

# Systematic Review Approach to identifying key trends in adaptation governance at the supranational level

Working Paper No. 93

CGIAR Research Program on Climate Change,  
Agriculture and Food Security (CCAFS)

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Daniella Echeverría  
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RESEARCH PROGRAM ON  
Climate Change,  
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Working Paper

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## **Abstract**

In this paper we analyzed peer-reviewed literature on adaptation governance focused on food security at the supranational level. A total of 281 papers were collected, of which 52 met our focus. We used 10 criteria (and 74 sub-criteria) to categorize the included papers. With research presented in these papers as our focus, we looked at key aspects of food security explored, identified types of governance measures and major challenges, and finally developed an understanding of the location of the research teams and involved countries. Overall, we found that the supranational focus in the context of adaptation governance on food security is not prevalent in current peer-reviewed literature—only approximately 16 per cent of the papers focus on this topic. In terms of the identified trends, there was a strong focus on developed countries and research led by teams from these countries; the governance systems aimed to prepare for a range of climate change impacts; and finally, there was limited interest in exploring the role of regional agencies in adaptation governance. In terms of future research needs, there is a strong need to develop processes for the integration of diverse sectors and issues when designing policies on food security in the context of climate change. It is also important to improve the skills and opportunities of research teams in the Global South to engage effectively in research on food security and governance.

### **Keywords:**

Adaptation governance, food security, systematic review

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## **Acronyms**

EU	European Union
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Countries
OECD	Organisation for Economic Co-operation and Development

## Introduction

The current focus of the climate change research and policy community is shifting toward governance of adaptation, building on outcomes of climate change impact and vulnerability assessments. This shift requires that we identify institutions, processes and implementation pathways to design strategies, policies and means for their implementation. In this context, adaptation governance includes formal and informal systems and their interactions in order to assist in delivering adaptation actions, and to promote improvements in adaptive capacities and resilience. Together, these steps are meant to reduce vulnerability and climate risks in a specific area, country, or region and on a global scale (Rijke et al., 2012; IPCC, 2012). This understanding of governance integrates specific features of *adaptive governance*, which emphasizes the importance of learning from diverse knowledge systems and experience—including networking and participation among various actors—to facilitate social learning of novel solutions and leadership to navigate change in social processes (Folke et al., 2011).

Recently, this increased interest in adaptation governance has been manifested through peer-reviewed papers assessing governance processes and institutions involved in the development of adaptation in developed countries (in the EU Member States see Biesbroek et al., 2010; for OECD countries see Birkman, 2011); at the city and municipal levels (see Measham et al., 2011; Sharma et al., 2010), in sectors (energy in Sapkota et al., 2014; agriculture in Bizikova et al., 2014; water in Lemieux et al., 2014 and forestry Wellstead et al., 2012); and the role of innovation and new approaches in advancing governance (Biesbroek et al., 2014; Charles, 2012). These papers summarize key aspects of governance by emphasizing the importance of placing adaptation responses into a broader context of multiple stressors and risks, and the critical nature of addressing multi-scale processes through diverse institutions and in partnership with multiple stakeholders. Furthermore, they argue that governance structures should be capable of providing support to specific adaptation actions as well as to actions aiming to promote research, communication, institutional development coupled with providing extension to assist public and stakeholders' groups in risk reduction by changing management practices, adopting new technologies and using forecasts and other means of information in the planning process (IPCC, 2012; Archie et al., 2014). Building on these insights, the importance



of a coordinated governance process at the national, sectoral and local levels is increasingly brought forward as a crucial element for successful implementation of adaptation policies and actions (Adger et al., 2011).

While there has been research conducted on diverse sectoral, national and subnational adaptation planning challenges, it seems that less attention has been devoted to the context of food security. Overall, food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996). This definition comprises four dimensions of food security: food availability, access, utilization and stability (Schmidhuber and Tubiello, 2007). Climate variability and change threaten food security both directly (for example by reducing crop yields) and indirectly (by disrupting the systems and infrastructure that people use to access food). Most studies that have examined these issues have so far focused on the impacts of climate variability or extreme climate events on food, particularly on crop production (for example Ericksen, 2008; World Bank 2010); linkages between climate change and changes in food prices (Wheeler and von Braun, 2013); the stability of food systems and economic returns (Schmidhuber and Tubiello, 2007); and on nutrition and food safety (Lake et al., 2012). However, other aspects of food security, such as decision-making processes in the context of climate change, have not received the same attention.

As a result, we are faced with limited understanding of the complex relationships within a food system to support food security. It is thus difficult to fully grasp what support is needed for governance structures and institutions to improve capacities of the system to absorb climate shocks and stresses without experiencing emergency situations. Furthermore, the literature suggests that less interest seems to be devoted to linkages between national and supranational levels, e.g., on processes and institutional interactions that trickle down from global and regional processes to inform national planning and vice versa. Thus, given the need to increase understanding on how governance advances adaptation to climate change (and noting how failed decisions have detrimental consequences on food security, especially in places already affected by malnutrition and poverty) this paper explores the current status of research and policy on adaptation governance with a specific focus on food security.

# Methodological approach

## Background

The research methodology uses a systematic literature review approach, which involves reviewing documents according to clearly formulated criteria, using systematic and explicit methods to select and critically appraise relevant information (Lesnikowski et al. 2011). This approach, common in health sciences, has recently been applied to climate change studies to assess current knowledge about climate change impacts and adaptation measures, and relies on peer-reviewed literature and national adaptation planning documents focused on water (Larsen et al. 2012), human health (Lesnikowski et al. 2011) in places such as the Arctic regions of Canada (Ford et al., 2010), within climate change hotspot regions (Ford et al., 2013), and in general regarding the governance of adaptation (Biesbroek et al, 2014). In this paper, we build on these applications to analyze documents on issues such as climate change adaptation governance and food security at the national and supranational levels.

## Defining the Scope and Keywords for Online Searches

For the literature searches, we used Google Scholar and ScienceDirect. To collect documents for the review, we started with a set of keywords covering the focus of the study such as “climate change adaptation,” “governance” and “national.” We focused on the time period 2008–2014 as was suggested by Lesnikowski et al. (2011). In total, 281 peer-reviewed papers and 56 pieces of so-called “grey” literature <sup>1</sup>were collected.

Table 1. Overview of inclusions and exclusion criteria

Category	Included	Excluded
Type	Journal papers	Books, book chapters, editorials, grey literature
Language	English	Peer-reviewed papers written in other languages
Publication year	2008 - 2014	Papers published earlier were excluded
Focus	Aspects of agriculture and food security	Other sectoral focus
Geographic scale	National	Subnational; local; farm, operations-level; community-level
	Regional	
	Global	

<sup>1</sup> By grey literature we mean published literature online on publically available sites but without a clear indication of a peer review.

Based on our assessment of the collected documents, we decided to focus the rest of the review on peer-reviewed literature only, as the collected grey literature was not representative. When we tried to cross-check the collected grey literature by looking at the websites of the different organizations, such as the World Bank, Overseas Development Institute, World Resources Institute, we found additional published papers. Thus, we concluded that the online search for the grey literature is not representative because not all of the grey literature collected was referenced properly in online databases. From the peer-reviewed documents we excluded books, book chapters, editorials and book reviews (Table 1).

We then reviewed the collected 281 peer-reviewed papers and assessed their focus in terms of food, food security and agriculture. We created a sub-file with the documents that met the criteria. From this selection process, the final set of articles numbered 52. These papers were assessed according to a set of criteria to gather in-depth insights on the types of governance issues they focus on.

#### **Specifying the list of criteria**

The criteria covered 10 basic areas. The first three categories focused on the basic description such as the level of governance, development status of the country, and the names of the countries. This was followed by the description of the food and agricultural focus and types of governance processes and structures, and identified barriers discussed based on the criteria suggested in Ford et al. 2014; Meadowcroft, 2009.

In terms of assessing the focus on governance and related barriers, we did not find a set of criteria used in previous studies. We thus based our work on a broad definition suggested in a number of recent publications. This included looking at both key steps in adaptation planning and related governance and institutional processes and agreements. For this assessment we used three studies as guidance. First, Rijke et al. (2012) offer an operational framework that includes the identification of purpose, context, and evaluation of the governance outcomes as three key steps for achieving adaptive governance. Second, Ford et al. (2013) look at policies and supporting institutions to advance sectoral adaptation. Finally, Meadowcroft (2009) defines key aspects of national-level governance systems needed to advance adaptation to climate change. We also used these sources to identify a set of governance challenges.

In total, 10 major categories and 74 subcategories are used to describe the papers reviewed in this study.

## **Data Collection and Analysis**

The collected papers were sorted according to the chosen criteria and then information was analyzed using Excel spreadsheets. For the collected material, descriptive and basic statistics were used to summarize quantitative trends in the data. We focused on analyzing the collected information by key types of criteria including:

1. Scale of the focus (i.e., national, regional or global).
2. Focus on the type of aspects of food security and potentially other sectors.
3. Types of adaptation and governance process discussed.
4. Identified key challenges to advance adaptation governance. For each paper we also included the citation and the location of the academic institutions that was involved in the paper development.

For coding, multiple codes could apply to a specific paper. For example, a paper could cover different aspects of adaptation governance, discuss governance in the context of multiple sectors and cover multiple countries and scales. Therefore the sum of the entries per each category is higher than the total number of papers reviewed.

The authors of this paper jointly contributed to the collection and coding of the papers. The team met regularly in person and by phone to identify potential data sources and develop the coding system, followed by a preliminary data collection. Based on the results of this process, the coding system was finalized, including all the categories, their definitions and subcategories. Specifically, for the actual data collection and coding, one team member was responsible for the material collection and two team members responsible for coding them. The results were reviewed by all the team members and the outcomes were presented during a regional workshop. In addition, the draft paper was reviewed by a group of researchers working in the fields of climate change adaptation, food security and governance. All the comments were incorporated into the final version of the paper.

## **Limitations of the Methods**

The findings of this paper are based on information accessed through peer-reviewed papers with a focus on the supranational level. During this review, we did not include subnational institutions and organizations that have a significant role in enabling the implementation of these supranational governance priorities and issues. In future, it would be important to link our assessment with studies and papers focused on the subnational level to ensure that synergies between local needs and the directions suggested at the supranational level are integrated in the analysis.

Furthermore, we focused only on peer-reviewed literature due to challenges in narrowing down specific grey literature when using only online searches. There are many different organizations, and hence potential sources, such as international organizations active at the global, regional and national level [e.g. United Nations Environment Programme, Global Environment Facility and World Bank, The Mekong River Commission, Organisation of Eastern Caribbean States] that provide policy and strategic advice on issues relevant to the focus of this paper. In future, it would be important to select a set of key institutions that conduct detailed review of published grey literature and identify trends compared to those observed in the peer-reviewed literature.

## **Results**

In total, 52 peer-reviewed papers on adaptation governance that focused on food security were assessed according to the countries and specific aspects of food security, types of climate change impacts (and related governance measures) discussed and barriers for governance identified. Finally, we also assessed the country affiliation of the authors to indicate where most research support originates from.

### **Scale and Development Status of the Countries Analyzed in the Reviewed Papers**

We assessed three levels of focus regarding supranational adaptation governance—national, regional and global. From these scales, the most prevalent was the focus on the national level, and often accompanied with a focus on a specific country. Half of all the papers (26 papers) covered multiple scales, giving to national and global scales such as national water scarcity and its global effects on food security; comparison in adaptation governance challenges between North and South in terms of biofuels and food security; and how to translate global priorities to the national level. The regional focus was much less significant and was covered by only a third of the papers. Most of the discussion was focused on shared issues and challenges within regions such as the European Union (six papers), and sub-Saharan Africa (six papers). Other regional focuses included the Mekong Delta, the Caribbean and the South East Asian regions.

In terms of development status, most of the focus was on developed countries. However, around half of the papers also discussed governance issues in developing countries and Least Developed Countries. The lowest documented focus was on

emerging economies. In terms of the specific country focus we identified 45 countries, with prominence on developed countries such as Australia (six papers), United Kingdom (six papers), the United States (four papers), Finland (four papers), and the Netherlands (three papers).

Table 2. Overview of the development and spatial focus on the reviewed papers

Criteria	Sub-criteria	Scores
Geographic scale	National	41
	Regional	18
	Global	25
Geographic location	Listing the region, country	45 countries included; Australia (six), UK (six), United States (four), Finland (six), Netherlands (three); Bangladesh (two), Mozambique (two), Spain (two); Mexico (two), Germany (two), Canada (two)
Level of development	Least Developed Countries (LDCs)	24
	Emerging economy	18
	Developing country (if not LDC or emerging)	28
	Developed country	33

## Aspects of Agriculture & Food Security and Other Sectors Assessed in the Papers

To gain deeper insight into the texts relevant for our focus we looked at specific aspects of food security as well as the broader systems needed to ensure it. This approach recognizes that food security must be ensured in the context of a system, including its specific contexts such as available environmental resources, market participation, social interactions and preferences, and political leadership and governance systems. When the collected papers were assessed, we looked at key aspects of food security, such as food access, utilization and availability. We also looked at related systems, including types of productions, related infrastructure and markets (Table 3).

The reviewed papers covered in two basic areas: policies aiming at agriculture and food security, and exploration of the natural resource base necessary to ensure food production and food access. In terms of focusing on policy and planning instruments, these mostly included exploring National Adaptation Programmes of Action, adaptation strategies, National Communications and development plans to ensure that measures on responding to climate change consider food security, agricultural production and overall needs for risk reduction in food production. This also includes

exploring specific policies on drought and flood responses and their impacts on food security. In this context, most of the institutions examined included ministries of agriculture and agencies dealing with climate change.

Papers focused on natural resources looked at the potential of soil, water and biodiversity (together with available technological solutions) to produce the amount of food needed to feed global and national populations. These papers focus on analyzing climate change impacts on key resources food production and needed policies and governance for adaptation actions to address climate impacts.

Finally, most of the listed issues were discussed in tandem: for example, the focus on an adaptation policy and strategy was used to provide context for the integration of policies/adaptation actions in natural resource management and access to food into the policy process. Similarly, the interplay between diverse policy instruments on water, rural development, agriculture and ecosystem services was often discussed together with their contributions to providing food and other benefits (e.g., fuel and fibre) as well as the extent to which concerns about these policy instruments are incorporated into global and regional governance (e.g., the adaptation or mitigation strand of the climate convention process or in environmental components of regional trade agreements; and the interplay between these policies and private companies and corporations in ensuring food security within changing global supply chains in the context of climate change).

Table 3. Overview of the sectoral focus of the papers

Category	Subcategory	Score
Aspect of agriculture & food security addressed	Nutrition	12
	Food availability	23
	Food access	14
	Infrastructure	7
	Natural resource base	21
	Policy (food safety, trade, agriculture)	35
	Plant production	13
	Livestock production	10
	Agricultural production inputs	9
	Markets	8
	Pastoralism	0
Sectoral focus (secondary to agriculture & food):	Forests/forestry	3
	Fisheries	2
	Water	22
	Human health	8

	Infrastructure	5
	Human settlements	3
	Tourism	1
	Industry (including energy)	8
	Social protection	3
	Biodiversity	8
	Multisectoral (more than three sectors)	17
	Other	7

## Focus on Mitigation Issues When Discussing Adaptation Governance

This category explored the question of whether adaptation governance systems are discussed in the context of mitigation needs and related institutions and decision making. Our review indicates that only 38 per cent (19) of reviewed papers had this focus. Because our main focus is on food security, mitigation issues were discussed in the context of agriculture and livestock sectors and biofuel production, as well as coordination of adaptation and mitigation efforts in policy coordination at the national level.

In terms of in-depth discussion on mitigation, the issues related to the following: different plant and livestock management practices to reduce greenhouse gas emissions while improving adaptive capacities; the impacts of biofuel production on food and water security and contribution to energy production; and, in the context of research to investigate specific types of efforts and funding allocations on mitigation and adaptation in agriculture and food security. Finally, in terms of governance structures, the focus regarding mitigation was on coordination and identification of trade-offs between adaptation and mitigation decisions to address these activities. Both of these were considered in the context of sustainable development, inequalities and justice intertwined with the relationship between mitigation and adaptation, the level and distribution of assistance, and planning and decision making regarding adaptive and mitigation responses.

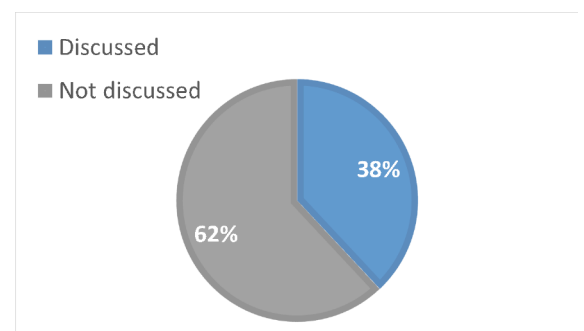


Figure 1. Overview of the distribution of the focus of papers on mitigation issues (N= 52 papers)



## Climate Change Impact Discussed

More than half (32) of the reviewed papers discussed the issue of adaptation governance in the context of the ability of institutions and processes to enable response capacity to climate change impacts without focusing on any specific types of impacts. A brief review of climate change impacts is often provided in the reviewed papers; however, this review acted more as an introduction or context-setter than a major focal point that the papers built on. The review found that governance issues are largely discussed in the following contexts: the ability of institutions, policies and related processes to address both direct and indirect impacts of climate change on food security and production systems; reducing climate vulnerabilities mostly focused on improving conditions and capacities of vulnerable people; and needed policy development and institutional interactions. In this context, the role of climate science and information on impacts is discussed, but it is rather viewed as one of many needed inputs to enable effective governance.

When specific impacts are addressed in the reviewed papers, the focus was often on drought, floods and extreme events. In these cases, the focus was on discussing specific governance processes and existing policies and strategies to respond to specific current and potentially more severe climatic events such as larger floods and more severe droughts. In these papers the specified impacts are related to diverse sectors such as agriculture, forest, water and coastal management

Table 4. Overview of types of climate change impacts discussed in the papers

Category	Subcategory	Score
Climate change impact discussed	Sea-level rise	1
	Temperature rise	4
	Droughts,	10
	Changes in precipitation	6
	Floods	10
	Extreme events	6
	Pest infestation	0
	Other	3
	Generic information on climate change impacts for which to be prepared	38

## **Governance Aspects Analyzed and Major Barriers Identified**

In reviewing the papers, we distinguish 15 categories of different aspects of adaptation governance. These criteria sufficiently covered the diverse aspects of governance, as only six entries out of 184 included other aspects (as indicated in Table 4 and Figure 2). When assessing the aspects of adaptation governance, we looked at two types of governance actions: (1) creating new policy frameworks, institutional agreements or policies; and (2) working with the existing policies, or mainstreaming into existing systems and institutions. From these two different types of actions, the focus of the papers was primarily on working with existing systems and policies using tools such as mainstreaming and channelling adaptation measures and policies through vertical and horizontal coordination and reviews to tailor existing policies to adaptation needs. Overall, these groups of subcategories covered 83 entries while focus on new policies, strategies and institutions only covered 40.

In the context of working with existing systems, the greatest focus was on promoting mainstreaming of climate change adaptation into current policies and strategies. In reference to food security, this meant mainstreaming of adaptation into overarching development documents/goals as well as into sectoral strategies and policies including agriculture, water, health, natural resource management and infrastructure. It was emphasized that linking adaptation to food security at the level of strategic development priorities and goals helps ensure effective mainstreaming. Taking this further, the next step suggested was to mainstream adaptation needs with sectoral approaches as well promoting coordination between these sectors. The importance of mainstreaming is also emphasized in terms of effective risk reduction to climate change which is able to account for risks that cross sectoral silos.

The importance of cross-sectoral collaborations is stressed at both the national level and subnational levels. In this way, horizontal and vertical collaborations are connected processes implemented to ensure that adaptation actions are relevant for both national and local needs and priorities. The purpose of these collaborations is also to ensure that synergies, trade-offs and pathways of change can be identified at all governance levels and reflect specific conditions. This includes transparent and flexible processes to policy actors in all levels to enable policy negotiations, accountability and monitoring of impacts of their implementation.

Some of the reviewed papers divided their focus on adaptation governance between a broader national approach to address many diverse climate and other risks or one that focused on spatial, in-depth adaptation planning in highly vulnerable places. In the

latter, when prioritizing and implementing adaptation responses, “hot spots”—where a high proportion of the population suffers from malnutrition, hunger and extreme poverty and other challenges—are given top priority.

An important part of adaptation governance directly emphasized in the papers is the need for new, flexible forms of multilevel governance. These would provide institutional support for experimentation and learning as a dynamic strategy to deal with multi-faceted challenges. This includes transparent governance mechanisms that can meaningfully acknowledge and negotiate the complexity arising from the manifestation of diverse values—for example, deliberative platforms for adaptive action involving wide sets of stakeholders in effective participation and policy dialogue both horizontally and vertically.

Relatedly, the documents saw it as crucial that participatory approaches and processes of engagement be established within the planning framework and governing institutions. This would allow them to work collectively to design and mainstream adaptation strategies and policies. Legitimate and inclusive institutions can play a key role in achieving this through formal and informal institutions and social networks. Exchange of knowledge and information, trust building and openness to experimentation were seen as necessary prerequisites for effective adaptation governance, especially at the national and subnational levels. Governance mechanisms that can meaningfully acknowledge and negotiate the complexity arising from the manifestation of diverse values—such as, for example, deliberative platforms for adaptive action involving wide sets of stakeholders including those from the national to the local levels and those that will be engaged in implementation at all scales.

It was also recognized that the challenges of participation and engagement are hard to ensure at the regional and global levels. It was stressed that institutional arrangements need to be developed in a way such that they are capable of linking both local and global issues. They could do this by enhancing their capability to address climate change and challenges in an effective and efficient way, and allowing regional institutions to act as the mediating organizations for responding to global challenges.

Interaction and coordination at the supranational level is also discussed in the context of harmonizing international funding agencies’ priorities with national-level priorities. Improvements in dialogue at the three scales help to create more dynamic interaction between local and international goals on food security. This is primarily proposed

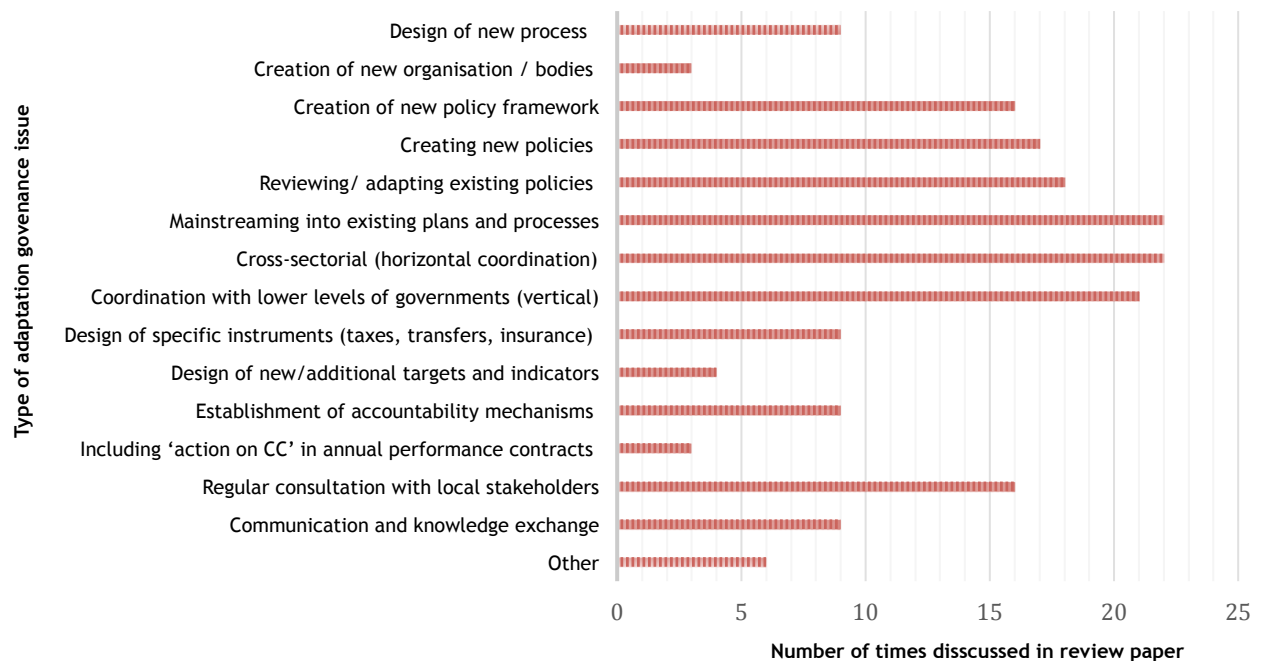
through better coordination between global and regional institutions to help integrate national level adaptation needs into the priorities of regional and global agencies as well as sharing of experiences between different countries to support capacity development.

In terms of linkages between governance and research needs, the general call is to widen and diversify the expertise and science base. This includes policy-relevant research on food production in the context of food security, addressing gaps in strategic planning, linking food-security challenges with economic dimensions (especially price variability), and engaging communities of practice such as different groups in the value chains, banking and other private entities and, policy-makers from agencies relevant to food security. There is also an identified need to better coordinate and institutionalize regional climate science in the involved counties so it integrates science outcomes with actual governance processes.

Table 5. Overview of key types of adaptation governance focus in the reviewed papers (N = 184)

Subcategory	Score
Design of new process (e.g., national vulnerability assessments every five years)	9
Creation of new organizations/bodies (e.g. climate change secretariat – Kenya)	3
Creation of new policy framework	16
Creating new policies	17
Reviewing/adapting existing policies	18
Mainstreaming into existing plans and processes	22
Cross-sectoral (Horizontal coordination)	22
Coordination with lower levels of governments (vertical)	21
Design of specific instruments (taxes, transfers, insurance)	9
Design of new/additional targets and indicators	4
Establishment of accountability mechanisms (e.g. reporting to parliament every year including “action on climate change” in annual performance contracts, etc.)	9
Regular consultation with local stakeholders	16
Communication and knowledge exchange	9
Other	6

Figure 2. Overview of the different types of adaptation governance issues discussed in the review paper in the context of food security (N = 184)



## Identified Governance Challenges

The reviewed papers identified a number of challenges when advancing adaptation governance. In the created categories we distinguished eight diverse types of barriers (Table 6). Approximately only 15 per cent of the total entries covered areas other than the identified categories. Among the most listed barriers was the lack of inclusion of approaches/challenges to implement integrated approaches in the current adaptation governance.

In terms of specific focus on food security, it was emphasized that there is a strong need for integration across an array of areas and sectors such as climate change, agriculture, infrastructure, health, economic and investment priorities, rural development, and environmental agendas. It was suggested that it is crucial to bring these sectors together in order to identify complex trade-offs, effectively address risks and create effective accountability and transparency among them. Limited recognition of these trade-offs often results in food insecurity because of high sensitivities to shocks such as climate change hazards and impacts as well as environmental change, market and policy failures—all of these have implications for food security and adaptation strategies.

Furthermore, adaptation so far is narrowly centred on climate change and overlooks institutional capacity and its associated challenges. For example, it was noted that the science and policy of climate change, food systems, and health remain disconnected across a range of institutions and government portfolios. This has the effect of limiting the capacity of policy-makers and decision makers to address these complex challenges. It is critical, when attempting to identify coherent policy solutions, to understand and take into account the synergistic impacts of these interlinked systems.

Also listed were the lack of political commitment to support practice and procedures for adaptation planning and the inconsistent use of existing adaptation guidance, suggesting that this limitation leads to many institutions operating largely in an ad hoc manner without a standardized planning process.

Other barriers identified in the review included the low level of effective coordination between high-level policy-making processes and coordination of local actions to address climate change. Overall, the absence of steering and designating resources for the design and implementation of adaptation measures at subnational scales allows only those municipalities that have the capacity and resources to move ahead on adaptation strategies. In addition, this raises the issue of maladaptation, where a lack of coordination between regional, national and/or local bodies may ultimately prove counterproductive to wider adaptation efforts in future.

Finally, the other issues mentioned included the vague definitions coming from adaptation science and actions. For example, calls to address the needs of vulnerable groups may be impaired due to the difficulty in identifying and separating these groups from the rest of the poor people, and thus could lead to widening inequalities in access to food and other resources.

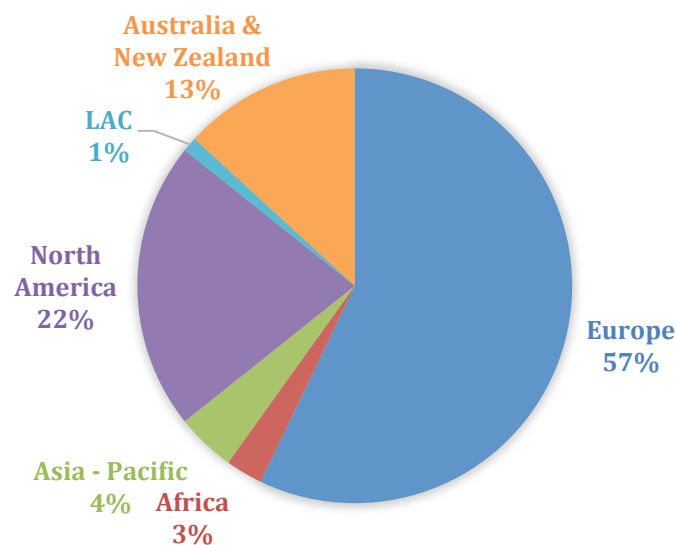
Table 6. Overview of the challenges mentioned in the reviewed papers (N = 117)

Criteria	Scores
Political commitment	13
Insufficient science	13
Lack of subnational support	11
Lack of global, regional framework	10
Legislative	10
Consultation, participation challenges	13
Monitoring	4
Lack of integrated approaches/challenges to implement integrated approaches	27
Other	16

### Author Affiliations

Based on the conducted review, most of the research (57 per cent) was carried out by researchers affiliated with European research institutions. This is followed by research teams based in North America (22 per cent). Lowest involvement was observed from research teams based in Africa, Asia Pacific and Latin America and the Caribbean, which accounted for only 8 per cent of the authorship out of all the reviewed papers.

Figure 3. Affiliations of authors listed in the reviewed papers



### Discussions

In this paper, we analyzed peer-reviewed literature on adaptation governance focused on food security at the supranational level. In this context, we looked at key aspects of

food security explored by these papers, identified types of governance measures and major challenges, and finally developed an understanding of the location of the research teams and countries involved in the research presented by the reviewed papers. Overall, the supranational focus in the context of adaptation governance on food security was not found to be prevalent in the current peer-reviewed literature. Only approximately 16 per cent of the papers focus on this topic. In terms of the identified trends in the reviewed papers we can conclude that major issues included:

- A strong focus on developed countries and the research led by research teams from these countries.
- A strong focus to improve governance systems to prepare for a range of climate change impacts.
- A limited interest in exploring the role of regional agencies in adaptation governance.
- A recognition of the limited guidance on integration of adaptation on food security across sectors and scales of governance.

In terms of the focus on climate change, the review indicated that most of the research focus was on the ability of policies, governance structures and processes to be adaptable in the context of a wide range of potential climate change impacts, as opposed to adaptable to specific responses to narrowly defined impacts such as drought and flood projections. This suggests a departure from the direct focus on specific links between climate impacts and adaptation needs toward a broader, adaptive governance approach. This approach also emphasizes a call for a new kind of climate change research agenda that addresses climate change in the context of multiple challenges, identifying policies and actions to improve resilience and to improve abilities of countries to respond to multiple impacts. Key elements to designing such governance systems include increased participation, experimentation and learning to identify suitable policies and actions, all of which are integral to the governance process and cross-sectoral and cross-scale coordination.

While we emphasize the importance of experimentation and learning as part of the planning process, there was also a strong call for standardized planning adaptation governance and planning processes. It was stressed that current approaches to adaptation are rather ad hoc, and policy-makers lack guidelines on procedures, especially when it comes to food security. However, a growing number of papers address adaptation issues other than food security, potentially considering how to translate adaptation governance processes and issues to other sectors relevant to food security.



The challenges in the area of food security also included creating effective linkages between diverse sectors to identify trade-offs and synergies between adaptation actions. To address food security in the context of climate change, it requires involvement of agriculture, health, natural resource management, rural development and other sectors which would need coordination, which poses significant challenges in terms of creating accountable and transparent governance processes. It was reported that compared to other sectoral adaptation, these coordination issues might be more prevalent in the context of food security. Similar efforts were suggested to explore cross-scale coordination so national priorities are linked with local food security needs and capacities to enable implementation.

Finally, the findings of the review indicate that most of the research is conducted by research teams from developed countries and is mostly focused on these countries. Some of these papers covered governance issues in developing countries, but again were largely carried out by research groups located in developed countries. It would be important to assist research groups in developing countries to encourage and support research on their regions.

## **Concluding remarks—Identified gaps and future research needs**

The review revealed a number of gaps and research needs, giving an opportunity to support additional research and improve understanding of climate change adaptation governance and its relevance to food security. In terms of adaptation governance and food security, the following opportunities were identified:

- Building on the existing adaptation governance processes to identify means of effective integration and coordination of diverse sectoral priorities to promote climate change adaptation in the context of food security.
- Creating standardized procedures that policy-makers can follow when developing adaptation strategies to address food security challenges.
- Helping policy-makers engage in transparent trade-offs and synergies assessments by involving diverse stakeholder groups as a way to collectively identify acceptable responses to improve food security in the context of climate change at the national and subnational levels.

Improving capacities to undertake research and policy development on adaptation governance on food security:

- Improving capacities of research teams in developing countries to lead research on these issues with a focus on governance issues and processes.
- Developing climate impact information that focuses on impacts of specific aspects of the food system in the context of multiple threats to guide policy development.
- Exploring the role of regional agencies in assisting in knowledge and skills transfer to improve capacities at the national and subnational levels to address these issues.

# Appendix

## List of criteria

Criteria	Sub-criteria
<b>Geographic scale</b>	National
	Regional
	Global
<b>Geographic location</b>	Listing the region, country
<b>Level of development</b>	LDC
	Emerging economy
	Developing country (if not LDC or emerging)
	Developed country
<b>Aspect of agriculture &amp; food security addressed</b>	Nutrition
	Food availability
	Food access
	Infrastructure
	Natural resource base
	Policy (food safety, trade, agriculture)
	Plant production
	Livestock production
	Agricultural production inputs
	Markets
	Pastoralism
<b>Sectoral focus (secondary to agriculture &amp; food)</b>	Forests/forestry
	Fisheries
	Water
	Human health
	Infrastructure
	Human settlements
	Tourism
	Industry including energy
	Social protection
	Biodiversity
	Multisectoral (more than three sectors)
	Other
<b>Mitigation</b>	YES OR NO AND details in the box next to it
<b>Climate change impact discussed</b>	Sea-level rise
	Temperature rise
	Droughts
	Changes in precipitation,

	Floods
	Extreme events
	Pest infestation
	Other
	Generic information on climate change impact to be prepared for
<b>Type of adaptation actions</b>	General awareness raising on the need for adaptation
	(Scientific) understanding of impacts / research of climate change
	Risk assessment
	Identifying options for adaptation
	Planning (developing strategies and policies)
	Financing / resource mobilization
	Technology transfer
	Capacity building
	Behavioural change
	Monitoring of both impacts and progress in adaptation
	Evaluation
	Stakeholder engagement
	Field implementation
	Other
<b>Governance aspects</b>	Design of new process (e.g., national vulnerability assessments every five years);
	Creation of new organizations/bodies (e.g., climate change secretariat – Kenya)
	Creation of new policy framework
	Creating new policies
	Reviewing/ adapting existing policies
	Mainstreaming into existing plans and processes
	Cross-sectoral (Horizontal coordination)
	Coordination with lower levels of governments (vertical)
	Design of specific instruments (taxes, transfers, insurance)
	Design of new/additional targets and indicators
	Establishment of accountability mechanisms (e.g. reporting to parliament every year)
	Action on climate change in performance contracts, strategies
	Regular consultation with local stakeholders
	Communication and knowledge exchange
Other	
<b>Identified governance challenges:</b>	Lack of political commitment
	Insufficient science
	Lack of subnational support
	Lack of global, regional framework
	Legislative
	Consultation, participation challenges

	Monitoring
	Lack of integrated approaches/challenges to implement integrated approaches
	Other

## References

- Adger, W. N., Brown, K., Nelson, D. R., Berkes, F., Eakin, H., Folke, C. ... & Tompkins, E. L. (2011). Resilience implications of policy responses to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 2(5), 757-766.
- Archie, K. M., Dilling, L., Milford, J. B., & Pampel, F. C. (2014). Unpacking the 'information barrier': Comparing perspectives on information as a barrier to climate change adaptation in the interior mountain West. *Journal of environmental management*, 133, 397-410.
- Biesbroek G. R., R. J. Swart, T. R. Carter, C. Cowan, T. Henrichs, H. Mela... D. Rey (2010). Europe adapts to climate change: Comparing national adaptation strategies. *Global Environmental Change*, 20: 440–450
- Biesbroek GR, Termeer CJAM Klostermann JEM, Kabat P (2014) Rethinking barriers to adaptation: mechanism-based explanation of impasses in the governance of an innovative adaptation measure. *Global environmental change: human and policy dimensions* 26: 108 - 118
- Birkmann, J. (2011). First-and second-order adaptation to natural hazards and extreme events in the context of climate change. *Natural Hazards*, 58(2), 811-840.
- Bizikova L., E. Crawford Boettcher, Nijnik, M. Swart R. 2014. Review of Key National and Regional Policies and Incentives to Support Adaptation and Adaptive Capacity in the Agricultural Sector. *Mitigation and Adaptation Strategies for Global Change* 19 (4): 411-430
- Charles, A. (2012) People, oceans and scale: governance, livelihoods and climate change adaptation in marine social–ecological systems. *Current Opinion in Environmental Sustainability*, 4:351–357
- Ericksen P. J. 2008. Conceptualizing food systems for global environmental change research. *Global Environmental Change*, 18. 234–245.
- Ericksen, P. J., Ingram, J. S. I. and Liverman, D. M., 2009. Food security and global environmental change: emerging challenges. *Environmental Science & Policy*, 12(4). 373–77.
- Ford, J.D., Pearce, T., Durden, F., Furgal, C. and Smith, B. (2010). Climate change policy responses for Canada's Inuit population: the importance of and opportunities for adaptation. *Global Environmental Change*. 20: 177–191.
- IPCC (2012) Summary for Policymakers. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change.

- Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 1-19.
- Lake, I. R., Hooper, L., Abdelhamid, A., Bentham, G., Boxall, A.B.A., Draper, A., Fairweather-Tate, S., Hulme, M., Hunter, P.R., Nichols, G., Waldron, K.W., 2012. Climate change and food security: Health impacts in developed countries. *Envir. Health Perspect*, 120(11). 1520–1526.
- Larsen, R. K., Swartling, Å. G., Powell, N., May, B., Plummer, R., Simonsson, L., & Osbeck, M. (2012). A framework for facilitating dialogue between policy planners and local climate change adaptation professionals: Cases from Sweden, Canada and Indonesia. *Environmental Science & Policy*, 23, 12-23.
- Lemieux CJ, PA Gray, AG Douglas, G Nielsen, D Pearson (2014) From science to policy: The making of a watershed-scale climate change adaptation strategy. *Environmental Science & Policy* 42: 123-137
- Lesnikowski, A. C., Ford, J. D., Berrang-Ford, L., Paterson, J. A., Barrera, M., & Heymann, S. J. (2011). Adapting to health impacts of climate change: a study of UNFCCC Annex I parties. *Environmental Research Letters*, 6(4), 044009.
- Meadowcroft J. (2009) Climate Change Governance. Policy Research Working Paper no. 4941. The World Bank; Development Economics, World Development Report Team, Washington, DC.
- Measham, T.G., B.L. Preston, T.F. Smith, C. Brooke (2011) Adapting to climate change through local municipal planning: barriers and challenges. *Mitig Adapt Strateg Glob Change* 16: 889–909
- Reidsma P, Ewert F, Lansink AO et al (2010) Adaptation to climate change and climate variability in European agriculture: the importance of farm level responses. *Eur J Agron* 32:91–102
- Rijke J, Brown R, Zevenbergen C, Ashley R, Farrelly M, Morisom P, van Herk S (2012) Fit for purpose governance: A framework to make adaptive governance operational. *Environmental Science and Policy* 22: 73-84.
- Sapkota, A., Lu, Z., Yang, H., & Wang, J. (2014). Role of renewable energy technologies in rural communities' adaptation to climate change in Nepal. *Renewable Energy*, 68, 793-800.
- Schmidhuber, J & Tubiello, F., 2007. Global food security under climate change. *PNAS*, 104(50). 19703–19708.
- Sharma, D. and Tomar, S. (2010) Mainstreaming climate change adaptation in Indian cities. *Environment and Urbanization* 19(1): 65 – 79.
- Wellstead A., J. Rayner, M. Howlett (2012) People, oceans and scale: governance, livelihoods and climate change adaptation in marine social–ecological systems

Current Opinion in Environmental Sustainability, Volume 4, Issue 3, July 2012,  
Pages 351-357

Wheeler, T. R. and von Braun, J., 2013. Climate change impacts on global food security. *Science* 341(6145). 508–513.

World Bank, 2010. World Development Report 2010: Development and Climate Change. Washington, D.C., World Bank.

World Food Summit. (1996). Rome Declaration on World Food Security. *Population and Development Review*, 22(4): 807-809.



## Supplementary material

### Included peer-reviewed papers

- Adger, W.,N. (2010). Climate Change, Human Well-Being and Insecurity. *New Political Economy*, 15(2): 275-292
- Adger, W.,N., S. Dessai, M. Goulden, M. Hulme, I. Lorenzoni, D.R. Nelson ... A. Wreford (2009). Are there social limits to adaptation to climate change? *Climate Change*, 93:335-354
- Agrawal A., A. Chhatre, R. Hardin (2009) Changing Governance of the World's Forests. *Science*, 320: 1460 – 1462
- Agrawala S., M. Van Aalst (2008) Adapting development cooperation to adapt to climate change. *Climate Policy* 8: 183–193
- Ayers J. and S. Huq. (2008). The Value of Linking Mitigation and Adaptation: A Case Study of Bangladesh. *Environmental Management*, 43(5): 753-764
- Biermann, F. and I. Boas. (2010). Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees. *MIT Press*, 10(1):60-88
- Biermann, F., M. M. Betsill, S. Camargo Vieira, J. Gupta, N. Kanie, L. Lebel, ... R. Zondervan (2010). Navigating the anthropocene: the Earth System Governance Project strategy paper. *Science Direct*, 2: 202-208.
- Biesbroek G. R., R. J. Swart, T. R. Carter, C. Cowan, T. Henrichs, H. Mela... D. Rey (2010). Europe adapts to climate change: Comparing National Adaptation Strategies. *Global Environmental Change*, 20: 440–450
- Bizikova L., E. Crawford Boettcher, Nijnik, M. Swart R. (2014). Review of Key National and Regional Policies and Incentives to Support Adaptation and Adaptive Capacity in the Agricultural Sector. *Mitigation and Adaptation Strategies for Global Change* 19 (4): 411-430
- Bizikova L., M. Nijnik and A. Nijnik (2014). A role of institutions and collaboration in adaptation planning to climate change in agriculture in transition countries. *Mitigation and Adaptation Strategies for Global Change*.
- Butler, C. D. (2009). Food security in the Asia-Pacific: climate change, phosphorus, ozone and other environmental challenges. *Asia Pacific journal of clinical nutrition*, 18(4), 590.
- Conway, D. and Schipper, E.L. (2011). Adaptation to climate change in Africa: Challenges and opportunities identified from Ethiopia. *Global Environmental Change* 21: 227–237
- Daniell, K.A., M. A. Máñez Costa, N. Ferrand, A. Kingsborough, P. Coad, I. Ribarova. (2010). Aiding multi-level decision-making processes for climate change mitigation and adaptation. *Regional Environmental Change*, 11(2): 243-258.
- Deere-Birkbeck D. (2009) Global governance in the context of climate change: the challenges of increasingly complex risk parameters *International Affairs* 85 (6): 1173–1194

- Eakin, H., S. Eriksen, P-O. Eikeland and C. Øyen. (2011). Public Sector Reform and Governance for Adaptation: Implications of New Public Management for Adaptive Capacity in Mexico and Norway. *Environmental Management*, 47:338–351
- Edwards, F., J. Dixon, S. Friel, G. Hall, K. Larsen, S. Lockie, B. Wood, M. Lawrence ... L. Hattersley (2011). Climate Change Adaptation at the Intersection of Food and Health. *Asia-Pacific Journal of Public Health*, 23: 91S-104S
- Erickson, P.J., J.S. Ingram and D.M. Liverman. (2009). Food security and global environmental change: emerging challenges. *Environmental Science & Policy*, 12(4): 373-377
- Folke, C., Å. Jansson, J. Rockström, P. Olsson, S. Carpenter, F. S. Chapin III ... F. Westley. (2011). Reconnecting to the biosphere. *AMBIO: A Journal of the Human Environment*, 40(7):719-738
- Garcia, S. M. and A. A. Rosenberg. (2010). Food security and marine capture fisheries: characteristics, trends, drivers and future perspectives. *Philosophical Transactions of the Royal Society*, 365 (1554): 2869-2880
- Glaas, E. and S. Juhola. (2013). New Levels of Climate Adaptation Policy: Analyzing the Institutional Interplay in the Baltic Sea Region. *Sustainability*, 5: 256-275
- Gupta J. and L. Lebel (2009) Access and allocation in earth system governance: water and climate change compared. *Int Environ Agreements* (2010) 10:377–395
- Hanjra, M. and M. E. Qureshi. (2010). Global water crisis and future food security in an era of climate change. *Food Policy*, 35: 365–377
- Hardee, K. and C. Mutunga (2010). Strengthening the link between climate change adaptation and national development plans: lessons from the case of population in National Adaptation programmes of Action (NAPAs). *Mitigation and Adaptation Strategies for Global Change*, 15: 113–126
- Huntjens, P., L. Lebel, C. Pahl-Wostl, J. Camkin, R. Schulze, and N. Kranz. (2012). Institutional design propositions for the governance of adaptation to climate change in the water sector. *Global Environmental Change*, 22: 67–81
- Ingram J. (2011) A food systems approach to researching food security and its interactions with global environmental change. *Food Sec.* 3:417–431
- Juhola, S. and L. Westerhoff. (2011). Challenges of adaptation to climate change across multiple scales: a case study of network governance in two European countries. *Environmental Science & Policy*, 14: 239-247
- Lesnikowski, A.C., J.D. Ford a, L. Berrang-Ford, M. Barrera, ... S.J. Heymann. (2013). National-level factors affecting planned, public adaptation to health impacts of climate change. *Global Environmental Change*, 23: 1153–1163
- Liverman, D. and S. Billett. (2010). Copenhagen and the Governance of Adaptation. *Environment: Science and Policy for Sustainable Development*, 52(3): 28-36
- Mardsen, T. (2013). From post-productionism to reflexive governance: Contested transitions in securing more sustainable food futures. *Journal of Rural Studies*, 29:123 – 134

- Millstone, E. (2009). Science, risk and governance: Radical rhetorics and the realities of reform in food safety governance. *Research Policy*, 38: 624–636
- Nelson R., M. Howden, M. S. Smith (2008) Using adaptive governance to rethink the way science supports Australian drought policy. *Environmental Science and Policy*, 11(7):588-601
- O'Brien, K., B. Hayward and F. Berkes. (2009). Rethinking Social Contracts: Building Resilience in a Changing Climate. *Ecology and Society*, 14(2): 12.
- Paavola, J. (2008). Science and social justice in the governance of adaptation to climate change. *Environmental Politics*, 17(4): 644-659
- Pittock, J. (2011). National Climate Change Policies and Sustainable Water Management: Conflicts and Synergies. *Ecology and Society*, 16(2): 25
- Pramova, E., B. Locatelli, M. Brockhaus and S. Fohlmeister. (2012). Ecosystem services in the National Adaptation Programmes of Action. *Climate Policy*, 12(4): 393-409
- Preston B.L., R. M. Westaway and E. J. Yuen (2011). Climate adaptation planning in practice: an evaluation of adaptation plans from three developed nations. *Mitigation and Adaptation Strategies for Global Change*, 16:407–438
- Rice, J.C. and S. M. Garcia. (2011). Fisheries, food security, climate change, and biodiversity: characteristics of the sector and perspectives on emerging issues. *ICES Journal of Marine Science*, 68(6), 1343–1353.
- Rodima-Taylor, D., M. F. Olwig, N. Chhetri. (2011) Adaptation as innovation, innovation as adaptation: An institutional approach to climate change. *Applied Geography*, 33: 107-111
- Sharma, S. K. (2011). The political economy of climate change governance in the Himalayan region of Asia: a case study of Nepal. *Procedia Social and Behavioral Sciences*, 14: 129–140
- Sietz, D., M. Boschu, and R. Klein. (2011). Mainstreaming climate adaptation into development assistance: rationale, institutional barriers and opportunities in Mozambique. *Environmental Science & Policy*, 14: 493-502
- Smith, M.S., L. Horrocks, A. Harvey and C. Hamilton. (2010). Rethinking adaptation for a 4°C world. *Philosophical Transactions of The Royal Society*, 369: 196-216
- Smith, P., J.E. Olesen (2010). Synergies between the mitigation of, and adaptation to, climate change in agriculture. *The Journal of Agricultural Science*. 148(5): 543-552.
- Sowers, J., A. Vengosh and E. Weinthal. (2011). Climate change, water resources, and the politics of adaptation in the Middle East and North Africa. *Climatic Change*, 104: 599–627
- Stringer, L., J. Dyer, M. Reed, A. Dougill, C. Twyman, and D. Mkwambisi. (2009). Adaptations to climate change, drought and desertification: local insights to enhance policy in southern Africa. *Environmental Science & Policy*, 12(7): 748-765
- Termeer, C., A. Dewulf, H. van Rijswijk, A. van Buuren, D. Huitema, ... M. Wiering. (2011). The regional governance of climate adaptation: A framework for developing legitimate, effective, and resilient governance arrangements. *Climate Law*, 2: 159–179

- Thornton, P. K., P. G. Jones, P. J. Ericksen and A. J. Challinor. (2010). Agriculture and food systems in sub-Saharan Africa in a 4°C+ world. *Philosophical Transactions of The Royal Society* 369: 117-136
- Thompson, J., & Scoones, I. (2009). Addressing the dynamics of agri-food systems: an emerging agenda for social science research. *Environmental science & policy*, 12(4), 386-397.
- Tirado, M.C., M.J. Cohen, N. Aberman, J. Meerman , and B. Thompson. (2010). Addressing the challenges of climate change and biofuel production for food and nutrition security. *Food Research International*, 43: 1729–1744
- Urwin K. and A. Jordan (2008) Does public policy support or undermine climate change adaptation? Exploring policy interplay across different scales of governance. *Global Environmental Change*, 18: 180–191
- Warner, K. (2010). Global environmental change and migration: Governance challenges. *Global Environmental Change*, 20: 402–413
- Wilder, M., C. A. Scott, N. Pineda Pablos, R. G. Varady, and G. M. Garfin. (2010). Adapting Across Boundaries: Climate Change, Social Learning, and Resilience in the U.S.–Mexico Border Region. *Annals of the Association of American Geographers*, 100(4): 917–928
- Ziervogel, G. and P. J. Ericksen. (2010). Adapting to climate change to sustain food security. *WIREs Climate Change*, 1: 525–540

## Rejected papers

- Abel, N., R. Gorddard, B. Harman, A. Leitch, J. Langridge, A. Ryan, S. Heyenga (2011). Sea level rise, coastal development and planned retreat: Analytical framework, governance principles and an Australian case study. *Environmental Science Policy*. 14(3): 279–288.
- Adger, W. N., Barnett, J., Brown, K., Marshall, N., and O'Brien, K. (2013). Cultural dimensions of climate change impacts and adaptation, *Nature Climate Change*, 3:112–117.
- Adger, W. N., Brown, K., Nelson, D. R., Berkes, F., Eakin, H., Folke, C., ... & Tompkins, E. L. (2011). Resilience implications of policy responses to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 2(5), 757-766.
- Adger, W. N., Dessai, S., Goulden, M., Hulme, M., Lorenzoni, I., Nelson, D. R., ... & Wreford, A. (2009). Are there social limits to adaptation to climate change?. *Climatic change*, 93(3-4), 335-354.
- Adger, W. N., Lorenzoni, I., & O'Brien, K. L. (2009). Adaptation now. *Adapting to climate change: thresholds, values, governance*, 1-22.
- Agrawal, A., Perrin, N., (2009). Climate adaptation, local institutions and rural livelihoods. In: Adger, W.N., Lorenzoni, I., O'Brien, K.L. (Eds.), *Adapting to Climate Change: Thresholds, Values, Governance*. Cambridge University Press, Cambridge.
- Amanor, K. S. (2009). Global food chains, African smallholders and World Bank governance. *Journal of Agrarian Change*, 9(2), 247-262.
- Amarasinghe, U. A., & Sharma, B. (2008). National River Linking Project-Analyses of hydrological, social and ecological issues. *Strategic Analysis of National River Linking Project of India*. Series, 2.
- Anguelovski, I. and Carmin, J.A. (2011). Something borrowed, everything new: innovation and institutionalization in urban climate governance. *Current Opinion in Environmental Sustainability*. 3:169-175.
- Anguelovski, I., Chu, E., & Carmin, J. (2014). Variations in approaches to urban climate adaptation: Experiences and experimentation from the global South. *Global Environmental Change*, 27, 156-167.
- Araral, E. (2013). A transaction cost approach to climate adaptation: Insights from Coase, Ostrom and Williamson and evidence from the 400-year old zangjeras. *Environmental Science & Policy*, 25, 147-156.
- Archie, K. M., Dilling, L., Milford, J. B., & Pampel, F. C. (2014). Unpacking the 'information barrier': Comparing perspectives on information as a barrier to climate change adaptation in the interior mountain West. *Journal of environmental management*, 133, 397-410.
- Armitage, D. R., Plummer, R., Berkes, F., Arthur, R. I., Charles, A. T., Davidson-Hunt, I. J., ... & Wollenberg, E. K. (2008). Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment*, 7(2), 95-102.
- Armitage, D., Berkes, F., Dale, A., Kocho-Schellenberg, E., & Patton, E. (2011). Co-management and

- the co-production of knowledge: Learning to adapt in Canada's Arctic. *Global Environmental Change*, 21(3), 995-1004.
- Artur, L., & Hilhorst, D. (2012). Everyday realities of climate change adaptation in Mozambique. *Global Environmental Change*, 22(2), 529-536.
- Ayers, J. (2009). International funding to support urban adaptation to climate change. *Environment and Urbanization*. *Environment and Urbanization*, 21(1): 225-240.
- Ayers, J. and T. Forsyth (2009). Community-based adaptation to climate change. *Environment: Science and Policy for Sustainable Development*. 51(4): 22-31.
- Baker, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. *Landscape and urban planning*, 107(2), 127-136.
- Bambrick, H. J., Capon, A. G., Barnett, G. B., Beaty, R. M., & Burton, A. J. (2011). Climate change and health in the urban environment: adaptation opportunities in Australian cities. *Asia-Pacific Journal of Public Health*, 23(2 suppl), 67S-79S.
- Banuri, T. (2009, November). Climate change and sustainable development. In *Natural Resources Forum* (Vol. 33, No. 4, pp. 257-258). Blackwell Publishing Ltd.
- Bardsley, D. K., & Wiseman, N. D. (2012). Climate change vulnerability and social development for remote indigenous communities of South Australia. *Global Environmental Change*, 22(3), 713-723.
- Barnett, J. (2008). The effect of aid on capacity to adapt to climate change: Insights from Niue. *Political Science*. 60(1): 31-45.
- Barrett, S. (2013). Local level climate justice? Adaptation finance and vulnerability reduction. *Global Environmental Change*, 23(6), 1819-1829.
- Bartlett, S. (2008). Climate Change and Urban Children: Impacts and implications for adaptation in low-and middle-income countries. *Environment and Urbanization*, 20(2), 501-519.
- Beddington, J. R., Asaduzzaman, M., Clark, M. E., Bremauntz, A. F., Guillou, M. D., Howlett, D. J. B., ... & Wakhungu, J. (2012). What next for agriculture after Durban. *Science*, 335(6066), 289-290.
- Beddington, J. R., Asaduzzaman, M., Clark, M. E., Bremauntz, A. F., Guillou, M. D., Howlett, D. J. B., ... & Wakhungu, J. (2012). What next for agriculture after Durban. *Science*, 335(6066), 289-290.
- Bedsworth, L. W., & Hanak, E. (2010). Adaptation to climate change: a review of challenges and tradeoffs in six areas. *Journal of the American Planning Association*, 76(4), 477-495.
- Bernier, P., & Schoene, D. (2009). Adapting forests and their management to climate change: an overview. *Unasylva*, 60(231/232), 5-11.
- Bernstein, S., Betsill, M., Hoffmann, M., & Paterson, M. (2010). A tale of two Copenhagens: carbon markets and climate governance. *Millennium-Journal of International Studies*, 39(1), 161-173.
- Biagini, B., Bierbaum, R., Stults, M., Dobardzic, S., & McNeeley, S. M. (2014). A typology of

- adaptation actions: A global look at climate adaptation actions financed through the Global Environment Facility. *Global Environmental Change*, 25: 97-108.
- Bierbaum, R., Smith, J. B., Lee, A., Blair, M., Carter, L., Chapin III, F. S., ... & Verduzco, L. (2013). A comprehensive review of climate adaptation in the United States: more than before, but less than needed. *Mitigation and Adaptation Strategies for Global Change*, 18(3), 361-406.
- Biermann, F. (2010). Beyond the intergovernmental regime: recent trends in global carbon governance. *Current Opinion in Environmental Sustainability*, 2(4), 284-288.
- Biermann, F., & Pattberg, P. (2008). Global environmental governance: Taking stock, moving forward. *Annual Review of Environment and Resources*, 33, 277-294.
- Biesbroek, G. R., Klostermann, J. E., Termeer, C. J., & Kabat, P. (2013). On the nature of barriers to climate change adaptation. *Regional Environmental Change*, 13(5), 1119-1129.
- Biesbroek, G. R., Swart, R. J., & Van der Knaap, W. G. (2009). The mitigation–adaptation dichotomy and the role of spatial planning. *Habitat international*, 33(3), 230-237.
- Biesbroek, G. R., Swart, R. J., Carter, T. R., Cowan, C., Henrichs, T., Mela, H., ... & Rey, D. (2010). Europe adapts to climate change: comparing national adaptation strategies. *Global environmental change*, 20(3), 440-450.
- Birkmann, J. (2011). First-and second-order adaptation to natural hazards and extreme events in the context of climate change. *Natural Hazards*, 58(2), 811-840.
- Birkmann, J., Garschagen, M., & Setiadi, N. (2014). New challenges for adaptive urban governance in highly dynamic environments: Revisiting planning systems and tools for adaptive and strategic planning. *Urban Climate*, 7, 115-133.
- Birkmann, J., Garschagen, M., Kraas, F., & Quang, N. (2010). Adaptive urban governance: new challenges for the second generation of urban adaptation strategies to climate change. *Sustainability Science*, 5(2), 185-206.
- Bisaro, A., Hinkel, J., & Kranz, N. (2010). Multilevel water, biodiversity and climate adaptation governance: evaluating adaptive management in Lesotho. *Environmental Science & Policy*, 13(7), 637-647.
- Bodansky, D. (2010). The Copenhagen climate change conference: a postmortem. *American Journal of International Law*. 104(2): 230-240.
- Boyd E, Grist N, Juhola S, Nelson V. (2009). Exploring development futures in a changing climate: frontiers for development policy and practice. *Development Policy Review* 27(6): 659–674.
- Boyd, E., Ensor, J., Broto, V. C., & Juhola, S. (2014). Environmentalities of urban climate governance in Maputo, Mozambique. *Global Environmental Change*, 26, 140-151.
- Bramwell, B., & Lane, B. (2011). Critical research on the governance of tourism and sustainability. *Journal of Sustainable Tourism*, 19(4-5), 411-421.
- Brooks, N., N. Grist and K. Brown. (2009) Development Futures in the Context of Climate Change: Challenging the Present and Learning from the Past. *Development Policy Review*, 27 (6): 741-765

- Brugger, J., & Crimmins, M. (2013). The art of adaptation: Living with climate change in the rural American Southwest. *Global Environmental Change*, 23(6), 1830-1840.
- Buhaug, H. (2010). Climate not to blame for African civil wars. *Proceedings of the National Academy of the United States of America*. 107(38): 16477-16482.
- Bumpus, A. G., & Liverman, D. M. (2008). Accumulation by decarbonization and the governance of carbon offsets. *Economic Geography*, 84(2), 127-155.
- Busby, J. W. (2008). Who cares about the weather?: Climate change and US national security. *Security Studies*, 17(3), 468-504.
- Camacho, A.E. (2009). Adapting governance to climate change: managing uncertainty through a learning infrastructure. *Emory Law Journal*. 59(1): 1-78.
- Cannon, T., D. Müller-Mahn (2010). Vulnerability, resilience and development discourses in context of climate change. *Natural Hazards*. 55: 621-635.
- Carey, M., Huggel, C., Bury, J., Portocarrero, C., & Haeberli, W. (2012). An integrated socio-environmental framework for glacier hazard management and climate change adaptation: lessons from Lake 513, Cordillera Blanca, Peru. *Climatic Change*, 112(3-4), 733-767.
- Carmin, J, I Anguelovski and D. Roberts (2012), Urban climate adaptation in the global South: planning in an emerging policy domain. *Journal of Planning Education and Research*. 32(1): 18–32.
- Carter, J. G. (2011). Climate change adaptation in European cities. *Current opinion in environmental sustainability*, 3(3), 193-198.
- Carter, J. G., Cavan, G., Connelly, A., Guy, S., Handley, J., & Kazmierczak, A. (2014). Climate change and the city: Building capacity for urban adaptation. *Progress in Planning*.
- Cashmore, M., & Wejs, A. (2014). Constructing legitimacy for climate change planning: A study of local government in Denmark. *Global Environmental Change*, 24, 203-212.
- Castán Broto, V., & Bulkeley, H. (2013). A survey of urban climate change experiments in 100 cities. *Global Environmental Change*, 23(1), 92-102.
- Chapin III, F. S., Carpenter, S. R., Kofinas, G. P., Folke, C., Abel, N., Clark, W. C., ... & Swanson, F. J. (2010). Ecosystem stewardship: sustainability strategies for a rapidly changing planet. *Trends in Ecology & Evolution*, 25(4), 241-249.
- Charles, A. (2012) People, oceans and scale: governance, livelihoods and climate change adaptation in marine social–ecological systems. *Current Opinion in Environmental Sustainability*, 4:351–357
- Charlton, M.B. and N.W. Arnell (2011). Adapting to climate change impacts on water resources in England—An assessment of draft Water Resources Management Plans. *Global Environmental Change*. 21(1): 238-248.
- Cinner, J. E., McClanahan, T. R., Graham, N. A. J., Daw, T. M., Maina, J., Stead, S. M., ... & Bodin, Ö. (2012). Vulnerability of coastal communities to key impacts of climate change on coral reef fisheries. *Global Environmental Change*, 22(1), 12-20.
- Clarke, B., L. Stocker, B. Coffey, P. Leith, N. Harvey, C. Baldwin, T. Baxter, G. Bruekers, C.D.



- Galano, M. Good, M. Haward, C. Hofmeester, D.M. De Freitas, T. Mumford, M. Nursey-Bray, L. Kriwoken, J. Shaw, J. Shaw, T. Smith, D. Thomsen, D. Wood, et al. (2013). Enhancing the knowledge–governance interface: Coasts, climate and collaboration. *Ocean & Coastal Management*, 86, 88-99.
- Collins, K. and R. Ison (2009). Jumping off Arnstein's ladder: social learning as a new policy paradigm for climate change adaptation. *Environmental Policy and Governance*. 19(6): 358-373.
- Corbera, E., & Schroeder, H. (2011). Governing and implementing REDD+. *Environmental Science & Policy*, 14(2), 89-99.
- Craig, R. K. (2010). Adapting Water Federalism to Climate Change Impacts: Energy Policy, Food Security, and the Allocation of Water Resources. *Envtl. & Energy L. & Pol'y J.*, 5, 183.
- Craig, R.K. (2010). “Stationarity is dead”—long live transformation: five principles for climate change adaptation law. *Harvard Environmental Law Review*. 34:9-73.
- Dannevig, H., Rauken, T., & Hovelsrud, G. (2012). Implementing adaptation to climate change at the local level. *Local Environment*, 17(6-7), 597-611.
- Davies, M. and Schlitzer, B. (2008). The impracticality of an international “one size fits all” corporate governance code of best practice. *Managerial Auditing Journal*. 23(6): 532-544.
- Davies, M., Guenther, B., Leavy, J., Mitchell, T., & Tanner, T. (2009). Climate change adaptation, disaster risk reduction and social protection: complementary roles in agriculture and rural growth?. *IDS Working Papers*, 2009(320), 01-37.
- Davoudi, S., K Shaw, LJ Haider, AE Quinlan, GD Petersone, C Wilkinsonf, H Fünfgeldg, D McEvoyg, L Porterh and S Davoudii (2012). Resilience: A Bridging Concept or a Dead End? “Reframing” Resilience: Challenges for Planning Theory and Practice Interacting Traps: Resilience Assessment of a Pasture Management System in Northern Afghanistan Urban Resilience: What Does it Mean in Planning Practice? Resilience as a Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning: A Cautionary Note. *Planning Theory and Practice*. 13(2): 299-333.
- de Bremond, A., Preston, B. L., & Rice, J. (2014). Improving the usability of integrated assessment for adaptation practice: Insights from the US Southeast energy sector. *Environmental Science & Policy*, 42, 45-55.
- Defeo, O., & Castilla, J. C. (2012). Governance and governability of coastal shellfisheries in Latin America and the Caribbean: multi-scale emerging models and effects of globalization and climate change. *Current Opinion in Environmental Sustainability*, 4(3), 344-350.
- Dellink, R., Elzen, M. D., Aiking, H., Bergsma, E., Berkhout, F., Dekker, T., & Gupta, J. (2009). Sharing the burden of financing adaptation to climate change. *Global Environmental Change*, 19(4), 411-421.
- Dimitrov, R. S. (2010). Inside UN climate change negotiations: The Copenhagen conference. *Review of Policy Research*, 27(6), 795-821.
- Dodman, D. (2009). Blaming cities for climate change? An analysis of urban greenhouse gas emissions

- inventories. *Environment and Urbanization*, 21(1), 185-201.
- Dodman, D. and Satterwaite, D. (2008). Institutional Capacity, Climate Change Adaptation and the Urban Poor. *IDS Bulletin*. 39(4): 67-74.
- Doria, M., Boyd, E., Tompkins, E., Adger, W.N., (2009). Using expert elicitation to define successful adaptation to climate change. *Environmental Science and Policy*. 12(7): 810–819.
- Dow, K., Berkhout, F., & Preston, B. L. (2013). Limits to adaptation to climate change: a risk approach. *Current Opinion in Environmental Sustainability*, 5(3), 384-391.
- Dreyer, M., Renn, O., Cope, S., & Frewer, L. J. (2010). Including social impact assessment in food safety governance. *Food Control*, 21(12), 1620-1628.
- Dryzek, J. S., & Stevenson, H. (2011). Global democracy and earth system governance. *Ecological Economics*, 70(11), 1865-1874.
- Duguma, L. A., Wambugu, S. W., Minang, P. A., & van Noordwijk, M. (2014). A systematic analysis of enabling conditions for synergy between climate change mitigation and adaptation measures in developing countries. *Environmental Science & Policy*, 42, 138-148.
- Dupont, L., & Van Eetvelde, V. (2013). Assessing the potential impacts of climate change on traditional landscapes and their heritage values on the local level: Case studies in the Dender basin in Flanders, Belgium. *Land Use Policy*, 35, 179-191.
- Dupuis, J., & Biesbroek, R. (2013). Comparing apples and oranges: the dependent variable problem in comparing and evaluating climate change adaptation policies. *Global Environmental Change*, 23(6), 1476-1487.
- Eakin, H. C., & Patt, A. (2011). Are adaptation studies effective, and what can enhance their practical impact?. *Wiley Interdisciplinary Reviews: Climate Change*, 2(2), 141-153.
- Eakin, H. C., Lemos, M. C., & Nelson, D. R. (2014). Differentiating capacities as a means to sustainable climate change adaptation. *Global Environmental Change*, 27, 1-8.
- Eakin, H., Eriksen, S., Eikeland, P. Øyen, C. (2011) Public Sector Reform and Governance for Adaptation: Implications of New Public Management for Adaptive Capacity in Mexico and Norway. *Environmental Management*. 47(3): 338-351.
- Eisenack, K., & Stecker, R. (2012). A framework for analyzing climate change adaptations as actions. *Mitigation and Adaptation Strategies for Global Change*, 17(3), 243-260.
- Engle, N.L., M.C. Lemos (2010) Unpacking governance: building adaptive capacity to climate change of river basins in Brazil. *Global Environmental Change* 20(1): 4–13
- Eriksen S, Aldunce P, Bahinipati CS, Martins RD, Molefe JI, Nhemachena C, O'Brien K, Olorunfemi F, Park J, Sygna L, Ulsrud K (2011) When not every response to climate change is a good one: identifying principles for sustainable adaptation. *Climate and Development* 3: 7-20.
- Eriksen P. J. 2009. Conceptualizing food systems for global environmental change research. *Global Environmental Change*, 18. 234–245.
- Evans, J.P. (2011). Resilience, ecology and adaptation in the experimental city. *Transactions of the Institute of British Geographers*. 36(2): 223-237.

- Fidelman, P. I., Leitch, A. M., & Nelson, D. R. (2013). Unpacking multilevel adaptation to climate change in the Great Barrier Reef, Australia. *Global Environmental Change*, 23(4), 800-812.
- Figueiredo, P., & Perkins, P. E. (2013). Women and water management in times of climate change: participatory and inclusive processes. *Journal of Cleaner Production*, 60, 188-194.
- Fleming, A., Hobday, A. J., Farmery, A., van Putten, E. I., Pecl, G. T., Green, B. S., & Lim-Camacho, L. (2014). Climate change risks and adaptation options across Australian seafood supply chains—A preliminary assessment. *Climate Risk Management*, 1, 39-50.
- Ford, J. D., L. Berrang-Ford, A. Lesnikowski, M. Barrera, and S. J. Heymann. (2013). How to track adaptation to climate change: a typology of approaches for national-level application. *Ecology and Society* 18(3):40.
- Ford, J.D. and C. Furgal (2009). Foreword to the special issue: climate change impacts, adaptation and vulnerability in the Arctic. *Polar Research*. 28(1): 1-9.
- Ford, J.D., Keskkitalo, E.C.H., Smith, T., Pearce, T., Berrang-Ford, L., Duerden, F., Smit, B. (2010). Case study and analogue methodologies in climate change vulnerability research. *Wiley Interdisciplinary Reviews: Climate Change* 1(3): 374-392.
- Ford, J.D., Pearce, T., Durden, F., Furgal, C. and Smith, B. (2010). Climate change policy responses for Canada's Inuit population: the importance of and opportunities for adaptation. *Global Environmental Change*. 20: 177-191.
- Frumkin, H., Hess, J., Luber, G., Malilay, J., & McGeehin, M. (2008). Climate change: the public health response. *American Journal of Public Health*, 98(3), 435.
- Fünfgeld, H. (2010). Institutional challenges to climate risk management in cities. *Current Opinion in Environmental Sustainability*, 2(3), 156-160.
- Füssel, H. M. (2008). Assessing adaptation to the health risks of climate change: what guidance can existing frameworks provide?. *International Journal of Environmental Health Research*, 18(1), 37-63.
- Füssel, H. M. (2010). How inequitable is the global distribution of responsibility, capability, and vulnerability to climate change: A comprehensive indicator-based assessment. *Global Environmental Change*, 20(4), 597-611.
- Galbreath, J. (2010). Corporate governance practices that address climate change: an exploratory study. *Business Strategy and the Environment*, 19(5), 335-350.
- Glaas, E., Jonsson, A., Hjerpe, M., & Andersson-Sköld, Y. (2010). Managing climate change vulnerabilities: formal institutions and knowledge use as determinants of adaptive capacity at the local level in Sweden. *Local Environment*, 15(6), 525-539.
- Glicksman, R. L. (2010). Climate Change Adaptation: A Collective Action Perspective on Federalism Considerations. *Environmental Law* 40: 1159.
- Godden, L., Ison, R. L., & Wallis, P. J. (2011). Water governance in a climate change world: appraising systemic and adaptive effectiveness. *Water Resources Management*, 25(15), 3971-3976.

- Gore, C. D. (2010). The limits and opportunities of networks: Municipalities and Canadian climate change policy. *Review of Policy Research*, 27(1), 27-46.
- Grafton, R. Q., Pittock, J., Davis, R., Williams, J., Fu, G., Warburton, M., ... & Quiggin, J. (2013). Global insights into water resources, climate change and governance. *Nature Climate Change*, 3(4), 315-321.
- Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., van den Brink, M., Jong, P., ... & Bergsma, E. (2010). The adaptive capacity wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science & Policy*, 13(6), 459-471.
- Gurran, N., Norman, B., & Hamin, E. (2013). Climate change adaptation in coastal Australia: An audit of planning practice. *Ocean & Coastal Management*, 86, 100-109.
- Hallegatte, S. and J. Corfee-Morlot (2011). Understanding climate change impacts, vulnerability and adaptation at city scale: an introduction. *Climatic Change*. 104:1-12.
- Hansen, J., Sato, M., & Ruedy, R. (2012). Perception of climate change. *Proceedings of the National Academy of Sciences*, 109(37), E2415-E2423.
- Hanson, S., Nicholls, R., Ranger, N., Hallegatte, S., Corfee-Morlot, J., Herweijer, C., & Chateau, J. (2011). A global ranking of port cities with high exposure to climate extremes. *Climatic change*, 104(1), 89-111.
- Hardoy, J., P. Romero Lankao (2011). Latin American cities and climate change: challenges and options to mitigation and adaptation responses. *Current Opinion in Environmental Sustainability*. 3(3): 158-163.
- Harmin, E.M. and Gurran, N. (2009). Urban form and climate change: Balancing adaptation and mitigation in the US and Australia. *Habitat international*. 33(3): 238-245.
- Hegger, D., Lamers, M., Van Zeijl-Rozema, A., & Dieperink, C. (2012). Conceptualising joint knowledge production in regional climate change adaptation projects: success conditions and levers for action. *Environmental Science & Policy*, 18, 52-65.
- Hjerpe, M., & Linnér, B. O. (2010). Functions of COP side-events in climate-change governance. *Climate Policy*, 10(2), 167-180.
- Hobson, K., & Niemeyer, S. (2011). Public responses to climate change: The role of deliberation in building capacity for adaptive action. *Global environmental change*, 21(3), 957-971.
- Hulme, M. (2008). Geographical work at the boundaries of climate change. *Transactions of the Institute of British Geographers*, 33(1), 5-11.
- Hulme, M. (2008). Governing and adapting to climate. A response to Ian Bailey's Commentary on 'Geographical work at the boundaries of climate change'. *Transactions of the Institute of British Geographers*. 33(3): 424-427.
- Hulme, M., & Dessai, S. (2008). Predicting, deciding, learning: can one evaluate the'success' of national climate scenarios?. *Environmental Research Letters*, 3(4): 1-7.
- Huntjens, P., Lebel, L., Pahl-Wostl, C., Camkin, J., Schulze, R., & Kranz, N. (2012). Institutional

- design propositions for the governance of adaptation to climate change in the water sector. *Global Environmental Change*, 22(1), 67-81.
- Huntjens, Patrick, Claudia Pahl-Wostl, and John Grin. (2010) "Climate change adaptation in European river basins." *Regional Environmental Change* 10(4): 263-284.
- Hurlbert, M., Diaz, H., Corkal, D. R., & Warren, J. (2009). Climate change and water governance in Saskatchewan, Canada. *International Journal of Climate Change Strategies and Management*, 1(2), 118-132.
- Ingold, K., Balsiger, J., & Hirschi, C. (2010). Climate change in mountain regions: how local communities adapt to extreme events. *Local Environment*, 15(7), 651-661.
- Islam, M., Sallu, S., Hubacek, K., & Paavola, J. (2014). Limits and barriers to adaptation to climate variability and change in Bangladeshi coastal fishing communities. *Marine Policy*, 43, 208-216.
- Jagers, S. C., & Duus-Otterström, G. (2008). Dual climate change responsibility: on moral divergences between mitigation and adaptation. *Environmental Politics*, 17(4), 576-591.
- Johnson, C. A., & Krishnamurthy, K. (2010). Dealing with displacement: Can “social protection” facilitate long-term adaptation to climate change?. *Global Environmental Change*, 20(4), 648-655.
- Jones, H.P., D.G. Hole, E.S. Zavaleta (2012). Harnessing nature to help people adapt to climate change. *Nature Climate Change*. 2: 504-509.
- Jones, L., & Boyd, E. (2011). Exploring social barriers to adaptation: Insights from Western Nepal. *Global Environmental Change*, 21(4), 1262-1274.
- Juhola, S., & Westerhoff, L. (2011). Challenges of adaptation to climate change across multiple scales: a case study of network governance in two European countries. *Environmental science & policy*, 14(3), 239-247.
- Kalame, F. B., Aidoo, R., Nkem, J., Ajayie, O. C., Kanninen, M., Luukkanen, O., & Idinoba, M. (2011). Modified taungya system in Ghana: a win-win practice for forestry and adaptation to climate change?. *Environmental Science & Policy*, 14(5), 519-530.
- Kanowski, P. J., McDermott, C. L., & Cashore, B. W. (2011). Implementing REDD+: lessons from analysis of forest governance. *Environmental Science & Policy*, 14(2), 111-117.
- Kates, R. W., Travis, W. R., & Wilbanks, T. J. (2012). Transformational adaptation when incremental adaptations to climate change are insufficient. *Proceedings of the National Academy of Sciences*, 109(19), 7156-7161.
- Kelman, I., & West, J. J. (2009). Climate change and small island developing states: a critical review. *Ecological and Environmental Anthropology*, 5(1), 1-16.
- Keohane RO, Victor DG (2011) The Regime Complex for Climate Change. *Perspectives on Politics* 9(1), 7-21.
- Kern, K., & Bulkeley, H. (2009). Cities, Europeanization and Multi-level Governance: Governing Climate Change through Transnational Municipal Networks\*. *JCMS: Journal of Common Market Studies*, 47(2), 309-332.

- Keskitalo, E. C. H. (2009). Governance in vulnerability assessment: the role of globalising decision-making networks in determining local vulnerability and adaptive capacity. *Mitigation and Adaptation Strategies for Global Change*, 14(2), 185-201.
- Keskitalo, E. C. H., & Kulyasova, A. A. (2009). The role of governance in community adaptation to climate change. *Polar Research*, 28(1), 60-70.
- Keskitalo, E.C.H. (2010). Adapting to climate change in Sweden: national policy development and adaptation measures in Västra Götaland. In: E.C.H. Keskitalo, ed., *Developing adaptation policy and practice in Europe: multi-level governance of climate change*. Dordrecht: Springer Netherlands, 189- 232.
- Khailani, D. K., & Perera, R. (2013). Mainstreaming disaster resilience attributes in local development plans for the adaptation to climate change induced flooding: A study based on the local plan of Shah Alam City, Malaysia. *Land Use Policy*, 30(1), 615-627.
- Kiem, A. S. (2013). Drought and water policy in Australia: Challenges for the future illustrated by the issues associated with water trading and climate change adaptation in the Murray–Darling Basin. *Global Environmental Change*, 23(6), 1615-1626.
- Kiers, E. T., Leakey, R. R., Izac, A. M., Heinemann, J. A., Rosenthal, E., Nathan, D., & Jiggins, J. (2008). Agriculture at a crossroads. *SCIENCE-NEW YORK THEN WASHINGTON-*, 320(5874), 320.
- Kopke, K., & O'Mahony, C. (2011). Preparedness of key coastal and marine sectors in Ireland to adapt to climate change. *Marine Policy*, 35(6), 800-809.
- Kriegler, E., O'Neill, B. C., Hallegatte, S., Kram, T., Lempert, R. J., Moss, R. H., & Wilbanks, T. (2012). The need for and use of socio-economic scenarios for climate change analysis: a new approach based on shared socio-economic pathways. *Global Environmental Change*, 22(4), 807-822.
- Kronsell, A. (2013). Gender and transition in climate governance. *Environmental Innovation and Societal Transitions*, 7, 1-15.
- Kuzdas, C., & Wiek, A. (2014). Governance scenarios for addressing water conflicts and climate change impacts. *Environmental Science & Policy*, 42, 181-196.
- Kwadijk, J. C., Haasnoot, M., Mulder, J. P., Hoogvliet, M., Jeuken, A., van der Krogt, R. A., ... & de Wit, M. J. (2010). Using adaptation tipping points to prepare for climate change and sea level rise: a case study in the Netherlands. *Wiley Interdisciplinary Reviews: Climate Change*, 1(5), 729-740.
- Larigauderie, A., & Mooney, H. A. (2010). The Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services: moving a step closer to an IPCC-like mechanism for biodiversity. *Current Opinion in Environmental Sustainability*, 2(1), 9-14.
- Larsen, K., & Gunnarsson-Östling, U. (2009). Climate change scenarios and citizen-participation: Mitigation and adaptation perspectives in constructing sustainable futures. *Habitat International*, 33(3), 260-266.

- Larsen, R. K., Swartling, Å. G., Powell, N., May, B., Plummer, R., Simonsson, L., & Osbeck, M. (2012). A framework for facilitating dialogue between policy planners and local climate change adaptation professionals: Cases from Sweden, Canada and Indonesia. *Environmental Science & Policy*, 23, 12-23.
- Laukkonen, J., PK Blanco, J Lenhart, M Keiner, B Cavric, C Kinuthia-Njenga (2009). Combining climate change adaptation and mitigation measures at the local level (2009). *Habitat International*. 33(3): 287-292.
- Lavenex, S., Lehmkuh, D. and Wichmann, N. (2009) Modes of external governance: a cross-national and cross-sectoral comparison. *Modes of external governance: a cross-national and cross-sectoral comparison*. 16(6): 813-833.
- Leck, H. and D. Simon. (2013) Fostering Multiscalar Collaboration and Co-operation for Effective Governance of Climate Change Adaptation. *Urban Studies*, 50(6): 1221-1238
- Lemieux, C. J., Gray, P. A., Douglas, A. G., Nielsen, G., & Pearson, D. (2014). From science to policy: The making of a watershed-scale climate change adaptation strategy. *Environmental Science & Policy*, 42, 123-137.
- Lemieux, C. J., Thompson, J. L., Dawson, J., & Schuster, R. M. (2013). Natural resource manager perceptions of agency performance on climate change. *Journal of environmental management*, 114, 178-189.
- Lesnikowski, A. C., Ford, J. D., Berrang-Ford, L., Paterson, J. A., Barrera, M., & Heymann, S. J. (2011). Adapting to health impacts of climate change: a study of UNFCCC Annex I parties. *Environmental Research Letters*, 6(4), 044009.
- Lorenzoni, I., & Hulme, M. (2009). Believing is seeing: laypeople's views of future socio-economic and climate change in England and in Italy. *Public Understanding of Science* 18: 383–400
- Lwasa, S. (2010). Adapting urban areas in Africa to climate change: the case of Kampala. *Current Opinion in Environmental Sustainability*, 2(3), 166-171.
- Lynch, A. H., Tryhorn, L., & Abramson, R. (2008). Working at the boundary: facilitating interdisciplinarity in climate change adaptation research. *Bulletin of the American Meteorological Society*, 89(2), 169-179.
- Malhi, Y., Roberts, J. T., Betts, R. A., Killeen, T. J., Li, W., Nobre, C. A. (2008): Climate change, deforestation, and the fate of the Amazon. *Science* 319: 169-172.
- Manuel-Navarrete, D., Pelling, M., & Redclift, M. (2011). Critical adaptation to hurricanes in the Mexican Caribbean: Development visions, governance structures, and coping strategies. *Global Environmental Change*, 21(1), 249-258.
- Maraseni, T. N. (2012). Climate change, poverty and livelihoods: adaptation practices by rural mountain communities in Nepal. *Environmental Science & Policy*, 21, 24-34.
- Marino, E., & Ribot, J. (2012). Special issue introduction: adding insult to injury: climate change and the inequities of climate intervention. *Global Environmental Change*, 22(2), 323-328.
- Marsden, G., & Rye, T. (2010). The governance of transport and climate change. *Journal of Transport*

- Geography, 18(6), 669-678.
- Martens, P., McEvoy, D., & Chang, C. (2009). The climate change challenge: linking vulnerability, adaptation, and mitigation. *Current Opinion in Environmental Sustainability*, 1(1), 14-18.
- Martin, S. (2010). Climate Change, Migration, and Governance. *Global Governance*, 16: 397–414.
- Martino, G. (2011). Trust, contracting, and adaptation in agri-food hybrid structures. *International Journal on Food System Dynamics*, 1(4), 305-317.
- Mastrandrea, M. D., Heller, N. E., Root, T. L., & Schneider, S. H. (2010). Bridging the gap: linking climate-impacts research with adaptation planning and management. *Climatic Change*, 100(1), 87-101.
- Matthews, J. H., Forslund, A., McClain, M. E., & Tharme, R. E. (2014). More than the Fish: Environmental Flows for Good Policy and Governance, Poverty Alleviation and Climate Adaptation. *Aquatic Procedia*, 2, 16-23.
- May, B., & Plummer, R. (2011). Accommodating the challenges of climate change adaptation and governance in conventional risk management: adaptive collaborative risk management (ACRM). *Ecology & society*, 16(1), 47.
- McClanahan, T. R., Cinner, J. E., Maina, J., Graham, N. A. J., Daw, T. M., Stead, S. M., ... & Polunin, N. V. C. (2008). Conservation action in a changing climate. *Conservation Letters*, 1(2), 53-59.
- McCrum, G., Blackstock, K., Matthews, K., Rivington, M., Miller, D., & Buchan, K. (2009). Adapting to climate change in land management: the role of deliberative workshops in enhancing social learning. *Environmental Policy and Governance*, 19(6), 413-426.
- McDowell, J. Z., & Hess, J. J. (2012). Accessing adaptation: Multiple stressors on livelihoods in the Bolivian highlands under a changing climate. *Global Environmental Change*, 22(2), 342-352.
- McIlgorm, A., Hanna, S., Knapp, G., Le Floc'H, P., Millerd, F., & Pan, M. (2010). How will climate change alter fishery governance? Insights from seven international case studies. *Marine Policy*, 34(1), 170-177.
- McLeman, R. A., & Hunter, L. M. (2010). Migration in the context of vulnerability and adaptation to climate change: insights from analogues. *Wiley Interdisciplinary Reviews: Climate Change*, 1(3), 450-461.
- McSweeney, K. and Coomes, O.T. (2011). Climate-related disaster opens a window of opportunity for rural poor in northeastern Honduras. 108(13): 5203-5208.
- Measham, T.G., B.L. Preston, T.F. Smith, C. Brooke (2011) Adapting to climate change through local municipal planning: barriers and challenges. *Mitig Adapt Strateg Glob Change* 16: 889–909
- Mercer, K. L., Perales, H. R., & Wainwright, J. D. (2012). Climate change and the transgenic adaptation strategy: Smallholder livelihoods, climate justice, and maize landraces in Mexico. *Global Environmental Change*, 22(2), 495-504.
- Middelbeek, L., Kolle, K., & Verrest, H. (2014). Built to last? Local climate change adaptation and governance in the Caribbean–The case of an informal urban settlement in Trinidad and Tobago. *Urban Climate*. 8, 138-154.



- Mooney, H., Larigauderie, A., Cesario, M., Elmquist, T., Hoegh-Guldberg, O., Lavorel, S., ... & Yahara, T. (2009). Biodiversity, climate change, and ecosystem services. *Current Opinion in Environmental Sustainability*, 1(1), 46-54.
- Moser, S. C. (2009). Governance and the art of overcoming barriers to adaptation. *Magazine of the International Human Dimensions Programme on Global Environmental Change*, 3, 31-36.
- Moser, S. C. (2010). Now more than ever: the need for more societally relevant research on vulnerability and adaptation to climate change. *Applied Geography*, 30(4), 464-474.
- Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences*, 107(51), 22026-22031.
- Moser, S. C., & Luers, A. L. (2008). Managing climate risks in California: the need to engage resource managers for successful adaptation to change. *Climatic Change*, 87(1), 309-322.
- Mount, P. (2012). Growing local food: scale and local food systems governance. *Agriculture and Human Values*, 29(1), 107-121.
- Nelson, R., Howden, M., & Smith, M. S. (2008). Using adaptive governance to rethink the way science supports Australian drought policy. *Environmental Science & Policy*, 11(7), 588-601.
- Nelson, R., Kokic, P., Crimp, S., Meinke, H. and Howden, S.M. (2009). The vulnerability of Australian rural communities to climate variability and change: Part I—Conceptualising and measuring vulnerability. *Environmental Science & Policy*, 13:8-17.
- Newig, J., & Fritsch, O. (2009). Environmental governance: participatory, multi-level—and effective?. *Environmental policy and governance*, 19(3), 197-214.
- Ng, A. K., Chen, S. L., Cahoon, S., Brooks, B., & Yang, Z. (2013). Climate change and the adaptation strategies of ports: The Australian experiences. *Research in Transportation Business & Management*, 8, 186-194.
- Nierop, S. C. (2014). Envisioning resilient electrical infrastructure: A policy framework for incorporating future climate change into electricity sector planning. *Environmental Science & Policy*, 40, 78-84.
- Njoroge, J. M. (2014). An enhanced framework for regional tourism sustainable adaptation to climate change. *Tourism Management Perspectives*, 12, 23-30.
- O'Brien, G., O'Keefe, P. Meena, H., Rose, J., & Wilson, L. (2008). Climate adaptation from a poverty perspective. *Climate Policy*, 8(2), 194-201.
- O'Brien, K. (2012). Global environmental change II From adaptation to deliberate transformation. *Progress in Human Geography*, 36(5), 667-676.
- Oberlack, C., & Eisenack, K. (2014). Alleviating barriers to urban climate change adaptation through international cooperation. *Global Environmental Change*, 24, 349-362.
- O'Brien, K.L., J. Wolf (2010). A values-based approach to vulnerability and adaptation to climate change. *Wiley Interdisciplinary Reviews: Climate Change*. 1(2): 232-242.
- Ogden, A. E., & Innes, J. L. (2009). Application of structured decision making to an assessment of climate change vulnerabilities and adaptation options for sustainable forest management.

- Ecology and Society, 14(1), 11.
- Oluoko-Odingo, A. A. (2011). Vulnerability and adaptation to food insecurity and poverty in Kenya. *Annals of the Association of American Geographers*, 101(1), 1-20.
- Orlove, B. (2009). Glacier retreat: reviewing the limits of human adaptation to climate change. *Environment: Science and Policy for Sustainable Development*, 51(3), 22-34.
- Osbaahr, H., C. Twyman, W. N. Adger, and D. S. G. Thomas (2008). Effective livelihood adaptation to climate change disturbance: scale dimensions of practice in Mozambique. *Geoforum* 39:1951-1964.
- Osbaahr, H., Twyman, C., Adger, W. N., & Thomas, D. S. (2010). Evaluating successful livelihood adaptation to climate variability and change in southern Africa. *Ecology and Society*, 15(2), 27.
- Paavola, J. (2008). Livelihoods, vulnerability and adaptation to climate change in Morogoro, Tanzania. *Environmental Science & Policy*. 11(7); 642-654.
- Pahl-Wostl C., L. Lebel, C. Knieper, E. Nikitina (2012). From applying panaceas to mastering complexity: toward adaptive water governance in river basins. *Environmental Science and Policy*. 23:24-34.
- Palmer M.A., Reidy Liermann C.A., Nilsson C., Florke M., Alcamo J., Lake P.S. & Bond N. (2008) Climate change and the world's river basins: anticipating management options. *Frontiers in Ecology and the Environment*, 6, 81–89.
- Park, S. E., Marshall, N. A., Jakku, E., Dowd, A. M., Howden, S. M., Mendham, E., & Fleming, A. (2012). Informing adaptation responses to climate change through theories of transformation. *Global Environmental Change*, 22(1), 115-126.
- Pasquini, L., Cowling, R. M., & Ziervogel, G. (2013). Facing the heat: barriers to mainstreaming climate change adaptation in local government in the Western Cape Province, South Africa. *Habitat International*, 40, 225-232.
- Patt, A. G., & Schröter, D. (2008). Perceptions of climate risk in Mozambique: implications for the success of adaptation strategies. *Global Environmental Change*, 18(3), 458-467.
- Pattberg, P., & Stripple, J. (2008). Beyond the public and private divide: remapping transnational climate governance in the 21st century. *International Environmental Agreements: Politics, Law and Economics*, 8(4), 367-388.
- Pearce, T., Ford, J. D., Duerden, F., Smit, B., Andrachuk, M., Berrang-Ford, L., & Smith, T. (2011). Advancing adaptation planning for climate change in the Inuvialuit Settlement Region (ISR): a review and critique. *Regional Environmental Change*, 11(1), 1-17.
- Pelling, M., & Dill, K. (2009). Disaster politics: tipping points for change in the adaptation of sociopolitical regimes. *Progress in Human Geography* 34: 21 - 37
- Pelling, M., High, C., Dearing, J., Smith, D. (2008). Shadow spaces for social learning: a Relational Understanding of adaptive capacity to climate change within organizations. *Environment and Planning A* 40: 867-884.
- Petheram, L., Zander, K. K., Campbell, B. M., High, C., & Stacey, N. (2010). 'Strange changes':

- Indigenous perspectives of climate change and adaptation in NE Arnhem Land (Australia). *Global Environmental Change*, 20(4), 681-692.
- Pinto, R., & Martins, F. C. (2013). The Portuguese national strategy for integrated coastal zone management as a spatial planning instrument to climate change adaptation in the Minho River Estuary (Portugal NW-Coastal Zone). *Environmental Science & Policy*, 33, 76-96.
- Poutiainen, C., Berrang-Ford, L., Ford, J., & Heymann, J. (2013). Civil society organizations and adaptation to the health effects of climate change in Canada. *Public health*, 127(5), 403-409.
- Preston, B. L., Yuen, E. J., & Westaway, R. M. (2011). Putting vulnerability to climate change on the map: a review of approaches, benefits, and risks. *Sustainability Science*, 6(2), 177-202.
- Puppim de Oliveira, J.A. (2009). The implementation of climate change related policies at the subnational level: an analysis of three countries. *Habitat International*. 33(3): 253-259.
- Qi, Y., Ma, L., Zhang, H., & Li, H. (2008). Translating a Global Issue Into Local Priority China's Local Government Response to Climate Change. *The Journal of Environment & Development*, 17(4), 379-400.
- Quay, R. (2010). Anticipatory governance: A tool for climate change adaptation. *Journal of the American Planning Association*. 76(4): 496-511.
- Quentin Grafton, R. (2010). Adaptation to climate change in marine capture fisheries. *Marine Policy*. 34(3): 606-615.
- Rauschmayer, F., Paavola, J., & Wittmer, H. (2009). European governance of natural resources and participation in a multi-level context: An editorial. *Environmental policy and governance*, 19(3), 141-147.
- Raymond, C. M., & Robinson, G. M. (2013). Factors affecting rural landholders' adaptation to climate change: Insights from formal institutions and communities of practice. *Global Environmental Change*, 23(1), 103-114.
- Reid, H., Alam, M., Berger, R., Cannon, T., Huq, S., & Milligan, A. (2009). Community-based adaptation to climate change: an overview. *Participatory learning and action*, 60(1), 11-33.
- Rickards, L., & Howden, S. M. (2012). Transformational adaptation: agriculture and climate change. *Crop and Pasture Science*, 63(3), 240-250.
- Roberts, D (2008). Thinking globally, acting locally—institutionalizing climate change at the local government level in Durban, South Africa. *Environment and Urbanization*. 20(2): 521-537.
- Rosenzweig, C., Solecki, W., Hammer, S. A., & Mehrotra, S. (2010). Cities lead the way in climate-change action. *Nature*, 467(7318), 909-911.
- Ruhl, J.B. (2010). Climate change adaptation and the structural transformation of environmental law. *Environmental Law*. 40: 363.
- Ruhl, J.B. (2010). General Design Principles for Resilience and Adaptive Capacity in Legal Systems—with Applications to Climate Change Adaptation. *North Carolina Law Review*. 89(5): 1374-1401.
- Runhaar H, Mees H, Wardekker A, Van der Sluijs J, Driessen P. (2012). Adaptation to climate change

- related risks in Dutch urban areas: Stimuli and barriers. *Regional Environmental Change*, 12(4): 777-790.
- Sanchez-Rodriguez, R. (2009). Learning to adapt to climate change in urban areas. A review of recent contributions. *Current Opinion in Environmental Sustainability*, 1(2): 201-206.
- Sandbrook, C., Nelson, F., Adams, W. M., & Agrawal, A. (2010). Carbon, forests and the REDD paradox. *Oryx*, 44(03), 330-334.
- Sapkota, A., Lu, Z., Yang, H., & Wang, J. (2014). Role of renewable energy technologies in rural communities' adaptation to climate change in Nepal. *Renewable Energy*, 68, 793-800.
- Satterthwaite, D. (2009). The implications of population growth and urbanization for climate change. *Environment and Urbanization*, 21(2): 545-567.
- Satterthwaite, D. (2011). Editorial: Why is community action needed for disaster risk reduction and climate change adaptation?. *Environment and Urbanization*, 23(2), 339-350.
- Schipper, E. L. F. (2009). Meeting at the crossroads?: Exploring the linkages between climate change adaptation and disaster risk reduction. *Climate and Development*, 1(1), 16-30.
- Schmidt, C.W. (2009) Beyond mitigation planning for climate change adaptation. *Environmental Health Perspectives*, 117(7): 306-309
- Schmidt, L., Prista, P., Saraiva, T., O'Riordan, T., & Gomes, C. (2013). Adapting governance for coastal change in Portugal. *Land Use Policy*, 31, 314-325.
- Schreurs, M. A. (2008). From the bottom up local and subnational climate change politics. *The Journal of Environment & Development*, 17(4), 343-355.
- Schroeder H. and Bulkeley H. (2009). Global cities and the governance of climate change: what is the role of law in cities? *Fordham Urban Law Journal*. 36: 313-359.
- Schweikert, A., Chinowsky, P., Kwiatkowski, K., & Espinet, X. (2014). The infrastructure planning support system: Analyzing the impact of climate change on road infrastructure and development. *Transport Policy*, 35, 146-153.
- Serrao-Neumann, S., Di Giulio, G. M., Ferreira, L. C., & Low Choy, D. (2013). Climate change adaptation: Is there a role for intervention research?. *Futures*, 53, 86-97.
- Sharma, D., & Tomar, S. (2010). Mainstreaming climate change adaptation in Indian cities. *Environment and Urbanization*, 22(2), 451-465.
- Sietz, D., Boschütz, M., & Klein, R. J. (2011). Mainstreaming climate adaptation into development assistance: rationale, institutional barriers and opportunities in Mozambique. *Environmental Science & Policy*, 14(4), 493-502.
- Smith, J. B., Vogel, J. M., & Cromwell III, J. E. (2009). An architecture for government action on adaptation to climate change. An editorial comment. *Climatic Change*, 95(1-2), 53-61.
- Solecki, W., Leichenko, R. and O'Brien, K. (2011). Climate change adaptation strategies and disaster risk reduction in cities: connections, contentions, and synergies. *Current Opinion in Environmental Sustainability*, 3(3): 135-141.
- Sonwa, D. J., Somorin, O. A., Jum, C., Bele, M. Y., & Nkem, J. N. (2012). Vulnerability, forest-related

- sectors and climate change adaptation: The case of Cameroon. *Forest Policy and Economics*, 23, 1-9.
- Sovacool, B. K., & Brown, M. A. (2009). Scaling the policy response to climate change. *Policy and Society*, 27(4), 317-328.
- Sovacool, B. K., D'Agostino, A. L., Rawlani, A., & Meenawat, H. (2012). Improving climate change adaptation in least developed Asia. *Environmental Science & Policy*, 21, 112-125.
- Sovacool, B. K., D'Agostino, A. L., Meenawat, H., & Rawlani, A. (2012). Expert views of climate change adaptation in least developed Asia. *Journal of environmental management*, 97, 78-88.
- Spies, T. A., Giesen, T. W., Swanson, F. J., Franklin, J. F., Lach, D., & Johnson, K. N. (2010). Climate change adaptation strategies for federal forests of the Pacific Northwest, USA: ecological, policy, and socio-economic perspectives. *Landscape Ecology*, 25(8), 1185-1199.
- Storbjörk, S. (2010). 'It takes more to get a ship to change course': Barriers for organizational learning and local climate adaptation in Sweden. *Journal of Environmental Policy & Planning*, 12(3), 235-254.
- Stringer, L., Dyer, J., Reed, M. S., Dougill, A. J., Twyman, C., & Mkwambisi, D. (2009). Adaptations to climate change, drought and desertification: insights to enhance policy in southern Africa. *Environmental Science and Policy*, 12(7): 748-765.
- Suckall, N., Tompkins, E., & Stringer, L. (2014). Identifying trade-offs between adaptation, mitigation and development in community responses to climate and socio-economic stresses: Evidence from Zanzibar, Tanzania. *Applied Geography*, 46, 111-121.
- Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., ... & Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American Psychologist*, 66(4), 241.
- Tallontire, A., Opondo, M., Nelson, V., & Martin, A. (2011). Beyond the vertical? Using value chains and governance as a framework to analyse private standards initiatives in agri-food chains. *Agriculture and Human Values*, 28(3), 427-441.
- Termeer, C., Biesbroek, R., & Van den Brink, M. (2012). Institutions for adaptation to climate change: comparing national adaptation strategies in Europe. *European political science*, 11(1), 41-53.
- Thompson, J., & Scoones, I. (2009). Addressing the dynamics of agri-food systems: an emerging agenda for social science research. *Environmental science & policy*, 12(4), 386-397.
- Tompkins, E. L., & Amundsen, H. (2008). Perceptions of the effectiveness of the United Nations Framework Convention on Climate Change in advancing national action on climate change. *Environmental Science & Policy*, 11(1), 1-13.
- Tompkins, E. L., & Eakin, H. (2012). Managing private and public adaptation to climate change. *Global environmental change*, 22(1), 3-11.
- Tompkins, E. L., Adger, W. N., Boyd, E., Nicholson-Cole, S., Weatherhead, K., & Arnell, N. (2010). Observed adaptation to climate change: UK evidence of transition to a well-adapting society. *Global environmental change*, 20(4), 627-635.

- Tschakert, P. and Dietrich, K. A., 2010. Anticipatory learning for climate change adaptation and resilience. *Ecology and Society*, 15(2): 11.
- Tubi, A., Fischhendler, I., & Feitelson, E. (2012). The effect of vulnerability on climate change mitigation policies. *Global Environmental Change*, 22(2), 472-482.
- Valdivia, C., & Barbieri, C. (2014). Agritourism as a sustainable adaptation strategy to climate change in the Andean Altiplano. *Tourism Management Perspectives*, 11, 18-25.
- Valdivia, C., A. Seth, J.L. Gilles, M. García, E. Jiménez, J. Cusicanqui, F. Navia & E. Yucra (2010). Adapting to climate change in Andean ecosystems: Landscapes, capitals, and perceptions shaping rural livelihood strategies and linking knowledge systems. *Annals of the Association of American Geographers*. 100(4): 818-834.
- van Vuuren, D. P., Isaac, M., Kundzewicz, Z. W., Arnell, N., Barker, T., Criqui, P., Berkhout, F., Hilderink, H., Hinkel, J., Hof, A., Kitous, A. Kram, T. Mechler, R. & Scrieciui, S. (2011). The use of scenarios as the basis for combined assessment of climate change mitigation and adaptation. *Global Environmental Change*, 21(2), 575-591.
- Vignola, R., McDaniels, T. L., & Scholz, R. W. (2013). Governance structures for ecosystem-based adaptation: Using policy-network analysis to identify key organizations for bridging information across scales and policy areas. *Environmental Science & Policy*, 31, 71-84.
- Virgoe, J. (2009). International governance of a possible geoengineering intervention to combat climate change. *Climatic Change* 95 (1): 103-119.
- Wamsler, C., & Brink, E. (2014). Interfacing citizens' and institutions' practice and responsibilities for climate change adaptation. *Urban Climate*, 7, 64-91.
- Wamsler, C., Brink, E., & Rivera, C. (2013). Planning for climate change in urban areas: from theory to practice. *Journal of Cleaner Production*, 50, 68-81.
- Wang, J., Huang, X., Zhong, T., & Chen, Z. (2013). Climate change impacts and adaptation for saline agriculture in north Jiangsu Province, China. *Environmental Science & Policy*, 25, 83-93.
- Weisser, F. (2014). Practices, politics, performativities: Documents in the international negotiations on climate change. *Political Geography*, 40, 46-55.
- Wellstead, A., Rayner, J., & Howlett, M. (2014). Beyond the black box: Forest sector vulnerability assessments and adaptation to climate change in North America. *Environmental Science & Policy*, 35, 109-116.
- Westerhoff, L., Keskitalo, E. C. H., & Juhola, S. (2011). Capacities across scales: local to national adaptation policy in four European countries. *Climate Policy*, 11(4), 1071-1085.
- Wheeler, T., & von Braun, J. (2013). Climate change impacts on global food security. *Science*, 341(6145), 508-513.
- Wolf, J., Adger, W.N., Lorenzoni, I., Abrahamson, V., Raine, R., 2010. Social capital, individual responses to heat waves and climate change adaptation: an empirical study of two UK cities. *Global Environmental Change* 20, 44-52.
- Wolf, J., Alice, I., & Bell, T. (2013). Values, climate change, and implications for adaptation:

- Evidence from two communities in Labrador, Canada. *Global Environmental Change*, 23(2), 548-562.
- Wong, E. P., de Lacy, T., & Jiang, M. (2012). Climate change adaptation in tourism in the South Pacific—Potential contribution of public–private partnerships. *Tourism Management Perspectives*, 4, 136-144.
- Wyss, R., Abegg, B., & Luthe, T. (2014). Perceptions of climate change in a tourism governance context. *Tourism Management Perspectives*, 11, 69-76.
- Xu, J., R.E. Grumbine, A. Shrestha, M. Eriksson, Yang, X., Wang, Y. and Wilkes, A. (2009). The melting Himalayas: cascading effects of climate change on water, biodiversity, and livelihoods. *Conservation Biology*. 23(3): 520-530.
- Zimmerman, R., & Faris, C. (2011). Climate change mitigation and adaptation in North American cities. *Current Opinion in Environmental Sustainability*, 3(3), 181-187.



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