

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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RESEARCH PROGRAM ON
Climate Change,
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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 ¹were 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	

¹ 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.

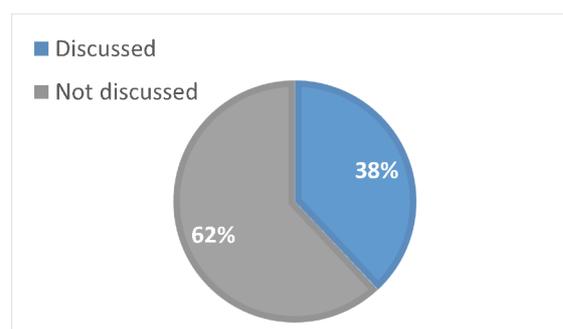


Figure 1. Overview of the distribution of the focus of papers on mitigation issues (N= 52 papers)

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.

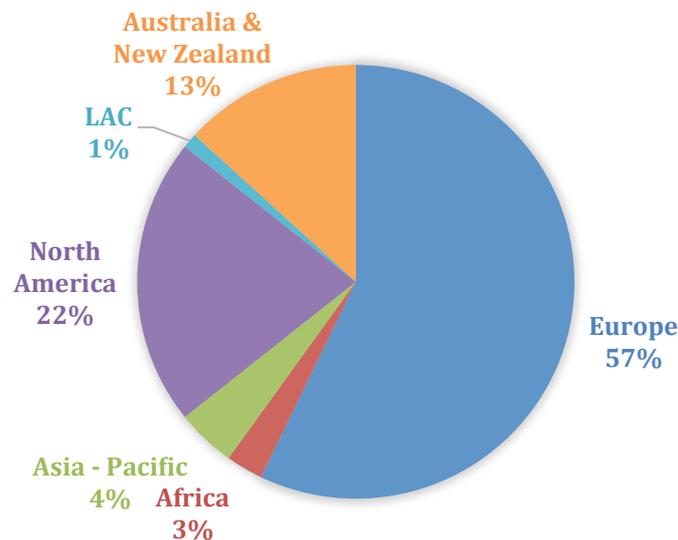
Table 6. Overview of the challenges mentioned in the reviewed papers (N = 117)

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
Geographic scale	National
	Regional
	Global
Geographic location	Listing the region, country
Level of development	LDC
	Emerging economy
	Developing country (if not LDC or emerging)
	Developed country
Aspect of agriculture & food security addressed	Nutrition
	Food availability
	Food access
	Infrastructure
	Natural resource base
	Policy (food safety, trade, agriculture)
	Plant production
	Livestock production
	Agricultural production inputs
	Markets
	Pastoralism
Sectoral focus (secondary to agriculture & food)	Forests/forestry
	Fisheries
	Water
	Human health
	Infrastructure
	Human settlements
	Tourism
	Industry including energy
	Social protection
	Biodiversity
	Multisectoral (more than three sectors)
	Other
Mitigation	YES OR NO AND details in the box next to it
Climate change impact discussed	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
Type of adaptation actions	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
Governance aspects	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	
Identified governance challenges:	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

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