

Entry

# Impacts of Climate Change on Rural Communities: Vulnerability and Adaptation in the Global South

Christopher L. Atkinson<sup>1,2,\*</sup>  and Allison M. Atkinson<sup>3</sup>

<sup>1</sup> Public Administration Program, University of West Florida, 11000 University Parkway, Pensacola, FL 32514, USA

<sup>2</sup> College of Health Sciences and Public Policy, Walden University, Minneapolis, MN 55401, USA

<sup>3</sup> College of Education and Professional Studies, University of West Florida, 11000 University Parkway, Pensacola, FL 32514, USA; ama122@students.uwf.edu

\* Correspondence: catkinson1@uwf.edu

**Definition:** Climate change has resulted in negative impacts upon rural communities, notably in the Global South; these impacts expose vulnerabilities that exist on individual and societal levels, necessitating consideration of adaptive capacity given the climate change threat, as well as the role of government in responding to hazards, and encouraging resilience and sustainability.

**Keywords:** climate change; rural communities; vulnerability; adaptive capacity; resilience; gender; Global South



**Citation:** Atkinson, C.L.; Atkinson, A.M. Impacts of Climate Change on Rural Communities: Vulnerability and Adaptation in the Global South. *Encyclopedia* **2023**, *3*, 721–729. <https://doi.org/10.3390/encyclopedia3020052>

Academic Editors: Daniel Durán Sandoval, Gemma Durán Romero, Francesca Uleri, Ana M. López and Raffaele Barretta

Received: 27 April 2023

Revised: 25 May 2023

Accepted: 6 June 2023

Published: 8 June 2023



**Copyright:** © 2023 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. Introduction

Climate change has been defined as “long-term change in the average weather patterns that have come to define Earth’s local, regional and global climates” [1]. Climate change causes direct effects, including death and destruction through the impact of extreme events, such as floods, wildfires, and hurricanes/typhoons, and indirect effects, like disruption of plant and animal species, and individual trauma as people attempt to respond to changing circumstances [2]. Direct effects, like flooding, may be quite noticeable, but the slow-developing, long-term implications of climate change, such as increasing poverty and loss of biodiversity [3], may be less obvious but arguably more devastating to the world’s future. Rural areas, described as “sparsely populated, [having] low housing density, and . . . far from urban centers” [4], are transforming, with shifts in employment, sociocultural factors, and concerns about the future of such areas related to infrastructure [5]. Coupled with climate change, effects on rural communities are complex and worthy of understanding and exploration. While climate change impacts on rural areas are a global problem, in the Global South there exists a “a large and growing gap between needs and action on climate change adaptation” [6].

This entry considers the impact of climate change on rural communities, focusing on vulnerability of these areas and their inhabitants, and adaptation efforts; the literature is generally considered, but specific attention is paid to cases involving the Global South. Understanding of the experiences of the Global South is relevant to strategies and policymaking elsewhere, as the threat of climate change continues. First, a review of climate change, with an emphasis on extreme events, sources of vulnerability and risk, and adaptation, is undertaken, given a review of the literature. Next, perspectives are offered on climate change’s impacts in agriculture, with a focus on smallholder farming. A discussion of government, trust, and collective action in rural communities considering climate change follows. A conclusion with opportunities for future research completes the entry.

## 2. Climate Change Impacts on Rural Areas: Extreme Events, Sources of Vulnerability and Risk, and Adaptation

Climate change is expected to worsen disaster risk and severity of events in the developing world [7]. While climate change has and will continue to affect all of civilization, the most serious impacts of climate change are frequently seen in vulnerable areas, including rural places, with Indigenous and disadvantaged populations being exposed to heightened inequality [2]. Many explorations of climate change impacts focus on the Global South and inequality [8–12].

Masuda and colleagues [13] considered an Indonesian case study, exploring behavioral data on risk factors as to how populations adapt to extreme weather events such as temperature changes, in terms of work health and productivity. Their paper investigated how temperature increases affect rural populations targeting output, mortality rates, migration, and human capital.

Socioeconomic issues and shortfalls in skills and capacities in agriculture have been noted as considerable vulnerabilities in rural areas [14]. Tribal groups are especially vulnerable given reliance on agriculture, which is being threatened by climate change, and poverty [15]. Government programs can serve as effective interventions to help indigenous populations through integrating natural systems and human systems, aiding vulnerable groups in reconciling climate change with employment opportunities and agricultural demands, as an example [15].

Climate change has intensified agricultural drought, which has altered rural areas in ways that threaten food security; this has implications for global sustainability [16,17]. Drought has implications beyond agriculture, necessitating water planning [18]. On the other hand, because of climate change, some areas have seen more frequent and larger floods [19]. Floods are especially damaging in rural areas from a business perspective because the business location and employees are both more likely affected by the event [20]. Forest-based work has been affected by climate change, due to fluctuations in rain and temperature, the threat of forest fires, and the incidence of pests, with non-wood products being more vulnerable [14].

There is a strong segment of research on the relationship of gender, climate change, and vulnerability [11]. Some research suggests that climate change has also caused impacts that adversely and disproportionately impact women [21,22]. Azong and Kelso [23] examined the relationship matrilineal and patrilineal lines have on women in agriculture, regarding ethnicity and vulnerability in Cameroon, finding vast differences in how women farmers are treated in this culture with focus on climate change. In a study of Mindanao, Philippines, there was a consideration of gender differences when looking at agrarian smallholders; ethnic, religious, and socioeconomic factors that threaten livelihoods of women are combined with the larger threat of climate change [24].

In a study in Kerala, India, women were shown to have greater vulnerability given floods, and that they may be assisted best by access to financial resources and information programs that are targeted to them. The frequency of extreme events due to climate change necessitates a shift of approach from relief and response to preparedness and availability of resources to reduce identified vulnerability [25]. Nyahunda and associates suggested that “vulnerabilities and inequalities manifest through lack of land and property rights, discrimination from decision-making processes, poverty and lack of adequate knowledge about climate change mitigation and adaptation,” and that this was aggravated by a lack of social work involvement [26]. The above studies noted, not all studies agree; a study by Ceci and colleagues did not show an influence due to gender on adaptation [27].

Issues of culture and belief may impact adaptive capacity and thus resilience of individuals and communities; handled poorly such matters may lead to maladaptive behaviors [28]. The tendency to adapt also depends on “well-being status of households . . . when individuals have incentive, knowledge, resources and skills to adapt” [29]. As an example, traditional means of living, such as cooking with fuelwoods, in rural areas have climate change implications that also touch upon vulnerabilities, such as the potential for adverse

impact on public health. Adaptive approaches may yield improved methods that address public health concerns, while also reducing climate change impacts [30].

Migrant populations may evidence vulnerability and it is important to plan for their needs. Migration concerns in rural coastal regions can lead to climate change-related emergencies [31]. The idea of ecobordering—connecting anti-immigration sensibilities with supposed concern for environmental sustainability—is a development that is troubling, shifting blame unfairly [32]. The movement of populations—climate refugees—from climate-challenged areas to the Global North has been seen as a sort of reverse-colonialism [33].

Aging populations can also be a source of potential vulnerability in rural areas; this is a global concern. Krawchenko and colleagues [34] focused on the vulnerable aging populations in Nova Scotia, Canada, and proactive planning for coastal climate change; the authors considered attempts to bridge the gap between vulnerability and sustainability in terms of infrastructure, programs and services that appeal to and are utilized by these aging populations.

Rural areas are arguably most known for their agricultural role; smallholders are notably impacted by climate change, as discussed in the next section.

### 3. Agriculture: Climate Change in Rural Areas and Impacts on Smallholders

The necessity of addressing sustainability in agriculture rests not only on ensuring the productive capacity of the Earth well into the future, while also attending to the needs of an expanding human population—there is also a need to consider these requirements in light of climate change. There is a relationship between increased risk and proportion of rural population working in agriculture, related to the variability introduced by climate change [35]. Any solutions must work as designed in developing countries, and specifically rural areas, for climate change to be reasonably and effectively addressed [36]. Rural areas are not all of one type. In the Solomon Islands, economic uncertainty, combined with the aftermath of an earthquake have made for a rather threatened insular economy consisting of agriculture and fishing. Adaptability, vulnerability, and resilience in this case seem difficult to quantify, making planning efforts problematic [37].

The perception of climate change being an important issue to solve is less common in rural areas than in urban places [38], with some rural areas unsure or defiant on the point of the anthropogenic (human-caused) sources of climate change, even given clear and undeniable evidence of change [39].

Generally, rural populations may not see climate change as a problem that affects them directly, mistakenly thinking they are somehow safe from it or that the matter is unrelated to them; even in marginalized areas heavily dependent on the land, people may be more convinced by family viewpoints than science, so a seeming denial of climate change is more akin to information not being used [40]. Other rural populations may be resistant to engaging in alternative agricultural approaches, for example, because they do not perceive benefits or reason to do so [41]. In the case of wildfires, blaming management practices and ignoring the impact of climate change are sources of vulnerability [33].

The key to solving this problem of perception and awareness may be in tying climate change concerns to the very real and well-understood concerns that surround industry, agricultural business, and productivity [39,41], reporting about climate change with scientific sources, and being willing to call out untruths when they are uttered [39]. Ideally, awareness leads to adaptation [42], which leads to resilience in rural areas. People in rural areas are aware of climate changes, and this is impacting their strategies and decision-making [27]. Dumenu and Obeng [43] evaluated adaptation strategies in four rural communities in Ghana using social and economic factors to assess climate change and vulnerability, focusing on local response efforts to climate change. Points of concern included crop diversification, non-farm second jobs, migration patterns and farm size. Adaptation methods such as water harvesting can be helpful in reducing vulnerability in rural areas [44].

Awareness of potential hazard and having been exposed to past instances of a hazard may indicate receptivity to acting appropriately in the face of a hazard event, but in an era of extremes, it is possible that public receptiveness may have limits, given that extreme events can cause catastrophes that are beyond simple preparedness [45].

Agriculture itself stands in a precarious state, with industrial enhancements to productivity accompanying trends toward environment degradation, and food scarcity persisting against a growth in productive capacity. Sustainability in agriculture implies “making best use of nature’s goods and services whilst not damaging these assets,” but this also means making best use of the capacities of people to work together and solve problems [36] (p. 459). Sectoral, community-led approaches can be helpful to achieving sustainable aims [46], as does attention and respect for the uniqueness and complexity of places [47].

Toulmin observed that smallholders “face an asymmetry of power vis-à-vis government and corporations in relation to their access to land, water, and natural resources” [21] (p. 458). The difficulty of smallholder livelihoods is made more challenging by the impacts of climate change, which include not only changes in the natural world, and in particular weather impacts on agricultural practices, but also price volatility when smallholders bring their products to market. Smallholders are challenged in accessing international markets, beyond some access to ‘fair-trade’ arrangements [36].

As alluded to above, extreme hazard events such as floods have resulted in similarly extreme effects for smallholders, causing economic damage due to lost yields, displacement, and homelessness. Because smallholders in rural areas are limited in their resources to respond to changes in climate and hazard events, they are highly vulnerable to such impacts; this may result in their being removed from agricultural employment entirely, or worse, under threat for their lives and those of their families [21].

Generally, smallholders lack influence [21]. A positive aspect is that there is a tendency in rural areas for farmers to share information with one another, forming useful patterns for sensemaking and decision-making [48]; this can be helpful if accurate information is being shared. Increasing social capital is helpful for enhancing preparedness and resilience in rural areas [49].

Smallholders, and rural residents generally, tend to evidence a variety of individual and community vulnerabilities [19]. These vulnerabilities may be related to the land itself (issues with land availability or quality, land title, and/or availability of water) and to the individual situation of the landowner/resident, such as a lack of credit or savings, or concerns about continuity and disaster planning [16].

Land conversion can leave rural areas susceptible to climate change. Azadi and colleagues noted that “the importance of [land use and land cover] cannot be overstated...conversion and degradation of . . . [rural] lands can pose a serious threat to rural development” [3] (p. 816). Economic instability is a vulnerability that may become heightened given the additional impacts of climate change and could keep communities from responding effectively to extreme events [50].

Interaction of rural residents and government is a point of consideration. The nexus between rural communities and government indicates potential vulnerability, but shows opportunity for improving trust and increasing capacity through enhanced involvement and governance, as noted in the next section.

#### **4. Interaction with Government: Climate Change, Trust and Collective Action in Rural Communities, Involvement in Public Space**

Governments have an essential role to play in leading rural communities toward increases in adaptive capacity and improved resilience. “Public administrators hold the responsibility to seek holistic and innovative solutions to maintain and enhance the organizational assets, the environment, and human resources,” and this includes responding to the threat of climate change [51] (p. 47). Interaction between government and rural communities works best when government is not averse to making good use of local knowledge, which in many respects has served communities for generations and may

hold important keys for appropriate responses to future challenges [52]. There is a need to build government perception and trust to respond to community vulnerabilities [53]. Where there are efforts to incorporate public participation in climate change planning, efforts should be meaningful and build toward outcomes that clearly improve protection of livelihoods [54].

There is a public interest in rural resilience from a variety of perspectives. Generally, society benefits when rural employments are maintained, from an economic development perspective [20]. Government programs can help with “vulnerabilities related to agriculture, water and household economic conditions” [15] (p. 156); such interventions are essential for marginalized groups. Climate change should be incorporated in government planning for how to decrease vulnerability and improve resilience [17]. Resilience in rural areas may be impacted by education levels, access to food and water and health, as shown in a case study in Bangladesh in development of policy strategies for government, among poor, impoverished farmers [55]. Research, improvements in use of technology, and reductions in the marginalization of smallholders are all essential to responding to the threat of climate change for rural areas [21].

Governments can assist with capacity building for rural interests, improvements in technology availability and utilization, and sharing essential information in ways that make sense for diverse populations [16,56,57]. Rural areas are at a disadvantage for receiving warnings of impending hazards, and so are more susceptible to impacts [2]. Information needs to be location-specific to be of greatest benefit for agricultural interests [58]. When adaptive measures are instituted, instructions on how to use strategies exactly should be provided [59].

Political instabilities reduce trust and do not lead to a sense of resilience for communities [60]. A lack of trust in public institutions may yield shortfalls in adaptive capacity, which is essential for dealing with the impacts of climate change. Such a lack of trust may be associated with a denial that risks exist, or undue hopefulness [61] given the serious threat posed by climate change and extreme events. There may be instances where different agricultural techniques should be tried, or some portion of the population may need to engage in alternative work to adapt to changing circumstances, to allow for sustainable communities [62].

However, the media may provide a venue for climate change denial, which can lead to political gains [39]; this creates a cycle where science and policy are questioned. This can undermine positive gains being made by government. Media framing of the threat posed by climate change is not always consistent, and this can have consequences for viewpoints on how policies and interventions are seen in rural areas [63]. Still, the media [39] and government can and should make clear the concerns about climate change, how they will affect humankind, and what may be done about the threat, to empower individuals and communities.

## 5. Conclusions and Opportunities for Future Research

Because rural areas are excessively affected by climate change, there are clear needs to allay such effects and adapt to them [64]. Poor healthcare services in rural areas contribute to vulnerability [14]. Additional research to explore the connections more fully between climate change and public health has been suggested [55,65] and is worthwhile given continually evolving circumstances. Additional research is likely needed given disagreement on the role of gender in adoption of climate change adaptation strategy [27]. Gender is perceived differently in different places, from Mindanao to Cameroon, and definitions and expectations vary considerably based on cultural attitudes, so context matters.

It is past time to examine the damage caused by a growth-only economic mindset [66]. Approaches to rural development have relied on community capacity for partnership with government, government participation strategies, aims toward expanding food production, and approaches focusing on welfare of rural residents; the general critical sense is that these approaches have failed because they do not take into consideration the need to move

away from what are fundamentally unsustainable practices. Additional attention to food and ecological security, careful management of natural resources, resilient responses to disasters, and consideration of inequality and market failures are all needed [67]. Migration is a key concern in many rural places and such phenomena will continue to be affected by climate change [31]. While a full consideration of resilience and mitigation is beyond the scope of this entry, these topics are essential elements of a coherent strategy for addressing the impacts of climate change in rural areas [68]; these areas are relevant to discussions of agriculture, food production, and energy.

Along these lines, there needs to be an understanding that social welfare is a public good worthy of support, removed from neoliberal, economic considerations, [69]; this is an essential point for addressing complex challenges like climate change impacts and vulnerabilities in rural communities, which overemphasize individualism and self-interest. Partnerships with local organizations may reinforce paternalism and dependence, which does not necessarily speak to the interests of all community segments [70].

The potential for sustainability is undermined by the fundamentally unequal and widening divide between rich and poor areas and nations. Attention in the Global South has been rightly placed on raising individual standards of living, and addressing the short-term implications of climate change that are already affecting ways of living [71]. It could be argued that the differences between immediate considerations and long-term ecological change concerns constitute a gap that approaches a ‘clash of civilizations’ [72]; unlike that scenario, though, climate change is a price we all pay, and we all will eventually lose if matters are not addressed appropriately.

Rural communities, closest to the impacts of climate change in many respects, present critical early warnings to civilization, but must be aided and assisted given their own inherent worth, and their value to their populations and to all life on Earth. The importance of this topic should not be underestimated. Rural areas are responsible in large part for food security; so goes their fortunes, so goes the world. In this regard, a proactive strategy toward climate change and rural places, as evidenced in the literature included here, is essential.

**Author Contributions:** Conceptualization, C.L.A. and A.M.A.; methodology, C.L.A.; writing—original draft preparation, C.L.A. and A.M.A.; writing—review and editing, C.L.A. and A.M.A. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

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

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** No new data were created or analyzed in this entry. Data sharing is not applicable to this entry.

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

## References

1. NASA. Global Warming vs. Climate Change. 2023. Available online: <https://climate.nasa.gov/global-warming-vs-climate-change/> (accessed on 25 April 2023).
2. Bell, E.; Seidel, B.; Kilpatrick, S. Climate Change: How Scientism Has Neutralised Health Policy Effectiveness for Rural Communities. *J. Rural Stud.* **2013**, *32*, 365–374. [CrossRef]
3. Azadi, H.; Barati, A.A.; Nazari Nooghabi, S.; Scheffran, J. Climate-Related Disasters and Agricultural Land Conversion: Towards Prevention Policies. *Clim. Dev.* **2022**, *14*, 814–828. [CrossRef]
4. U.S. Census Bureau. What Is Rural America? 2017. Available online: <https://www.census.gov/library/stories/2017/08/rural-america.html> (accessed on 24 April 2023).
5. Atkinson, C.L. Rural development. In *Global Encyclopedia of Public Administration, Public Policy, and Governance*; Farazmand, A., Ed.; Springer: Berlin/Heidelberg, Germany, 2017.
6. Woroniecki, S.; Spiegelberg, F.A.; Chausson, A.; Turner, B.; Key, I.; Irfanullah, H.M.; Seddon, N. Contributions of Nature-Based Solutions to Reducing People’s Vulnerabilities to Climate Change across the Rural Global South. *Clim. Dev.* **2022**, 1–18. [CrossRef]

7. Celse, J.; Kensen, M. Can Positional Concerns Be a Threat to Disaster Management? Assessing the Prevalence of Positional Concerns among Socially Vulnerable Populations in Trinidad & Tobago. *Environ. Hazards* **2022**, 1–25. [[CrossRef](#)]
8. Farazmand, A.; Pinkowski, J. *Handbook of Globalization, Governance, and Public Administration*, 1st ed.; CRC Press: Boca Raton, FL, USA, 2007.
9. O'Brien, K.; St. Clair, L.A.; Kristoffersen, B. *Climate Change, Ethics and Human Security*; Cambridge University Press: Cambridge, UK, 2010.
10. Delgado, G.C. (Ed.) *Inequality and Climate Change: Perspectives from the South*; CODESRIA: Dakar, Senegal, 2015.
11. Sen Roy, S. *Linking Gender to Climate Change Impacts in the Global South*; Springer International Publishing: Cham, Switzerland, 2018.
12. Atkinson, A.B. *Measuring Poverty around the World*; Princeton University Press: Princeton, NJ, USA, 2019.
13. Masuda, Y.J.; Castro, B.; Aggraeni, I.; Wolff, N.H.; Ebi, K.; Garg, T.; Game, E.T.; Krenz, J.; Spector, J. How Are Healthy, Working Populations Affected by Increasing Temperatures in the Tropics? Implications for Climate Change Adaptation Policies. *Glob. Environ. Chang.* **2019**, *56*, 29–40. [[CrossRef](#)]
14. Ofoegbu, C.; Chirwa, P.; Francis, J.; Babalola, F. Assessing Vulnerability of Rural Communities to Climate Change: A Review of Implications for Forest-Based Livelihoods in South Africa. *Int. J. Clim. Chang. Strateg. Manag.* **2017**, *9*, 374–386. [[CrossRef](#)]
15. Jha, S.K.; Mishra, S.; Sinha, B.; Alatalo, J.M.; Pandey, R. Rural Development Program in Tribal Region: A Protocol for Adaptation and Addressing Climate Change Vulnerability. *J. Rural Stud.* **2017**, *51*, 151–157. [[CrossRef](#)]
16. Bahta, Y.T.; Myeki, V.A. The Impact of Agricultural Drought on Smallholder Livestock Farmers: Empirical Evidence Insights from Northern Cape, South Africa. *Agriculture* **2022**, *12*, 442. [[CrossRef](#)]
17. Raikes, J.; Smith, T.F.; Baldwin, C.; Henstra, D. Disaster Risk Reduction and Climate Policy Implementation Challenges in Canada and Australia. *Clim. Policy* **2022**, *22*, 534–548. [[CrossRef](#)]
18. Kiem, A.S.; Austin, E.K. Drought and the Future of Rural Communities: Opportunities and Challenges for Climate Change Adaptation in Regional Victoria, Australia. *Glob. Environ. Chang.* **2013**, *23*, 1307–1316. [[CrossRef](#)]
19. Jamshed, A.; Birkmann, J.; McMillan, J.M.; Rana, I.A.; Feldmeyer, D.; Sauter, H. How Do Rural-Urban Linkages Change after an Extreme Flood Event? Empirical Evidence from Rural Communities in Pakistan. *Sci. Total Environ.* **2021**, *750*, 141462. [[CrossRef](#)] [[PubMed](#)]
20. Winkler, C.; Thaler, T.; Seebauer, S. The Interplay between Enterprise and Entrepreneur in the Flood Risk Management of Small- and Medium-Sized Enterprises in Austria. *Environ. Hazards* **2022**, *21*, 400–415. [[CrossRef](#)]
21. Toulmin, C. Securing a Future for Smallholder Farmers in an Era of Climate Change. In *New Directions for Smallholder Agriculture*; Hazell, P., Rahman, A., Eds.; Oxford University Press: Oxford, UK, 2014; pp. 457–481.
22. Anugwa, I.Q.; Obossou, E.A.R.; Onyeneke, R.U.; Chah, J.M. Gender Perspectives in Vulnerability of Nigeria's Agriculture to Climate Change Impacts: A Systematic Review. *GeoJournal* **2023**, *88*, 1139–1155. [[CrossRef](#)]
23. Azong, M.N.; Kelso, C.J. Gender, Ethnicity and Vulnerability to Climate Change: The Case of Matrilineal and Patri-Lineal Societies in Bamenda Highlands Region, Cameroon. *Glob. Environ. Chang.* **2021**, *67*, 102241. [[CrossRef](#)]
24. Chandra, A.; McNamara, K.E.; Dargusch, P.; Caspe, A.M.; Dalabajan, D. Gendered Vulnerabilities of Smallholder Farmers to Climate Change in Conflict-Prone Areas: A Case Study from Mindanao, Philippines. *J. Rural Stud.* **2017**, *50*, 45–59. [[CrossRef](#)]
25. George, B.; Kumar, R.; Banerjee, S. Vulnerability of Women in the Face of Climate Change: A Study of Wayanad District of Kerala, India. *J. Chin. Econ. Foreign Trade Stud.* **2022**, *15*, 279–297. [[CrossRef](#)]
26. Nyahunda, L.; Makhubele, J.C.; Mabvurira, V.; Matlakala, F.K. Vulnerabilities and Inequalities Experienced by Women in the Climate Change Discourse in South Africa's Rural Communities: Implications for Social Work. *Br. J. Soc. Work* **2021**, *51*, 2536–2553. [[CrossRef](#)]
27. Ceci, P.; Monforte, L.; Perelli, C.; Cicatiello, C.; Branca, G.; Franco, S.; Diallo, F.B.S.; Blasi, E.; Scarascia Mugnozza, G. Smallholder Farmers' Perception of Climate Change and Drivers of Adaptation in Agriculture: A Case Study in Guinea. *Rev. Dev. Econ.* **2021**, *25*, 1991–2012. [[CrossRef](#)]
28. Murphy, C.; Tembo, M.; Phiri, A.; Yerokun, O.; Grummell, B. Adapting to Climate Change in Shifting Landscapes of Belief. *Clim. Chang.* **2016**, *134*, 101–114. [[CrossRef](#)]
29. Gentle, P.; Thwaites, R.; Race, D.; Alexander, K.; Maraseni, T. Household and Community Responses to Impacts of Climate Change in the Rural Hills of Nepal. *Clim. Chang.* **2018**, *147*, 267–282. [[CrossRef](#)]
30. Berrueta, V.M.; Serrano-Medrano, M.; García-Bustamante, C.; Astier, M.; Masera, O.R. Promoting Sustainable Local Development of Rural Communities and Mitigating Climate Change: The Case of Mexico's Patsari Improved Cookstove project. *Clim. Chang.* **2017**, *140*, 63–77. [[CrossRef](#)]
31. Rabbani, M.M.G.; Cotton, M.; Friend, R. Climate Change and Non-Migration — Exploring the Role of Place Relations in Rural and Coastal Bangladesh. *Popul. Environ.* **2022**, *44*, 99–122. [[CrossRef](#)]
32. Turner, J.; Bailey, D. "Ecobordering": Casting Immigration Control as Environmental Protection. *Environ. Politics* **2022**, *31*, 110–131. [[CrossRef](#)]
33. Lunstrum, E.; Bose, P.S. Environmental Displacement in the Anthropocene. *Ann. Am. Assoc. Geogr.* **2022**, *112*, 644–653. [[CrossRef](#)]
34. Krawchenko, T.; Keefe, J.; Manuel, P.; Rapaport, E. Coastal Climate Change, Vulnerability and Age Friendly Communities: Linking Planning for Climate Change to the Age Friendly Communities Agenda. *J. Rural Stud.* **2016**, *44*, 55–62. [[CrossRef](#)]
35. Asare-Kyei, D.; Renaud, F.G.; Kloos, J.; Walz, Y.; Rhyner, J. Development and Validation of Risk Profiles of West African Rural Communities Facing Multiple Natural Hazards. *PLoS ONE* **2017**, *12*, 0171921. [[CrossRef](#)]

36. Pretty, J. Sustainable Agriculture and Food Systems. In *The Sage Handbook of Environment and Society*; Pretty, J., Ball, A.S., Benton, T., Guivant, J.S., Lee, D.R., Orr, D., Pfeffer, M.J., Ward, H., Eds.; Sage Publications: Thousand Oaks, CA, USA, 2007; pp. 457–470.
37. Schwarz, A.; Béné, C.; Bennett, G.; Boso, D.; Hilly, Z.; Paul, C.; Posala, R.; Sibiti, S.; Andrew, N. Vulnerability and Resilience of Remote Rural Communities to Shocks and Global Changes: Empirical Analysis from Solomon Islands. *Glob. Environ. Chang.* **2011**, *21*, 1128–1140. [[CrossRef](#)]
38. Pappo, E.; Wilson, C.; Flory, S.L. Enhancing Climate Change Education through Links to Agriculture. *Am. Biol. Teach.* **2022**, *84*, 207–212. [[CrossRef](#)]
39. Mocatta, G.; Mayes, E.; Hess, K.; Hartup, M.E. The Trouble with “Quiet Advocacy”: Local Journalism and Reporting Climate Change in Rural and Regional Australia. *Media Cult. Soc.* **2023**, *45*, 157–177. [[CrossRef](#)]
40. Caretta, M.A.; Rothrock, B.A.; Zegre, N.P. Exploring Climate Change Perspectives. An Analysis of Undergraduate Students’ Place-Based Attachment in Appalachia, USA. *Rural Sociol.* **2022**, *87*, 847–872. [[CrossRef](#)]
41. Taylor, A.; Wynants, M.; Munishi, L.; Kelly, C.; Mtei, K.; Mkilema, F.; Ndakidemi, P.; Nasser, M.; Kalnins, A.; Patrick, A.; et al. Building Climate Change Adaptation and Resilience through Soil Organic Carbon Restoration in Sub-Saharan Rural Communities. *Chall. Oppor.* **2021**, *13*, 10966. [[CrossRef](#)]
42. Szlafsztein, C.F. Development Projects for Small Rural Communities in the Brazilian Amazon Region as Potential Strategies and Practices of Climate Change Adaptation. *Mitig. Adapt. Strateg. Glob. Chang.* **2014**, *19*, 143–160. [[CrossRef](#)]
43. Dumenu, W.K.; Obeng, E.A. Climate Change and Rural Communities in Ghana: Social Vulnerability, Impacts, Adaptations and Policy Implications. *Environ. Sci. Policy* **2016**, *55*, 208–217. [[CrossRef](#)]
44. Bunclark, L.; Gowing, J.; Oughton, E.; Ouattara, K.; Ouoba, S.; Benao, D. Understanding Farmers’ Decisions on Adaptation to Climate Change: Exploring Adoption of Water Harvesting Technologies in Burkina Faso. *Glob. Environ. Chang.* **2018**, *48*, 243–254. [[CrossRef](#)]
45. Lai, C.; Liao, P.-C.; Chen, S.-H.; Wang, Y.-C.; Cheng, C.; Wu, C.-F. Risk Perception and Adaptation of Climate Change: An Assessment of Community Resilience in Rural Taiwan. *Sustainability* **2021**, *13*, 3651. [[CrossRef](#)]
46. Vaz, E. Sustainable Development of Fisheries Communities: The Role of Community-Led Local Development Policies. In *Regional Intelligence*; Springer International Publishing AG: Cham, Switzerland, 2020; pp. 49–72.
47. White, W.A. Terrestrial Carbon, Food Security, and Biosequestration Enhancement. In *Biosequestration and Ecological Diversity*; CRC Press: Boca Raton, FL, USA, 2013; pp. 114–149.
48. Tisch, D.; Galbreath, J. Building Organizational Resilience through Sensemaking: The Case of Climate Change and Extreme Weather Events. *Bus. Strategy Environ.* **2018**, *27*, 1197–1208. [[CrossRef](#)]
49. Bailey, K.M.; McCleery, R.A.; Barnes, G. The Role of Capital in Drought Adaptation among Rural Communities in Eswatini. *Ecol. Soc.* **2019**, *24*, 8. [[CrossRef](#)]
50. Saputra, A.; Setiawan, W.; Arif, M.; Sriyono; Nurmallasari, R.I.; Dijaya, R.; Ulinuha, A.; Hermawan, S. Non-Medical risk assessment of COVID-19 in parts of Central and East Java, Indonesia. *Quaest. Geogr.* **2022**, *41*, 147–169. [[CrossRef](#)]
51. Alibašić, H. The Administrative and Ethical Considerations of Climate Resilience: The Politics and Consequences of Climate Change. *Public Integr.* **2022**, *24*, 33–50. [[CrossRef](#)]
52. Janif, S.Z.; Nunn, P.D.; Geraghty, P.; Aalbersberg, W.; Thomas, F.R.; Camailakeba, M. Value of Traditional Oral Narratives in Building Climate-Change Resilience: Insights from Rural Communities in Fiji. *Ecol. Soc.* **2016**, *21*, 7. [[CrossRef](#)]
53. Jacobs, D.B.; Cramer, L.A. The Relationships between Social Capital and Concerns for Climate Change with Increasing Wildfire Risks in Rural Communities in Central Oregon. *J. Environ. Stud. Sci.* **2020**, *10*, 12–30. [[CrossRef](#)]
54. Samaddar, S.; Oteng-Ababio, M.; Dayour, F.; Ayaribila, A.; Obeng, F.K.; Ziem, R.; Yokomatsu, M. Successful Community Participation in Climate Change Adaptation Programs: On Whose Terms? *Environ. Manag.* **2021**, *67*, 747–762. [[CrossRef](#)]
55. Alam, G.M.M.; Alam, K.; Mushtaq, S.; Filho, W.L. How Do Climate Change and Associated Hazards Impact on the Resilience of Riparian Rural Communities in Bangladesh? Policy Implications for Livelihood Development. *Environ. Sci. Policy* **2018**, *84*, 7–18. [[CrossRef](#)]
56. Faruk, M.O.; Maharjan, K.L. Factors Affecting Farmers’ Adoption of Flood Adaptation Strategies Using Structural Equation Modeling. *Water* **2022**, *14*, 3080. [[CrossRef](#)]
57. Shaikh, S.; Brown, A.; Enebuma, W.I. Application of Technological Tools in Improving Housing Resilience. IOP Conference Series. *Earth Environ. Sci.* **2022**, *1101*, 032017. [[CrossRef](#)]
58. Abbasi, Z.A.K.; Nawaz, A. Impact of Climate Change Awareness on Climate Change Adaptations and Climate Change Adaptation Issues. *Pak. J. Agric. Res.* **2020**, *36*, 619. [[CrossRef](#)]
59. Shahbaz, P.; Ul Haq, S.; Boz, I. Linking Climate Change Adaptation Practices with Farm Technical Efficiency and Fertilizer Use: A Study of Wheat–Maize Mix Cropping Zone of Punjab Province, Pakistan. *Environ. Sci. Pollut. Res. Int.* **2022**, *29*, 16925–16938. [[CrossRef](#)]
60. De Falco, S.; Fiorentino, G. Geographical scattering in Italian inner areas, politics and COVID-19. *AIMS Geosci.* **2022**, *8*, 137–158. [[CrossRef](#)]
61. Faruk, M.O.; Maharjan, K.L. Impact of Farmers’ Participation in Community-Based Organizations on Adoption of Flood Adaptation Strategies: A Case Study in a Char-Land Area of Sirajganj District Bangladesh. *Sustainability* **2022**, *14*, 8959. [[CrossRef](#)]
62. Eskander, S.M.S.U.; Fankhauser, S. Income Diversification and Income Inequality: Household Responses to the 2013 Floods in Pakistan. *Sustainability* **2022**, *14*, 453. [[CrossRef](#)]

63. Atkinson, C.L.; Alibasic, H. Prospects for Governance and Climate Change Resilience in Peatland Management in Indonesia. *Sustainability* **2023**, *15*, 1839. [[CrossRef](#)]
64. O’Kane, G. Climate Change and Rural Health. *Aust. J. Rural Health* **2020**, *28*, 186. [[CrossRef](#)] [[PubMed](#)]
65. Bell, E.J. Climate Change and Health Research: Has It Served Rural Communities? *Rural Remote Health* **2013**, *13*, 2343. [[CrossRef](#)] [[PubMed](#)]
66. Nicoson, C. Towards Climate Resilient Peace: An Intersectional and Degrowth Approach. *Sustain. Sci.* **2021**, *16*, 1147–1158. [[CrossRef](#)]
67. Singh, K.; Shishodia, A. *Rural Development: Principles, Policies, and Management*, 4th ed.; Sage Publications India: New Delhi, India, 2016.
68. Bahadur, A.V.; Tanner, T. *Resilience Reset: Creating Resilient Cities in the Global South*; Taylor and Francis: Abingdon, UK, 2021.
69. Caplan, M.; Ricciardelli, L.A. Institutionalizing neoliberalism: 21st Century capitalism, market sprawl and implications for social policy. *Poverty Public Policy* **2016**, *8*, 20–38. [[CrossRef](#)]
70. Sobrinho, M.V.; Vasconcellos, A.M.A. Local Organisations Capacity and Its Influence on Partnership with Local Government for Rural Development in Brazilian Amazonia. *AOS-Amazon. Organ. Sustentabilidade* **2012**, *1*, 25–44. [[CrossRef](#)]
71. Axelrod, R.S.; VanDeveer, S.D.; Vig, N.J. Introduction: Governing the International Environment. In *The Global Environment: Institutions, Law, and Policy*; Axelrod, R.S., VanDeveer, S.D., Downie, S.L., Eds.; CQ Press: Washington, DC, USA, 2011; pp. 1–23.
72. Huntington, S.P. The Clash of Civilizations? In *The New Social Theory Reader*; Seidman, S., Alexander, J.C., Eds.; Routledge: Abingdon, UK, 2008; pp. 305–314.

**Disclaimer/Publisher’s Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.