

# Conflict-Sensitive Climate Change Adaptation: A Review

Md Nadiruzzaman <sup>1,\*</sup> , Jürgen Scheffran <sup>1</sup> , Hosna J. Shewly <sup>2</sup>  and Stefanie Kley <sup>3</sup> 

<sup>1</sup> Research Group Climate Change and Security (CLISEC), Institute of Geography, Center for Earth System Research and Sustainability (CEN), Universität Hamburg, 20146 Hamburg, Germany; juergen.scheffran@uni-hamburg.de

<sup>2</sup> Department of Social and Cultural Sciences, Fulda University of Applied Sciences, 36037 Fulda, Germany; hosna.shewly@sk.hs-fulda.de

<sup>3</sup> Faculty of Economics and Social Sciences, Universität Hamburg, 20146 Hamburg, Germany; stefanie.kley@uni-hamburg.de

\* Correspondence: md.nadiruzzaman@uni-hamburg.de

**Abstract:** Climate change adaptation (CCA) evolved in the global policy framework in the early 1990s. However, it began to flourish about a decade later through a subsequent development of institutions, policies and supporting financial mechanisms. Various adaptation approaches and development practices have been evolving over the last couple of decades through a process of scrutiny, debates, and critiques. One such recent approach is called conflict-sensitive adaptation, which encompasses concepts to understand potential conflict-inflicting elements and peacebuilding aspects of adaptation interventions. This paper examines 35 peer-reviewed research articles that have analysed field data with the notion of conceptualising conflict-sensitive CCA initiatives. Emerging key results were presented and discussed in different academic forums to stimulate peer reflections and debates. We found that the understanding of conflict-sensitive adaptation has its universality in engaging with diverse stakeholders. However, practicalities were different in the cases of the global north and the global south. In the global south, there is a concentration of research in areas of pre-existing conflict in Africa and Asia, where climate change links are often assumed from IPCC reports in order to compensate for the unavailability of field data. However, from the perspective of adaptation politics and governance, there is a concerted urge for the emancipatory participation of local and marginalised populations. We argue for a need to pretest adaptation projects through a conflict lens. Decolonising the adaptation and understanding of local geography is critical in such planning.

**Keywords:** climate change; adaptation; conflict; participation; review



**Citation:** Nadiruzzaman, M.; Scheffran, J.; Shewly, H.J.; Kley, S. Conflict-Sensitive Climate Change Adaptation: A Review. *Sustainability* **2022**, *14*, 8060. <https://doi.org/10.3390/su14138060>

Academic Editor: Baojie He

Received: 6 June 2022

Accepted: 28 June 2022

Published: 1 July 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Climate Change Adaptation: Meaning and Scope

The concept of conflict-sensitive adaptation has seemingly evolved to address adaptation challenges in conflict-prone countries. In 2008, 35 agencies operating in Kenya, Sierra Leone, Sri Lanka and the UK combined their efforts in establishing the Conflict Sensitivity Consortium (CSC) to improve conflict sensitivity in development, humanitarian aid and peacebuilding. CSC defines conflict sensitivity as the “ability of an organisation to (1) understand the context it operates in; (2) understand the interaction between its intervention and that context; and (3) act upon this understanding to minimise negative impacts and maximise positive impacts on conflict” [1]. Interestingly, from humanitarian aid and peacebuilding initiatives, the term has silently surfaced in the climate change adaptation (CCA) literature. Technically, this idea of borrowing concepts is highly problematic and deserves serious scrutiny, particularly in this case, where the meaning of adaptation could vary in cases of disaster response, business-as-usual development, and so on from climate change actions. For example, building a dam is a mitigation action in flood protection and an adaptation decision for climate change. Therefore, it is imperative to differentiate conflict-sensitive CCAs from all other conflict-sensitive adaptations. This brings in the

following obvious question—understanding the meaning of CCA. In today's world, climate change is a part of politics, negotiations and justice, tied up with scientific attribution, accountability and payment. Thus, there are controversial, contested and ever-evolving narratives of climate change and its impact.

Inter-subjective conceptualisations of the problem cause the divergent nature of these narratives. Inherent politics and diplomacy are tied up with climate attributions, complexities, and interconnections of different elements in a particular context. Without clarifying a meaningful nexus between climate change and its myriad impacts on different groups in a particular geographic setting, this new vocabulary of conflict-sensitive adaptation to climate change is gradually taking its space in the climate change adaptation discourse. Against such a backdrop, it is important to understand the nature and application of this new terminology. How is conflict-sensitive adaptation essentially different from the other versions of participatory adaptation? Can climate change adaptation measures inflict unrest and violence? How would adaptation support peacebuilding processes in prevailing conflict areas? How is a conflict-sensitive adaptation to climate change different from other practices? This paper explores the meaning of conflict-sensitive climate adaptation in existing knowledge through a review of scholarly literature and the validation of the results by engaging in debates and discussions in formal academic forums.

Before going into further discussion, it is essential to discuss some basic concepts of climate change adaptation and its essential elements and conflict sensitivity. Adaptation is probably one of the most basic instincts that all living species of this biosphere have to endure for their evolution, survival, and growth. In very basic terms, adaptation is the actions and processes of adjusting to new settings. According to the Intergovernmental Panel on Climate Change (IPCC) [2], adaptation to climate change is the process of adjustments in actions and strategies to reduce harm or bring about beneficial opportunities from the recorded and projected changes in climatic features and their effects. For example, adjusting cropping patterns, inventing new varieties tolerant to climatic changes, developing infrastructures to cope with the changing future onsets, crop diversification and index-based insurance are all part of climate change adaptation in agriculture. As we see in the definition, the very central focus of adaptation is on climate change onsets and their induced impacts. However, we often see that without much critical reflection on the causes of environmental stresses, they are assumed as a proxy for the trigger of climate change events [3]. For example, the southern coast of Bangladesh is often referred to as a climate change “ground zero” because it is highly susceptible to sea-level rise and increased salinity. In an editorial in *Science*, Huq [4] took an “emitters-must-pay” stand to describe the suffering of climate change in Bangladesh. In recent years, he and his team have looked into the problem of salinity from a holistic perspective of environmental degradation through upstream water blockage, polderisation, inappropriate internal water management, and the promotion of shrimp cultivation [5,6]. This shift of perspective, from blaming climate change to analysing multiple triggers, has attracted increasing attention. This example underscores the importance of asking in-depth questions to understand the broader spectrum of different interfaces. Raising these questions does not bear the intention of denying or diminishing the role of climate change. Instead, thinking through these questions gives guidance for profoundly understanding the nexus of climate change together with contextual variables [7,8].

Despite how we conceptualise climate change adaptation in isolation, a global consensus was reached at the Earth Summit in Rio de Janeiro in 1992. Article 4 of the United Nations Framework Convention on Climate Change (UNFCCC) calls for cooperative action adaptation. From 1995 on, there have been developments on finalising the necessary actions, its institutional set-up and monitoring framework, actors' accountability, financial mechanisms, transparency, knowledge and technology sharing, the prioritisation of least developed countries and low-lying islands for their capacity development, mechanisms of loss and damage, operationalising green climate funds, and so on. Thus, adaptation has gradually risen to a relatively complete picture. As a result, Article 7 of the Paris agree-

ment encompasses a globally accepted climate change adaptation. Below are two crucial paragraphs (2 and 5) of the article that recognise its geographical scope and inclusive nature.

*Article 7.2: Parties recognise that adaptation is a global challenge faced by all with local, subnational, national, regional and international dimensions, and that it is a key component of and makes a contribution to the long-term global response to climate change to protect people, livelihoods and ecosystems, taking into account the urgent and immediate needs of those developing country Parties that are particularly vulnerable to the adverse effects of climate change.*

*Article 7.5: Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.*

The sections of Article 7 mentioned above clearly recognise that adaptation will vary based on its spatial scale, which requires the emancipatory participation of different groups and the maintenance of a pro-vulnerable and pro-environmental agenda. However, this very political notion of climate change adaptation seemingly overlaps with conflict-sensitive adaptation discussions, as elaborated below.

## 2. Conflict-Sensitive Climate Change Adaptation

Since the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [9], scholars have focused on connecting the dots between climate change and security. Despite remaining substantial controversies, some consensus has evolved that climate change could be a potential trigger of conflict by interacting with and multiplying risk factors and stressors [10], e.g., food production, income opportunities, and other material wellbeing factors. Climate change causes more harm to people in a society where justice and equity in all forms (i.e., social, economic, environmental, political, etc.) are absent or inadequate [11,12]. Thus, climate change could pose a security threat vis-a-vis conflict, increasing vulnerability by exacerbating conditions to adapt to climate change. This particular idea of justice has been growing in the discourses of environmental hazards since the 1970s, challenging naturalistic understandings of disasters triggered by the search for embedded economic and political inequalities and their role in provoking catastrophes [13–15]. Socially marginal groups are often regarded as the most vulnerable to stress from natural hazards, where marginality and exposure prompt each other. Such narratives also echo in the climate justice literature [16–18].

Scheffran et al. [3] elaborate on the climate change and security nexus through a reciprocal cause-and-effect matrix of four elements: climate change, natural resources, human security and social stability. The bottom line is: that conflicts are potentially triggered by human actions, in combination with the impacts of climate change, which could exacerbate the overall situation towards conflict but also induce cooperation [8,19]. Against the backdrop of the evolving climate–security nexus, we address the connections between conflict and cooperation, focusing on climate adaptation initiatives and their links with questions of conflict.

Conflict sensitivity of climate change adaptation organically emerged from increased interests in the climate change and security nexus. Considering climate change as a threat multiplier that disproportionately affects vulnerable states and peoples, adaptation needs to prevent vulnerabilities and avoid conflicts rather than aggravate them [20,21]. Moreover, as Babicky [11] suggests, communities could play a key role in designing adaptation policies, reducing the risk of causing unintended harm that inflicts tension, distrust, and conflict. Therefore, climate change adaptation measures must move beyond a mere technical understanding of building resilience; policymaking is needed to carefully balance needs and capacities, at minimum, to avoid causing harm and, at maximum, to

contribute to peace [22]. Implementation includes a wide range of strategies: human rights focus on ensuring equity, justice, inclusion, and learning; strengthening capabilities at local and central government levels; risk management and mitigation; technologies, early warning and traditional knowledge, conflict resolution, peacebuilding, and good governance [1].

### 3. Methodology

The above discussion sheds light on the concept of climate change adaptation and its connections with conflict. From the very beginning, adaptation by definition and in practice was top-down and expert-led. Later, ideas of community-based adaptation and locally led adaptation started bubbling up, which brought in elements of the participation of people on the ground. Over the last decade and so, literature on conflict-sensitive climate change adaptation has been gradually growing. It would be interesting to see how the new name adds value to the overall climate change adaptation discourse. We have found that the conflict-sensitive climate change adaptation discussion follows two major paths—firstly, the potential of an ill-planned and exclusive adaptation to cause insecurity and inflict conflict; secondly, the capacity for an inclusive and well-planned adaptation in peacebuilding.

As highlighted earlier, a growing number of papers have strived to establish connections between climate change and conflict over the last decade. While climate change exacerbates conflict situations, it is essential to carefully think through an adaptation plan that is one step ahead of business-as-usual adaptation. The primary focus of this research is to explore evidence from peer-reviewed works to understand how conflict-sensitive adaptation to climate change has been conceptualised in diverse contexts. The keywords for the search were ‘climate change’, ‘adaptation’, and ‘conflict’ in the Web of Science, Google Scholar, PubMed, Scopus, Science Direct, and ProQuest databases. Proxy words for climate change were ‘environment’, ‘weather’ and ‘nature’. The word ‘adaptation’ was swapped with ‘adjustment’, ‘intervention’, and ‘transformation’. Similarly, ‘conflict’ was a proxy for ‘security’, ‘injustice’, ‘deprivation’, ‘war’, and ‘violence’. We also investigated the citation lists and added more papers to the list. All the initial searches were transferred to an endnote library. After the initial check for duplications, we received a list of 1496 peer-reviewed articles.

We developed a selection criterion right at the beginning. All the papers were peer-reviewed, published in English and available in our library. Two of the authors read through the titles, keywords, and abstracts and found that a significant portion of the literature encompassed theoretical and methodological developments of the concept of climate change adaptation and had no mention of security or conflict. Thus, we separated 293 articles with climate change, adaptation, security, and conflict in their thematic interests. Finally, we read the introductions and conclusions of all 293 articles and grouped them based on disciplinary background, region, nature of climatic impacts, conflicts, economic strengths, vulnerabilities, capacity-development needs, cooperation, the social and ethnic diversity of people, built environment and so on. Though we wanted to examine the conflict sensitivity of climate change adaptation, many papers were merely confined to discussions of the nexus of climate change and conflict. Some pieces were eliminated for focusing on disaster adaptation instead of climate change adaptation. Two authors read every single article, and then they decided on the article’s suitability for review. Had there been any dispute over the selection decision, a third author read the article and discussed it with the other two authors to come to a final decision. Thus, we shortlisted only 35 papers that fit our research agenda. In the reviewed articles, we examined: 1. the process and governance of stakeholder engagement in climate change adaptation; 2. what the triggers of conflict in existing interventions are; 3. how climate change adaptation measures support the peacebuilding process in an ongoing conflict.

Such diversity in the literature would help us understand how different places are experiencing different environmental onsets and their adjustments. We transferred our final selection to a spreadsheet, where we designed columns to analyse our three core research

questions. Firstly, to understand climate change attribution and evidence, we looked into the sources of data and details of methodological approaches, climate change onsets (i.e., drought, flood, etc.), underlying conditions (i.e., knowledge and skills, economic condition, cooperation, ethnic tension, conflict, etc.), potential impacts and the complexity of the systems. Secondly, we investigated the adaptation measures, their direct and indirect beneficiaries, impacts of the interventions, excluded and left-behind groups, participation of stakeholders, gender sensitivity and the overall political economy of the measures. The analysis of this second step eventually unfolded two pictures: the potential areas of security threats and conflicts and how they could drive the deterioration of order and the restoration of security. At least two authors of this paper reviewed each article; each of them documented the findings in a separate spreadsheet; lastly, the findings were compiled together and discussed as a group. In the case of disputes, the articles were re-reviewed, and the results were debated using evidence from the paper and agreed to in a consensus. We kept the option of a third opinion had the disagreements not been resolved.

#### 4. Results and Discussion

Conflict-sensitive climate change adaptation is an emerging concept that is very visible in publications. In total, 35 papers were published between 2009 and 2020 (Table S1). The contributions were from various disciplines, such as geography, sociology, political science, environmental sciences, anthropology, urban and regional planning, law, conservation and life sciences, agriculture, and resources management. Disciplinary diversity is also reflected in methodologies, ranging from quantitative modelling to qualitative interviews and surveys. Several papers involved a multi-disciplinary approach to modelling and participatory engagement. Below, we discuss the key findings from our systematic review:

##### 4.1. Geographical Variation of Climate Change Impact

All the papers unanimously mentioned climate change as bad, causing misery for people, life and livelihoods and the biotic and abiotic environment. Two significant climate attributions of change echoed in most papers are extreme heat and reduced rainfall rate. Both these climatic elements separately and collectively influence the scarcity of water. Such water scarcity results in declining agricultural harvests in large parts of Africa [18] and South Asia [23,24] and creates a food crisis for livestock in pastoral societies [16,17]. Among different livelihood groups around the world [12,25–28], mounting water scarcity accelerates competition for access to and control over resources. In the Alps [29], declining water in cross-border channels is impacting environmental integrity in the watersheds. Moreover, parts of the Italian Alps [30] are losing income from ski tourism due to the diminishing accumulation of snow in the region. Thus, we see that climate-change-induced water scarcity is inflicting a wide spectrum of mounting challenges across the globe.

Water does not mount security issues only due to its scarcity; sometimes, it is due to its abundance. For example, the stormwater surges in Copenhagen [31] and Melbourne [32] and the floods from heavy rain in Mumbai [33] have posed very different sets of challenges to cities and urban centres both in the global south and the global north [34]. Moreover, water scarcity and abundance are not only associated with potential conflicts between individuals and groups but may also bring relevant institutions [31,35] to the bargaining table, across the board, through regional [36], national and international cooperation [11,19,20].

As we discuss climate change impacts, we need to remember that climate change alone hardly causes direct suffering, at least in the current context. Underlying conditions play a massive role. For example, if we do not have efficient drainage infrastructure in place and if there is a lack of coordination between different professional bodies of city water management [32], it is evident that the city and its citizens will suffer more than citizens under a benevolent city authority with efficient infrastructure in place [37].



#### 4.2. *Adaptation as a Source of Conflict: Design of Adaptation*

Adaptation is an action or process of voluntary or forced adjustment. In the context of hazard and risk, adapting means adjusting to a new or unfamiliar set of climatic attributes or changed parameters of existing features [38,39]. This adjustment can be based on conscious or autonomous planning. UNCCS [40] has noticed a shift of emphasis from the latter to the former since the 1970s. In this process, adaptation has gone from being considered something done by plants and animals in evolution to being promoted as a guiding policy to ensure sustainable development, reduce vulnerability, and minimise risk to humans from climate change. However, this latest notion of adaptation makes it a top-down, expert-led, policy-regulated implementation of the programme, where beneficiaries have very few or no options for emancipatory participation [41]. Instead, they are the passive recipients or followers of that regulation. Often, this will spark a conflict [11,20,42].

For example, following consecutive floods and cyclones in the 1960s, engineer-led polderisation was introduced in Bangladesh's coastal areas, which was later found to be a reason for land subsidence. In the years after, upstream water withdrawal for irrigation triggered salinity in the region. Due to salinity, traditional crops failed and were gradually replaced by shrimp farming. High revenue from shrimp farming lured people with significant capital from outside to make an investment, which created a sharp rise in landlessness, displacement and unemployment. Gradually, soil and surface water became saline, and household income dropped. This historical account of salinity in Bangladesh is one of the great examples of how top-down adaptation failed to acknowledge local needs and instead prioritised economic growth and safeguarded wealthy groups [5,6].

This Bangladeshi example occurred in a relatively stable situation without any pre-existing violent conditions. As we observe in our selected review articles, the spatial characteristics of studied conflict-prone places are an unequal society with embedded power differentials in the social fabric, natural-resource-dependent people, unequal distribution of resources, lack of good governance, limited or no emancipatory participation of the grassroots population, flawed institutions, weak infrastructure, scarcity of budget and allocation, constrained information flow, and so on. In the corpus of literature, there are shreds of evidence of disagreement, dispute, dismay, dissatisfaction, and conflict triggered by poverty, helplessness, exclusion, disparity, deprivation, and discrimination in the corpus of literature.

Pastoralists in Botswana were vulnerable because they were ignored in national policy [16]. In Mali, several natural-resource-dependent groups (pastorals, fishermen and farmers) were fighting for control over resources on a small piece of land [17,43]. In the South China Sea, climate-change-induced depletion of marine resources has created a demand for cross-border networking and coordination among organisations to conserve marine resources [26]. An act of coordination among multiple stakeholders has been echoed in all the papers [20,29,31,32,37,44,45]. In Europe, cross-border coordination, information sharing, stocktaking and collaborative research determine the distribution of diminishing water from the Alps [29,30]. Although local governments support the farmers in Punjab, they do not have adequate capacity to do so [23]. In Mumbai, the city water management authority has the training but not the motivation to implement the relevant policies [33]. There are several similar examples of adaptation through the lens of institutionalisation. Understanding the importance of exchanging opinions and giving everyone a voice potentially reduces the chances of a conflict. Equity and transparency are two fundamental building blocks of conflict-sensitive adaptation.

#### 4.3. *Emancipatory Participation and Environmental Justice*

Most of the articles are based on the rural settings of the global south and different African countries, where the technical and financial capacities of the state and its institutions, the human and social capital of individuals and groups, efficient legal and policy frameworks, and the availability of alternative resources are scarce. Therefore, individuals and groups squabble over access to resources, migrate to new places and become exposed

to a new set of risks. In contrast, there are a few European in-country and cross-border cases. In both cases, the institutionalisation of emancipatory public participation is the main strength of the decision-making process. There is always a ‘loser’ and a ‘winner’ in such a decision-making process. For instance, Goldman and Turner [46] explain the divergent material interests of herders, farmers, conservationists, and government officials over a barren stretch of ground in the Sahelian region of West Africa. They remark:

*Environmental knowledge production is framed, funded and publicised in widely different social arenas. The livestock herders, who arguably know the stretch of land in question best, are not even aware that their eventual exclusion from their pasture is because they have been identified as agents for its demise by research conducted halfway around the globe by scientists who have never set foot on the pasture or, in some cases, the region.* [46] (p. 3)

Making ‘winners’ pay for obtaining the environmental favour and compensating the ‘losers’ brings justice to those environmental decisions [47]. However, this does not mean that exporting institutions and policies from the global north to the global south would solve the problem. Environmental justice is highlighted as one of the major concerns in Pakistan, Srilanka, Bangladesh, Mali, Botswana, Sudan, Chad, Kenya, and all countries from the global south mentioned in the above paragraph. However, every country has very distinctive settings and socio-cultural and political contexts. These settings and contexts need to be taken into consideration when developing a pathway to environmental justice in those countries. Füssel [35] explains, with examples from Bangladesh and other countries from the global south, how ranking and national level adaptation options, a standard European practice, are irrelevant to other countries.

Though the reviewed papers have unanimously campaigned for grassroots participation, there was a general silence in mentioning ‘gender’ categorically. For example, only 3 articles out of the 35 articles selected mentioned gender inclusivity in understanding conflict-sensitive adaptation. This could be for two reasons: firstly, access to natural resources is very much gendered [48,49]; and secondly, research has a general focus on seeing insecurity and vulnerability at the household level through the livelihood security lens. Moreover, since men are more involved in farming, herding, fishing, and other nature-based livelihood opportunities, the other critical cross-cutting issues, such as gender, become blurred from the mainstream discussion.

The right to access environmental resources is very much gendered. In many parts of Africa, land and tree rights division is highly complex. Gambian women, for example, control their agricultural products on private lands but owe the harvest of communal village areas to the households. It is crucial to understand such complexities, particularly for development agencies. Robbins [50] gives an example of a tree plantation programme for Gambian women that was counter-productive because it did not address the local complexity of asset control.

In some cases, existing law restricts equal rights to environmental resources for both men and women. For example, according to the Khas Land Act 2003, in Bangladesh, women are not entitled to Khas land (government’s lands) unless she has an able male adult (son or husband) in her family. In addition, Muslim Family Law Ordinance 1961 recommends a gendered distribution of properties among all heirs.

#### 4.4. Attribution to Climate Change

Evidence from the reviewed articles demonstrates that several assessments used time-series data of more than 30 years to show variabilities and project future changes. A few papers used IPCC projections instead. Seven of the thirty-five articles used farmers’ perceptions as a proxy for climate data. For example, Elagib et al. [18] used Darfur farmers’ perceptions of rainfall and temperature data and compared them with meteorological data. They reveal that farmers’ perception of temperature data aligns with original meteorological data, though the perception of rainfall data seems inaccurate [51]. We think that clarity between the climate change element and the underlying condition is essential for

understanding the problem better and identifying options to address the issue. We see the same with the theoretical debate on the causes of a disaster. For example, until the 1980s, the decline in food availability, which was thought to be the most common cause of famine, was often triggered by extreme environmental events such as floods or droughts. Therefore, interventions for famine were mainly food and relief support.

Since the 1970s, there has been growing literature challenging the naturalistic understanding of insecurities, which is underpinned by the search for embedded economic and political inequalities and their role in triggering catastrophes [13–15]. This radical approach has gradually gained a platform to recognise that socioeconomic factors are crucial in assessing insecurities and stress [52]. With the same theoretical underpinning, we tried to reflect on whether any climate change onset would have the same impact on pastorals, farmers and fishermen across the global south if there was a strong voice for victims in economic, political, environmental and development decisions in everyday life.

Thus, as we look into long-term climatic data to understand weather variabilities, we equally need to understand marginality, a core manifestation of underlying conditions. Marginality has its roots in the 1980s in the environmental justice movement. It echoes explicit moral terrains in locating ecological problems across the globe, such as the lack of entitlements during the Bengal and Sahel famines [14]; failed market mechanisms and droughts in Nigeria [15]; the political economy of soil erosion and land degradation in Nepal [53]; challenging the received wisdom on the African environment [54]; complex relations between the shrinking economic power of Gulf residents and the threatened ecosystems of the Mexican Gulf [50]; knowledge controversies on land use and the exclusion of livestock herders in West Africa [46]; the political exclusion of ‘black’ South African women [55]; the resource struggles of Javanese women in the North Lampung [56]; and many others. The same marginality still exists in all vulnerable groups we discuss in this paper.

#### *4.5. Developing an Adaptation Decision*

Having clarity of ‘marginality’ or underlying vulnerabilities and understanding the nexus between marginality and climate trajectory would help portray the potential conflict sensitivities of any climate adaptation decision. However, conflict must not be judged primarily through its magnitude of violence. Conflict could be from a silent dissatisfaction to a violent war. In the review, we found that a wide range of these conflicts was captured, such as conflicts among different income groups over resource control [16,25], distrust and tension between different ethnic groups over access to resources [17,57], conflicts among different agencies [58,59], conflicts between humans and wild animals [24], conflicts of land-use decisions [60,61], conflicts in opinion on the framing of a particular problem [45,62], cross-border conflicts on control over natural resources [26], and so on. People need to discuss and communicate their concerns without any fear and understand the overall practicality of any adaptation decision. It has to be a multi-tier autonomous operation, where an individual and a group communicate with other individuals and groups of the same tier to discuss issues, concerns, and solutions [63]. At the same time, their practicalities are recognised at the upper tier. Thus, this communication loop develops a web from the local level through regional and national levels to the global arena.

One of the major challenges of such a participatory approach is how to deal with a loser if an adaptation decision cannot satisfy everyone. There are vast bodies of literature on payments for ecosystem services, which stresses achieving the fairness of adaptation through the distribution of adaptation costs and benefits [64]. Simultaneously, a top-down provision of services to marginal communities could gradually improve the quality of human capital and reduce insecurity threats [19].

### **5. Conclusions**

In the above discussion, we have presented some key results. We gave an overview of how climate change affects lives and livelihoods across the globe and inflicts concerns of



potential conflict. We emphasised possible threads of adaptation actions that could trigger conflict. We elaborated on the importance of continuous communication and agreement among actors at different tiers across spatial and temporal units in that connection. Another crucial point is about the political economy of knowledge production. As knowledge is not apolitical and vested interests are involved in the knowledge generation process, it is important to let the knowledge evolve through the emancipatory participation of relevant groups in order to acknowledge local sensitivities. In this review, we find that in many places, the production of knowledge is very much top-down and highly contested. Therefore, fishermen in Zimbabwe [25] and herders in Mali [17] and Botswana [16] and many other marginal groups across the globe are excluded from new land-use policies in a changing environment. This trend of marginality is observed in the reviewed articles where gendered vulnerability is absent in the mainstream research agenda. The following section focuses on the core research questions, emphasises the attribution of climate change in research on climate change adaptation, and sheds light on the way forward.

In very general terms, adaptation is (i) the ability of an individual, group, or system to absorb disturbance/change (ii) by maintaining or transforming living standards in the face of shocks or stresses (iii) without compromising long-term prospects [41]. Adaptation started becoming standard vocabulary in the United Nations Framework Convention on Climate Change (UNFCCC) from the Second Conference of Parties (COP) in 1996. Over the last two and half decades, the concept has started growing and unfolding through gradually executing different actions. A few of them are: developing financial mechanisms for the least developed countries (LDCs); facilitating policy frameworks (i.e., National Adaptation Programme of Action (NAPA)) for all countries; encouraging local-level participation in adaptation projects; learning and knowledge sharing; comprehensive plans for places where projected adversities are beyond adaptation [40]. These national and global level initiatives have been synchronised with local-level actions such as community-based adaptation [65].

This systematic review picks up various articles to accommodate multiple climate-change scenarios and their adaptation responses. This diverse literature set argues that adaptation to a particular climate change impact must not be a one-bullet-fits-all prescription. Instead, adaptation must be locally relevant in considering the availability of resources, the local capability of mobilising them, conditions of inequality and deprivation and so on [35].

Communications among the adaptation planners, experts, policymakers and stakeholders are vital to understanding and incorporating quotidian flexibility to make their adaptive interventions work. The essence of community-based or locally led participatory adaptation is a foundation for peacebuilding and conflict resolution. Therefore, it is essential to understand the very nature and politics of that participation.

**Supplementary Materials:** The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su14138060/s1>, Table S1: Summary of the reviewed papers.

**Author Contributions:** Conceptualisation, M.N., J.S., H.J.S. and S.K.; methodology, M.N. and H.J.S.; validation, M.N. and H.J.S.; formal analysis, M.N. and H.J.S.; investigation, M.N. and H.J.S.; resources, J.S. and S.K.; data curation, M.N. and H.J.S.; writing—original draft preparation, M.N.; writing—review and editing, M.N., J.S., H.J.S. and S.K.; visualisation, M.N.; supervision, J.S. and S.K.; project administration, M.N. and J.S.; funding acquisition, J.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under Germany's Excellence Strategy—EXC 2037 'CLICCS—Climate, Climatic Change, and Society' (Project Number: 390683824) and a contribution to the Center for Earth System Research and Sustainability (CEN) of Universität Hamburg.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Not applicable.

**Acknowledgments:** We would like to thank all the experts and practitioners who have supported the research by providing their reflections and comments on different aspects of the total write-up. We are also highly indebted to the reviewers for reading the paper and helping to strengthen the quality of the article by giving their comments.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Conflict Sensitivity Consortium (CSC). *How to Guide to Conflict Sensitivity*; Conflict Sensitivity Consortium; UK Department for International Development: London, UK, 2012.
2. IPCC. Annex I: Glossary. Matthews, J.B.R., Ed. In *Global Warming of 1.5 °C*; Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., et al., Eds.; An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty; IPCC: Geneva, Switzerland, 2018.
3. Scheffran, J.; Brzoska, M.; Kominek, J.; Link, P.M.; Schilling, J. Climate change and violent conflict. *Science* **2012**, *336*, 869–871. [[CrossRef](#)] [[PubMed](#)]
4. Huq, S. Climate Change and Bangladesh. *Science* **2001**, *294*, 1617. [[CrossRef](#)] [[PubMed](#)]
5. Paprocki, K.; Huq, S. Shrimp and coastal adaptation: On the politics of climate justice. *Clim. Dev.* **2018**, *10*, 1–3. [[CrossRef](#)]
6. Mostafa, M.; Nasir, N.; Rahman, M.F.; Huq, S. A Delta in Peril. *Am. Sci.* **2019**, *107*, 288–295. [[CrossRef](#)]
7. Gioli, G.; Hugo, G.; Costa, M.M.; Scheffran, M. Human mobility, climate adaptation, and development. *Migr. Dev.* **2016**, *5*, 165–170. [[CrossRef](#)]
8. Schilling, J.; Hertig, E.; Trambly, Y.; Scheffran, J. Climate change vulnerability, water resources and social implications in North Africa. *Reg. Environ. Chang.* **2020**, *20*, 15. [[CrossRef](#)]
9. IPCC. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*; Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E., Eds.; Cambridge University Press: Cambridge, UK, 2007.
10. Mach, K.J.; Kraan, C.M.; Adger, W.N.; Buhaug, H.; Burke, M.; Fearon, J.D.; Field, C.B.; Hendrix, C.S.; Maystadt, J.-F.; O’Loughlin, J.; et al. Climate as a risk factor for armed conflict. *Nature* **2019**, *571*, 193–197. [[CrossRef](#)]
11. Babicky, P.A. Conflict-Sensitive Approach to Climate Change Adaptation. *Peace Rev.* **2013**, *25*, 480–488. [[CrossRef](#)]
12. Okpara, U.T.; Stringer, L.C.; Dougill, A.J. Using a novel climate–water conflict vulnerability index to capture double exposures in Lake Chad. *Reg. Environ. Chang.* **2017**, *17*, 351–366. [[CrossRef](#)]
13. O’Keefe, P.; Westgate, K.; Wisner, B. Taking the Natureness Out of Natural Disaster. *Nature* **1976**, *260*, 566–567. [[CrossRef](#)]
14. Sen, A. *Poverty and Famines: An Essay on Entitlement and Deprivation*; Clarendon Press: Oxford, UK, 1981. [[CrossRef](#)]
15. Watts, M. *Silent Violence: Food, Famine and Peasantry in Northern Nigeria*; University of California Press: Berkeley, CA, USA, 1983.
16. Basupi, L.V.; Quinn, C.H.; Dougill, A.J. Historical perspectives on pastoralism and land tenure transformation in Ngamiland, Botswana: What are the policy and institutional lessons? *Pastoralism Res. Policy Pract.* **2017**, *7*, 24. [[CrossRef](#)]
17. Djoudi, H.; Locatelli, B.; Brockhaus, M. Once there was a lake: Vulnerability to environmental changes in northern Mali. *Reg. Environ. Chang.* **2013**, *13*, 493–508. [[CrossRef](#)]
18. Elagib, N.A.; Musa, A.; Sulieman, H. Socio-hydrological Framework of Farmer-Drought Feedback: Darfur as a Case Study. In *Water Resources in Arid Areas: The Way Forward*; Abdalla, O., Kacimov, A., Chen, M., Al-Maktoumi, A., Al-Hosni, T., Clark, I., Eds.; Springer International Publishing: Cham, Switzerland, 2017; pp. 461–479.
19. Fussler, H.-M. How inequitable is the global distribution of responsibility, capability, and vulnerability to climate change: A comprehensive indicator-based assessment. *Glob. Environ. Chang.* **2010**, *20*, 597–611. [[CrossRef](#)]
20. Tänzler, D.; Maas, A.; Carius, A. Climate change adaptation and peace. *WIREs Clim. Chang.* **2010**, *1*, 741–750. [[CrossRef](#)]
21. Bob, U.; Bronkhorst, S. (Eds.) *Conflict-Sensitive Adaptation to Climate Change in Africa*; Berliner Wissenschaftsverlag: Berlin, Germany, 2014.
22. Tänzler, D.; Scherer, N. *Guidelines for Conflict-Sensitive Adaptation to Climate Change*; Adelphi Research: Berlin, Germany, 2019.
23. Abid, M.; Schilling, J.; Scheffran, J.; Zulfiqar, F. Climate change vulnerability, adaptation and risk perceptions at farm level in Punjab, Pakistan. *Sci. Total Environ.* **2016**, *547*, 447–460. [[CrossRef](#)]
24. Premaratne, N.M.K.C.; Dissanayake, S.T.M.; De Silva, S.; Weerathunga, U.S.; Kumara, T.V.P. Impact of Changed Rainfall Patterns Due to Climate Change and Usage of Available Weather Information by Communities Who Face Human-Elephant Conflict (HEC) in Udawalawe, Sri Lanka. *Proc. Int. Conf. Clim. Chang.* **2017**, *1*, 40–50.
25. Ndhlovu, N.; Saito, O.; Djalante, R.; Yagi, N. Assessing the Sensitivity of Small-Scale Fishery Groups to Climate Change in Lake Kariba, Zimbabwe. *Sustainability* **2017**, *9*, 2209. [[CrossRef](#)]
26. Chircop, A. Regional Cooperation in Marine Environmental Protection in the South China Sea: A Reflection on New Directions for Marine Conservation. *Ocean Dev. Int. Law* **2010**, *41*, 334–356. [[CrossRef](#)]
27. Pinsky, M.L.; Fenichel, E.; Fogarty, M.; Levin, S.; Mccay, B.; St Martin, K.; Selden, R.L.; Young, T. Fish and fisheries in hot water: What is happening and how do we adapt? *Popul. Ecol.* **2021**, *63*, 17–26. [[CrossRef](#)]

28. Mohmmmed, A.; Zhang, K.; Kabenge, M.; Keesstra, S.; Cerdà, A.; Reuben, M.; Elbashier, M.M.A.; Dalson, T.; Ali, A.A.S. Analysis of drought and vulnerability in the North Darfur region of Sudan. *Land Degrad. Dev.* **2018**, *29*, 4424–4438. [\[CrossRef\]](#)
29. Beniston, M.; Stoffel, M. Assessing the impacts of climatic change on mountain water resources. *Sci. Total Environ.* **2014**, *493*, 1129–1137. [\[CrossRef\]](#) [\[PubMed\]](#)
30. Bonzanigo, L.; Giupponi, C.; Balbi, S. Sustainable tourism planning and climate change adaptation in the Alps: A case study of winter tourism in mountain communities in the Dolomites. *J. Sustain. Tour.* **2016**, *24*, 637–652. [\[CrossRef\]](#)
31. Franco-Torres, M.; Rogers, B.C.; Ugarelli, R.M. A framework to explain the role of boundary objects in sustainability transitions. *Environ. Innov. Soc. Transit.* **2020**, *36*, 34–48. [\[CrossRef\]](#)
32. Madsen, H.M.; Brown, R.; Elle, M.; Mikkelsen, P.S. Social construction of stormwater control measures in Melbourne and Copenhagen: A discourse analysis of technological change, embedded meanings and potential mainstreaming. *Technol. Forecast. Soc. Chang.* **2017**, *115*, 198–209. [\[CrossRef\]](#)
33. Weinstein, L.; Rumbach, A.; Sinha, S. Resilient Growth: Fantasy Plans and Unplanned Developments in India's Flood-Prone Coastal Cities. *Int. J. Urban Reg. Res.* **2019**, *43*, 273–291. [\[CrossRef\]](#)
34. Kebede, A.S.; Dunford, R.; Mokrech, M.; Audsley, E.; Harrison, P.A.; Holman, I.P.; Nicholls, R.J.; Rickebusch, S.; Rounsevell, M.D.A.; Sabaté, S.; et al. Direct and indirect impacts of climate and socio-economic change in Europe: A sensitivity analysis for key land- and water-based sectors. *Clim. Chang.* **2015**, *128*, 261–277. [\[CrossRef\]](#)
35. Fussler, H.-M. Ranking of national-level adaptation options: An editorial comment. *Clim. Chang.* **2009**, *95*, 47–51. [\[CrossRef\]](#)
36. Karlstetter, N. Co-evolution and Co-management of Economic and Ecological Sustainability: A Semantic Approach to Modeling Climate Adapted Land Use Strategies in Northwestern Germany. In *Information Technologies in Environmental Engineering*; Golinska, P., Fertsch, M., Marx-Gómez, J., Eds.; Springer: Berlin, Germany, 2011; Volume 3, pp. 213–227. [\[CrossRef\]](#)
37. Gober, P.; Quay, R.; Larson, K.L. Outdoor Water Use as an Adaptation Problem: Insights from North American Cities. *Water Resour. Manag.* **2016**, *30*, 899–912. [\[CrossRef\]](#)
38. Pelling, M.; Manuel-Navarrete, D. From Resilience to Transformation: The Adaptive Cycle in Two Mexican Urban Centres. *Ecol. Soc.* **2011**, *16*, 11. [\[CrossRef\]](#)
39. Folke, C. Resilience: The Emergence of a Perspective for Social-Ecological Systems Analyses. *Glob. Environ. Chang.* **2006**, *16*, 253–267. [\[CrossRef\]](#)
40. UNCCS. 25 Years of Adaptation under the UNFCCC. Available online: [https://unfccc.int/sites/default/files/resource/AC\\_25%20Years%20of%20Adaptation%20Under%20the%20UNFCCC\\_2019.pdf](https://unfccc.int/sites/default/files/resource/AC_25%20Years%20of%20Adaptation%20Under%20the%20UNFCCC_2019.pdf) (accessed on 19 December 2021).
41. Brown, K. Sustainable adaptation: An oxymoron? *Clim. Dev.* **2011**, *3*, 21–31. [\[CrossRef\]](#)
42. Froese, R.; Schilling, J. The Nexus of Climate Change, Land Use, and Conflicts. *Curr. Clim. Chang. Rep.* **2019**, *5*, 24–35. [\[CrossRef\]](#)
43. Lalthapersad-Pillay, P.; Oosthuizen, A.G. Perspectives on climate change and adaptation funding in developing countries. *J. Transdiscipl. Res. South. Afr.* **2011**, *7*, 351–366. Available online: <http://hdl.handle.net/10500/18964> (accessed on 15 November 2021). [\[CrossRef\]](#)
44. Garrick, D.E.; De Stefano, L. Adaptive capacity in federal rivers: Coordination challenges and institutional responses. *Curr. Opin. Environ. Sustain.* **2016**, *21*, 78–85. [\[CrossRef\]](#)
45. Litre, G.; Bursztyn, M.; Filho, S.R.; Mesquita, P. Challenges of performing socio-environmental interdisciplinary research: The experience of the Brazilian Research Network on Climate Change (Rede CLIMA). *Desenvolv. Meio Ambient.* **2019**, *51*, 141–153. [\[CrossRef\]](#)
46. Goldman, M.J.; Turner, M.D. Introduction. In *Knowing Nature: Conversations at the Intersection of Political Ecology and Science Studies*; Goldman, M.J., Nadasdy, P., Turner, M.D., Eds.; The University of Chicago Press: Chicago, IL, USA, 2011; pp. 1–23.
47. Corbera, E.; Brown, K.; Adger, W.N. The Equity and Legitimacy of Markets for Ecosystem Services. *Dev. Chang.* **2007**, *38*, 587–613. [\[CrossRef\]](#)
48. Jaggernath, J. Women, climate change and environmentally-induced conflicts in Africa. *Agenda* **2014**, *28*, 90–101. [\[CrossRef\]](#)
49. Ravera, F.; Reyes-García, V.; Pascual, U.; Drucker, A.G.; Tarrasón, D.; Bellon, M.R. Gendered agrobiodiversity management and adaptation to climate change: Differentiated strategies in two marginal rural areas of India. *Agric. Hum. Values* **2019**, *36*, 455–474. [\[CrossRef\]](#)
50. Robbins, P. *Political Ecology*, 2nd ed.; Wiley-Blackwell: West Sussex, UK, 2012.
51. Abid, M.; Scheffran, J.; Schneider, U.A.; Elahi, E. Farmer Perceptions of Climate Change, Observed Trends and Adaptation of Agriculture in Pakistan. *Environ. Manag.* **2019**, *63*, 110–123. [\[CrossRef\]](#)
52. Wisner, B.; Blaikie, P.; Cannon, T.; Davis, I. *At Risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed.; Routledge: London, UK, 2004.
53. Blaikie, P.; Brookfield, H. (Eds.) *Land Degradation and Society*; Methuen: London, UK, 1987. [\[CrossRef\]](#)
54. Leach, M.; Mearns, R. (Eds.) *The Lie of the Land: Challenging Received Wisdom on the African Environment*; James Currey and Heinemann: Oxford, UK, 1996.
55. McEwan, C. 'Bringing government to the People': Women, Local Governance and Community Participation in South Africa. *Geoforum* **2003**, *34*, 469–481. [\[CrossRef\]](#)
56. Elmhirst, R. Negotiating Land and Livelihood: Agency and Identities in Indonesia's Transmigration Programme. In *Gender Politics in the Asia-Pacific Region*; Yeoh, P.T., Huang, S., Eds.; Routledge: London, UK, 2002; pp. 79–98.

57. Ngaruiya, G.W.; Scheffran, J. Actors and networks in resource conflict resolution under climate change in rural Kenya. *Earth Syst. Dyn.* **2016**, *7*, 441–452. [[CrossRef](#)]
58. Xu, J.; Hou, S.; Xie, H.; Lv, C.; Yao, L. Equilibrium approach towards water resource management and pollution control in coal chemical industrial park. *J. Environ. Manag.* **2018**, *219*, 56–73. [[CrossRef](#)] [[PubMed](#)]
59. Zhang, T.; Bakar, S. The Implications of Local Perceptions, Knowledge, and Adaptive Strategies for Adaptation Planning in Coastal Communities of Zanzibar. *Environ. Justice* **2017**, *10*, 112–118. [[CrossRef](#)]
60. Lee, Y.-J.; Tung, C.-M.; Lin, S.-C. Carrying capacity and ecological footprint of Taiwan. In *Advances in Energy and Environment Research*; Achour, B., Wu, Q., Eds.; Taylor & Francis Group: London, UK, 2017; pp. 207–218.
61. Magrach, A.; Ghazoul, J. Climate and Pest-Driven Geographic Shifts in Global Coffee Production: Implications for Forest Cover, Biodiversity and Carbon Storage. *PLoS ONE* **2015**, *10*, e0133071. [[CrossRef](#)] [[PubMed](#)]
62. Roggero, M. Adapting institutions: Exploring climate adaptation through institutional economics and set relations. *Ecol. Econ.* **2015**, *118*, 114–122. [[CrossRef](#)]
63. Tirado, M.C.; Hunnes, D.; Cohen, M.J.; Lartey, A. Climate Change and Nutrition in Africa. *J. Hunger Environ. Nutr.* **2015**, *10*, 22–46. [[CrossRef](#)]
64. Adger, W.N.; Paavola, J.; Huq, S.; Mace, M.J. (Eds.) *Fairness in Adaptation to Climate Change*; MIT Press: Cambridge, MA, USA, 2006.
65. Kirkby, P.; Williams, C.; Huq, S. Community-based adaptation (CBA): Adding conceptual clarity to the approach, and establishing its principles and challenges. *Clim. Dev.* **2018**, *10*, 577–589. [[CrossRef](#)]