressures (regulations, stakeholder / community pressure) that lead to exemplary environmental management and responsiveness.

## Drivers and constraints of climate adaptation

Drivers of organisational responses to climate adaptation have been explored by Berkhout, Hertin and Gann (2006). They found that climate adaptation responses were similar to other adaptive responses, for example organisational responses to new technology. Key differences included the ambiguous nature of climate change stimuli and the often indirect experience of impacts. Four factors influencing an organisational approach to climate adaptation were identified: core competencies, core business, dynamic capabilities and organisational culture (*ibid*). Based on these drivers, four alternative adaptation strategies were identified: wait and see; risk assessment and options appraisal; bearing and managing risk; and sharing and shifting risks. These drivers and strategies provide an effective framework for developing and assessing organisational adaptive capacity and practice.

As well as organisational operational tactics, there has been a focus on the importance of relationships and social drivers of climate adaptation. Moser and Ekstrom (2010) demonstrate via a series of workshops that participation of local government and other stakeholders can assist in adaptation planning. Moreover, engagement can lead to communities 'opening-up' and engaging in conversations, when they were not previously involved, or where political support for addressing climate change is low. Burch (2010) has investigated overcoming barriers to climate change adaptation behaviours at the local level in Canada and found that often leadership, organisational culture, the need for locally relevant and specific information and the inter-jurisdictional context can all fundamentally affect the success at which capacity is utilised. The idea of adaptation occurring as a localised phenomenon, as noted in these studies and elsewhere (for example see Agrawal, 2008), indicates that the decision of this study to focus on local governments and other organisations at regional scale is appropriate.

Despite the recognition of local government as a key actor in supporting climate adaptation, little is known about priorities and barriers to action, or whether they have the capacity to deliver necessary adjustments. Results of international studies have indicated that many obstacles to effective climate change action are institutional in origin, with conflicting cultures and the absence of strong leadership the two most frequently mentioned barriers (*ibid*). Similar barriers to adaptation have been identified in an Australian local government context as outlined by (Measham et al., 2011). Five key challenges were identified including: leadership, competing priorities, planning process, information constraints and institutional constraints.

## The risk of maladaptive responses

Adaptation efforts need to be evaluated in order to avoid maladaptive responses and encourage shared learning of desired practices. Preston, Westerway and Yuen (2010) provide a desktop review of adaptation planning processes in developed nations and develop a framework for evaluating adaptation plans. The 57 adaptation plans were evaluated on 19 evaluative criteria. A total of 507 individual adaptation options were identified. Very few plans scored highly on the criteria and those that performed best were at the local/municipal scale suggesting a smaller scale can allow for greater detail in planning. They found that despite suggestions that developed nations have high adaptive capacity, a long term evolution of adaptation planning and practice is needed before such capacity can be realised. Many plans had a narrow, climate centric focus and did not integrate climate plans into existing policies which led to the authors concluding that many plans are driven by action on climate change rather than for better societal and ecological outcomes. Adger and Barnett (2009) further state that much of the preparedness of the future is based on historical and existing risks rather than on future projections and that adaptation has not been well embedded into planning systems. Capacity to act has been identified as difficult in some areas, highlighting the need for contextually relevant measurements of adaptation. This is particularly true for councils with mining operations such as in the Hunter region in NSW, Gladstone in QLD and the Pilbara in WA, and their ability to engage with mitigation efforts towards a low carbon future. (Pillora, 2011 ). Having discussed some background material of relevance, we will now move on to the main focus of this paper and consider the affect of the four primary factors identified and described in our introduction on organisational responses to climate change.

## Connections between adaptive capacity and adaptive practice

While adaptation is a widely cited concept in the literature, there are very few examples that demonstrate the relationship between adaptive capacity and adaptive practice. The contentious link between adaptive capacity and adaptation in organisations has been explored by Pelling et al. (2008). They identified six viable pathways from capacity to adaptation:

1. Organisational internal action (e.g. changes to management, structure or process).
2. Organisational external action (e.g. changes to external communication strategy).
3. Agent-centred command and control (e.g. manager adjusts work routines to meet performance targets).
4. Agent-centred resource management (e.g. although no guidelines exist a manager adjusts work routines to meet performance targets).
5. Agent-centred reflexive adaptation (e.g. pre-existing work aims are undermining sustainability, therefore aims and consequent work aims are changed).
6. Agent-centred institutional modification (e.g. a scientific advisor lobbies policymakers to change policy priorities).

Previous studies on organisational responses to climate adaptation provide useful guides for measuring and identifying adaptive capacity and adaptive behaviours. As highlighted social and contextual issues are of upmost importance. Our study aims to contribute to existing knowledge by examining whether an effective inter-organisational measurement of adaptive capacity can be created and whether such capacity can translate into adaptive responses.

By including local government as a focus, we recognise that this is a key level of government in developing and enacting effective adaptive responses to climate change, and also a key player in developing partnerships with other organisations at the regional level.

As the description of pathways above indicates, the re-configuration of institutional architecture is an important indicator of system flexibility supporting organisational change. The influence of institutions and governance systems on organisational responses to climate change is further explored in the next section.

## Impact of institutions and regional governance arrangements

Institutions are the formal regulations and informal “cultural norms, values and accepted practices” that shape or influence the way societies operate (Matthews and Sydneysmith, 2010). Institutions then will clearly affect our governance systems. Institutions have the ability to enhance and promote adaptive capacity in organisations. However, the potential rate of environmental and social change from climate change requires institutions that are flexible and supportive of actions across society (Gupta et al., 2008). In a recent review of the role of local institutions in adaptation to climate change prepared for the World Bank, Agrawal found that institutions play a pivotal role in access to resources, particularly among the poor and disadvantaged (Agrawal, *op cit*). Furthermore his review “suggests that adaptation to climate change is inevitably local and that institutions influence adaptation and climate vulnerability in three critical ways: they structure impacts and vulnerability; they mediate between individual and collective responses to climate impacts and thereby shape outcomes of adaptation; and they act as the means of delivery of external resources to facilitate adaptation, and thus govern access to such resources” ( *ibid* pp2).

Measham et al (*op cit*) found two distinct institutional limitations were evident at the local government level: council internal structures and those occurring at higher levels of government. It was found that planning for climate change actions at the local level can often compete against other needs which appear to be more pressing for councils. Other barriers have been uncovered by Scott and Weston (2011) in their analysis of two federally recommended adaptation planning guides in a New South Wales council. They found that work may be labelled ‘climate adaptation’ but adoption of strategies may be occurring for other reasons and that uncertainty, context, legislative responsibility and justification of investment were all important considerations. Overall they concluded that climate change adaptation planning suffers from multiple and sometimes conflicting interpretations and value judgements, highlighting the need to closely consider social barriers.

The most significant challenge faced by all players attempting to address the issue of climate change is the need for collective and collaborative action which is affected by the institutional environment. At the state and local government level there is a need for consistency in the presence and form of legislative arrangements and statutory protections. A recent report commissioned by ALGA, engaged the law firm Baker and McKenzie to undertake a desktop study of the legal liabilities and risks for local governments as they address climate change (Baker and McKenzie, 2011). The report indicates that there is “significant variation between the States and Territories with respect to the availability of statutory protections” and this is also the case with the adoption of “legislative guidance, policies and plans to respond to the impacts of climate change” (Baker and McKenzie *ibid* pp4). In addition, while the Federal Government has the ability through legislative powers to

influence mitigation, its ability to influence adaptation efforts at a regional to local scale is limited.

Overall then, the intricacy of regional governance has the potential to play a significant role in constraining or hampering climate adaptation efforts. Regional governance extends beyond formal levels of government and the rules and regulations embodied in statutory prescriptions to informal norms, regional practices and protocols that operate in any jurisdiction. Governance is understood to be “the body of rules, enforcement mechanisms and corresponding interactive processes that coordinate and bring into line the activities of the involved persons with regard to a concerted outcome” (Fischer and Peterson, 2004 pp2). Governance is not synonymous with government, but rather presupposes “that the relationship between state and society and particularly the successful implementation of public policy is increasingly dependent upon a much wider array of public, private and voluntary organisations than would traditionally be included within the ‘governmental’ framework” (Flinders, 2002 pp52). Governance then is a dynamic process where issues like control and accountability matter, and where interactions between institutions and between institutions and the public are more central than structure in the sense of institutional design. Organisations and their networks are both affected by and in turn affect the manner in which institutions are applied and the evolution and enactment of governance within their regional setting and beyond.

## **Role of inter-organisational networks on climate adaptation planning**

Little is known about the impact of organisational relationships (that is their networks), on decision-making processes associated with climate issues. The focus of this project is on adaptive capacity and practices at the regional level. Understanding the influence of networks is critical. To determine the importance of organisational networks the project is investigating the nature, extent and complexity of cross-scale linkages within the regional setting so that the patterns of relationships and emergent structural characteristics of networks become clear. “If influence processes operate through these relational structures, then policies, attitudes and behaviours relevant to adaptation may be diffused through the multi-level social network. At the same time, while networks can act as enablers for action, they might also inhibit the functional adaptive capacity of groups and individuals and result in inertia and blockages within a social system. The goal is to gain insight into the efficacy of organisational responses to climate change, and the potential for cooperation (or contestation) across the various elements of the social system” (Robins et al., 2010 pp3).

Network governance is a term used to describe how organisations, agencies or groups interact repeatedly to address issues of collective concern or interest. These exchanges are structured in the sense that the assignment of responsibilities or actions is patterned on recognised areas of expertise. The informal ties between the groups helps manage the adaptation and coordination required for cooperation in an uncertain environment (Jones et al., 1997). Jones et al further suggest that that the way that groups interact and the frequency with which they do so to address a complex issue, facilitates the emergence of structural embeddedness. Structural and relational embeddedness are terms used to describe how actions and outcomes are determined in particular domains of interest.

Relational embeddedness refers to the nature of the interaction between pairs of actors (or agencies), whereas structural embeddedness refers to the characteristics of the complete network of interactions (i.e. considering all pairwise interactions) (Granovetter, 1985, Granovetter, 1992, Uzzi, 1996, Uzzi, 1997). When the relationships between groups become structurally embedded, then effective coordination to achieve outcomes also requires them to interact with a number of common partners. Throughout these interactions, there is a role for network management, particularly when there are high levels of uncertainty as in the domain of climate change impacts. These concepts have currency in examining how organisational networks may operate to support the development and implementation of climate adaptation strategies.

Of course most if not all organisations through their very nature are already embedded in their own networks involving their business and social relationships (customers, suppliers etc). Inter-organisational or multi organisational networks are generally established to facilitate the solution of a common problem that can not easily be resolved by an organisation acting alone (Agranoff and McGuire, 2001). Klijn et al have described a set of pre-conditions generally required for networks to emerge and or be sustained (Klijn et al., 2010). These include:

1. The presence of many actors of different types who are dependent on each other to achieve their aims either through resource dependency or other type of commitment.
2. The network is relatively stable with regular interactions.
3. The problems and solutions confronted by the network members are subject to divergent perceptions.

Governance networks therefore not only support the development of greater knowledge but also assist in the development of negotiation skills as solutions to tricky and complex problems must be reached through consensus and often emerge from discussion of opinions and perceptions that are initially incongruent. In addition, because of the many processes that operate between individuals and groups when searching for consensus, alliances develop that can be called on at a later date. Therefore, organisations through their primary contacts get to know one another better and learn who they can depend on and who they might be less sure of. The 'store' of relationships established through numerous interactions includes those that evolve through participation in decision-making and industry forums. These represent a further tier of influence within a region.

## **The influence of regional policy and decision-making forums on organisations**

Types of forums include senior officers meetings, inter-agency task forces, sector advisory committees and public / private planning processes. Organisations participate in forums to solve complex mutual problems, to stay attuned with what their competitors are doing and/or influence their industry to undertake a particular course of action or inaction. Some participants take part in multiple arenas which tends to enhance complexity, and influence individual and group strategies as they attempt to address multiple inter-connected issues.

This approach picks up on the collective action problem associated with the implementation of climate adaptation strategies and the need for collaboration in a complex ecological environment.



Long (1958) suggested that a local community could be conceptualised as an 'ecology of games' where individuals within a community take part in many interactive forums to support their lifestyle. These different forums are called games in which the players make use of each others specialised skills and knowledge, for example banking, manufacturing, utility provision. Players often have common values that promote and underpin cooperative relationships. The games "give structures, goals, roles, strategies, tactics, and publics to the players" (Long *ibid* pp 251). This concept has been utilised in many collective action and resource management domains, for example (Lubell and Fulton, 2007, Lubell and Fulton, 2008, Lubell et al., 2010, Lubell et al., 2002, Schneider et al., 2003, Scholz et al., 2008). However, in Long's conceptualisation there are no coordinating institutions.

Within any region, there are multiple types of interactions operating at any one time. These relationships may focus on specific issues, organisational representatives, processes and the interactions between all these levels. Consequently to gain an appreciation of how interactions and processes within policy and decision-making forums attended by organisational representatives' flow back into their home organisation and out into local communities, it is necessary to adopt a multi-level perspective of networks.

We examine how the local forums interact and the influence of either pre-existing or evolving institutions on the relationships and actions of participating organisations. The key features are that:

- Organisations participate in 'games' to help solve mutual problems in very complex decision making processes.
- Individuals participate in multiple games or 'arenas', where arenas may be different geographical or governance levels eg local, regional, national, international.
- The arenas may be coupled or linked and this will affect participant strategies.
- A proliferation of games will contribute to uncertainty.

(Klijn, 2010, Klijn et al., 2010, Koppenjan and Klijn, 2004)

## Conclusion

Collaborative practice among organisations whether they are 'not for profits', academic organisations, community groups or local or state government, are likely to play a significant role in framing and responding to climate change issues at the regional level. However, the scientific literature does not adequately describe the role, extent or impact of these interactions on the effectiveness of climate change strategies aimed at adaptation.

Furthermore, there are knowledge gaps in the measurement of adaptive capacity and whether adaptive capacity actually increases adaptive response. The benefits of adaptation planning include the identification of early warning signs of potential climate hazards. Adger and Barnett (*opcit*) suggest four reasons to be concerned about climate adaptation. These include: the small window of opportunity for change (due to scale and interconnectedness of impacts); adaptive capacity not translating into adaptive practice; the maladaptive nature of existing actions and the importance of social context in measuring success. Traditional limits to adaptation have included ecological, physical, economic and technical factors but there is now a call by Adger et al (2009) to assess the influence of ethics, knowledge, risk and cultural factors. The apparent complexity in the conceptualisation of climate adaptation indicates that more research is required at the conceptual level as well as the applied.

The regional climate adaptation project will assist a diverse range of stakeholders dealing with the complex issue of climate change by providing insight into how organisations' perceive and respond to climate change risks. This will support the development of strategies to encourage and support regions and reduce vulnerability. The improved understanding of inter-organisational relationships will strengthen and enhance collective action at the regional level. Finally, clearer knowledge of the interplay between institutions, organisations and policy games has the potential to help guide effective strategic engagement at the local to regional level.

## References

- ADGER, W. N. (2003) Social capital, collective action, and adaptation to climate change. *Economic Geography*, 79, 387-404.
- ADGER, W. N., AGRAWALA, S., MIRZA, M. M. Q., CONDE, C., O'BRIEN, K. L., PULHIN, J., PULWARTY, R., SMIT, B. & TAKAHASHI, K. (2007) Assessment of adaptation practices, options, constraints and capacity. IN PARRY, M., CANZIANI, O. F., PALUTIKOFF, J. P., VAN DER LINDEN, P. J. & HANSON, C. E. (Eds.) *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, Cambridge University Press.
- ADGER, W. N. & BARNETT, J. (2009) Four reasons for concern about adaptation to climate change. *Environment and Planning A*, 41, 2800-2805.
- ADGER, W. N., DESSAI, S., GOULDEN, M., HULME, M., LORENZONI, I., NELSON, D. R., NAESS, L. O., WOLF, J. & WREFORD, A. (2009) Are there social limits to adaptation to climate change? *Climatic Change*, 93, 335-354.
- AGRANOFF, R. & MCGUIRE, M. (2001) Big questions in public network management research. *Journal of Public Administration Research and Theory*, 11, 295-326.
- AGRAWAL, A. (2008) *the Role of Local Institutions in Adaptation to Climate Change*. Washington, World Bank.
- ALGA (2010) ALGA Climate change position paper and discussion document.
- BAKER & MCKENZIE (2011) *Local Council Risk of Liability in the Face of Climate Change – Resolving Uncertainties. A Report for the Australian Local Government Association*.
- BERKHOUT, F., HERTIN, J. & GANN, D. M. (2006) Learning to adapt: Organisational adaptation to climate change impacts. *Climatic Change*, 78, 135-156.
- BURCH, S. (2010) Transforming barriers into enablers of action on climate change: Insights from three municipal case studies in British Columbia, Canada. *Global Environmental Change*, 20, 287-297.
- DELMAS, M. & TOFFEL, M. W. (2004) Stakeholders and environmental management practices: an institutional framework. *Business Strategy and the Environment*, 13, 209-222.
- ERNST & YOUNG (2010) *Action amid uncertainty: the business response to climate change*.
- FISCHER, A. & PETERSON, L. (2004) How incentives matter - a conceptual framework for natural resource governance in German development cooperation. *Agricultural Research for Development*. Berlin.
- FLINDERS, M. (2002) Governance in Whitehall. *Public Administration*, 80, 51-75.
- GARDNER, J., PARSONS, R. & PAXTON, P. (2009) *Adaptation Benchmarking Survey: Initial report. Climate Adaptation Flagship Working Paper No. 4. Climate Adaptation Flagship CSIRO*.
- GRANOVETTER, M. (1985) Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, 91, 481-510.
- GRANOVETTER, M. (1992) Problems of explanation in economic sociology. IN NOHRIA, N. & ECCLES, R. (Eds.) *Networks and Organisations: Structure, Form and Action*. Boston, MA Harvard Business School Press
- GUPTA, J., TERMEER, C. J. A. M. & KLOSTERMANN, J. E. M. (2008) *Institutions for climate change. A method to assess the inherent characteristics of institutions to enable the adaptive capacity of society*. IVM.

- JAKKU, E. & LYNAM, T. (2010) What is adaptive capacity. *South East Queensland Climate Adaptation Research Initiative. Climate Adaptation National Research Flagship. CSIRO.* .
- JONES, C., HESTERLY, W. S. & BORGATTI, S. P. (1997) A general theory of network governance: Exchange conditions and social mechanisms. *Academy of Management Review*, 22, 911-945.
- KLIJN, E.-H. (2010) Policy and Implementation Networks: Managing Complex Interactions. IN CROPPER, S., EBERS, M., HUXHAM, C. & SMITH RING, P. (Eds.) *The Oxford handbook of inter-organizational relations.* . New York, Oxford University Press.
- KLIJN, E. H., EDELENBOS, J. & STEIJN, B. (2010) Trust in Governance networks: its impacts on outcomes. *Administration & Society*, 42, 193-221.
- KOPPENJAN, J. & KLIJN, E. H. (2004) *Managing Uncertainties in Networks - A network approach to problem solving and decision making*, New York, Routledge.
- LEVINA, E. & TURPAK, D. (2006) Adaptation to Climate Change: Key Terms. France, Organisation for Economic Co-operation and Development (OECD).
- LONG, N. (1958) THE LOCAL-COMMUNITY AS AN ECOLOGY OF GAMES. *The American journal of sociology*, 64, 251-261.
- LUBELL, M. & FULTON, A. (2007) Local diffusion networks act as pathways to sustainable agriculture in the Sacramento River Valley. *California Agriculture*, 61, 131-137.
- LUBELL, M. & FULTON, A. (2008) Local policy networks and agricultural watershed management. *Journal of Public Administration Research and Theory*, 18, 673-696.
- LUBELL, M., HENRY, A. D. & MCCOY, M. (2010) Collaborative Institutions in an Ecology of Games. *American Journal of Political Science*, 54, 287-300.
- LUBELL, M., SCHNEIDER, M., SCHOLZ, J. T. & METE, M. (2002) Watershed partnerships and the emergence of collective action institutions. *American Journal of Political Science*, 46, 148-163.
- MATTHEWS, R. & SYDNEYSMITH, R. (2010) Adaptive Capacity as a Dynamic Institutional Process: Conceptual Perspectives and Their Application. IN ARMITAGE, D. & PLUMMER, R. (Eds.) *Adaptive Capacity and Environmental Governance*. Berlin, Springer.
- MCCARTHY, J. J., CANZIANI, O. F., LEARY, N. A., DOKKEN, D. J. & WHITE, K. S. (2001) Climate Change 2001: Impacts, Adaptation, and Vulnerability Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. IN. (Ed.). New York, Cambridge University Press.
- MEASHAM, T., PRESTON, B., SMITH, T., BROOKE, C., GORDDARD, R., WITHYCOMBE, G. & MORRISON, C. (2011) Adapting to climate change through local municipal planning: barriers and challenges. *Mitigation and Adaptation Strategies for Global Change*, 1-21.
- MOSER, S. C. & EKSTROM, J. A. (2010) A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences of the United States of America*, 107, 22026-22031.
- PAAVOLA, J. & ADGER, W. N. (2006) Fair adaptation to climate change. *Ecological Economics*, 56, 594-609.
- PELLING, M., HIGH, C., DEARING, J. & SMITH, D. (2008) Shadow spaces for social learning: a relational understanding of adaptive capacity to climate change within organisations. *Environment and Planning A*, 40, 867-884.
- PILLORA, S. (2011 ) Australian Local Government and Climate Change, Working Paper no.1. Sydney, Australian Centre of Excellence for Local Government, University of Technology.
- PRESTON, B. L., WESTAWAY, R. M. & YUEN, E. J. (2010) Climate adaptation planning in practice: an evaluation of adaptation plans from three developed nations. *Mitigation and Adaptation Strategies for Global Change*, 16, 407-438.
- ROBINS, G., BATES, L. E., PATTISON, P. & LUSHER, D. (2010) Climate Adaptation behaviours in multi-level governance environments: A proposed network-based research design. *Collaborative Research Report Climate Adaptation Flagship*. Perth, Climate Adaptation Flagship, CSIRO.
- SCHNEIDER, M., SCHOLZ, J., LUBELL, M., MINDRUTA, D. & EDWARDSSEN, M. (2003) Building Consensual Institutions: Networks and the National Estuary Program. *American Journal of Political Science*, 47, 143-158.
- SCHOLZ, J. T., BERARDO, R. & KILE, B. (2008) Do networks solve collective action problems? Credibility, search, and collaboration. *Journal of Politics*, 70, 393-406.

- SCOTT, J. & WESTON, C. (2011) The pitfalls and promises of climate adaptation planning. *Australasian Journal of Environmental Management*, 18, 73-87.
- UZZI, B. (1996) The sources and consequences of embeddedness for the economic performance of organizations: The network effect. *American sociological review*, 61, 674-698.
- UZZI, B. (1997) Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42, 35-67.