

Economic Evaluation Of Self-Protection Measures Vs. Climate Insurance In Developing Economies

James Walker

National Bureau Of Economic Research, University Of Wisconsin, United State

Abstract

climatic risks present major risks to households in developing economies; hence, adaptation strategies are often constrained by resource availability. In this paper, the author assess how households make choices on using self-insurance mechanisms for extreme weather events – for instance, designing and constructing flood barriers or drought-resistant crops – or paying for climate insurance. This paper evaluates the efficacy and equity of the various approaches expounded by assessing their cost or cost-benefit ratios with the aid of secondary sources of data and the actual and intended coverage rate of the household surveys conducted in multiple developing regions.

The findings show that less wealthy households use self-protection measures. Their costs are lower compared to climate insurance which more affluent populations choose because they trust financial indemnification. Education, risk perception, and government subsidies specific to goods and services increase the variation in these choices. The paper also outlines common challenges, that might prevent the application of either approach, such as costs of implementing reforms, limited awareness of them, and market failures inherent in insurance systems.

This research points to the fact that single-sector solutions in the form of; community-based self-protection measures alongside the expansion of value added insurance products should be sought out. Through examining these challenges, the country's policymakers can design measures that would help households in developing economies to withstand climate shocks.(Bastidas- Arteaga, E., & Stewart, M. G. (2015) The conclusions made in the study pose general significance for advancing the understanding of the governance and design of effective risk management systems that combine autonomous and conventional insurance solutions.

Keywords: *Climate risk management in developing economies, Economic evaluation of climate adaptation strategies, Self-protection measures vs. climate insurance, Cost-effectiveness of climate adaptation solutions, Climate resilience strategies in low-income regions*

Date of Submission: 08-01-2025

Date of Acceptance: 18-01-2025

I. Introduction

It is now evident that climate change has emerged as one of the biggest global concerns of this generation and especially has a nearly devastating effect on the development of the economies of the developing world. These regions remain more vulnerable as a result of constrained resource endowment, poor physical infrastructure base, and socio-economic susceptibility. In these economies, households have had to invest in measures towards mitigating climate risk which includes floods, droughts, and storms since it has become a survival strategy. Thus, the selection of the options for risk management becomes one of the key activities in their protective framework (Collier, S. J., Elliott, R., & Lehtonen, T. K. (2021).

Controlling measures, including flood walls, drought-enhancing crops, or drainage improvement, are applied at the level of households and might be installed without governmental interference. However, such solutions usually involve great costs and need technical means during implementation which may not be easily affordable or accessible. However, climate insurance provides a more developed, institutionalized method of risk transfer and reinsurance in the form of paying for the damage. (Busch, J., Bukoski, J. J., Cook-Patton, S. C., Griscom, B., Kaczan, D., Potts, M. D., ... & Vincent, J. R. (2024). However, climate insurance is still underdeveloped across developing markets, due to high costs, low trust in the formal systems, and inadequate awareness among the households.

It is therefore important for policymakers and development organizations interested in improving climate resilience to understand how households balance these choices. This research aims to examine the economic, social, and cultural determinants of household decisions between protection and climate insurance. The paper also studies how government standards and community programs influence these preferences.

The study is conducted on several countries that face the highest climate risks, these are Sub-Saharan (SSA), South Asia (SA), and Latin America and Caribbean (LAC). Considering the conceptual and empirical

gaps in the literature, this paper uses a cost-benefit perspective to outline the determinants of adoption and examine the viability and efficiency of both strategies. The conclusions asymptotically attempt to fill the acknowledged void in current knowledge and policy ideas and offer specific practical guidelines for policymakers to develop a properly cohesive and composite risk management framework.

This research contributes not only to the conceptual development of academic literature but also to the improvement of practice. In this regard, the current research benefits the formulation of durable frameworks in developing economies by capturing the complex decision-making mechanisms on household risks and crises and their blends of self-reliance with formal insurance. It endeavors to do so based on sustainable and equitable approaches towards risk management for climate change and assisting the vulnerable to prepare for climate change situations.

This research contributes not only to the conceptual development of academic literature but also to the improvement of practice. In this regard, the current research benefits the formulation of durable frameworks in developing economies by capturing the complex decision-making mechanisms on household risks and crises and their blends of self-reliance with formal insurance. It endeavors to do so based on sustainable and equitable approaches towards risk management for climate change and assisting the vulnerable to prepare for climate change situations.(Stage, J. (2010).

II. Literature Review

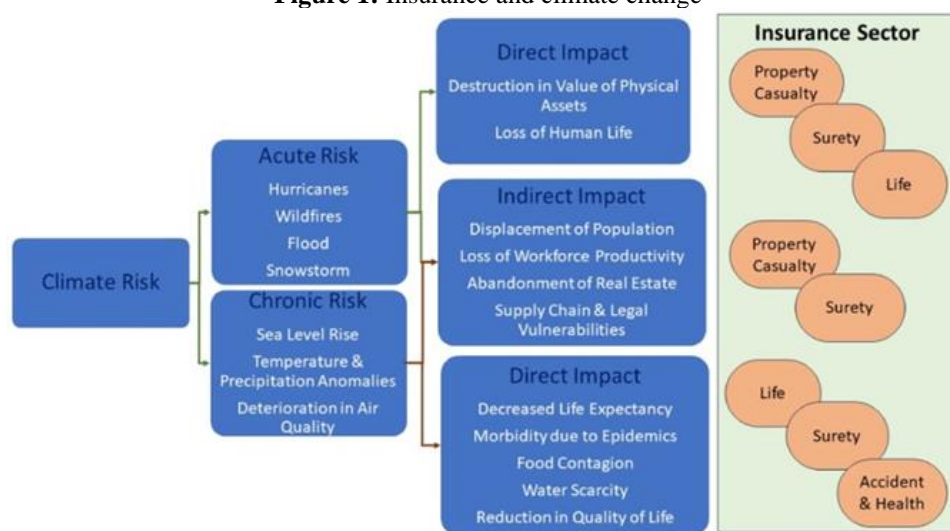
Self-Protection Measures: Definition and Applications

Hedging measures refer to steps households take on their own to reduce the vulnerability to climate-related risks, which implies giving targeted and time-consuming responses. Some of them are constructing flood shields, putting up rainwater harvesting structures and employing drought tolerant crops. Research has found out that all these measures are prevalent in places where other established financial structures like insurance are not well developed.(van der Pol, T. D., van Ierland, E. C., & Gabbert, S. (2017).

Climate Insurance: Concept and Adoption

Climate insurance is defined as a category of products that are created to mitigate climate change and to pay households amounts equal to the losses they have suffered from climate catastrophe. This consists of rainfall insurance, where one receives a payment for rainfall according to the certain agreed threshold, and indemnity insurance wherein one is paid back actual losses made. But in reality, the adoption rates of such solutions in developing economies are still low, the main reasons are high premiums, lack of trust, and awareness.(Finger, R., Hediger, W., & Schmid, S. (2011).

Figure 1: Insurance and climate change



Three Economic Theories on Decision Making

The process of decision making in household in managing risks can be captured by behavioral economics and utility theory. (Shogren, J. F. (1990) Key factors influencing decisions include:

1. Income Levels: The funds short households tend to seek simple and cheap remedies that directly addresses the problem and perhaps lasts for the shortest time.(Vogelsang, L. G., Weikard, & Bednar-Friedl, B. (2023)
2. Risk Perception: CL climate risks influence the choices made.
3. Accessibility: Whether it is insurance in some cases or protective assets that can be used in other cases.

Existing Research Findings

1. There is evidence in previous research that strongly links education with the probability of embracing climate insurance. (Zeng, J., Lin, G., & Huang, G. (2021).
2. Action taken at a communal level always complements those taken for personal protection. (Hassan, M. A. S., & Alsharef, O. M. (2024)
3. Governments have an essential responsibility in subsidizing gaps and delivering awareness campaigns as PART of the policymakers group.

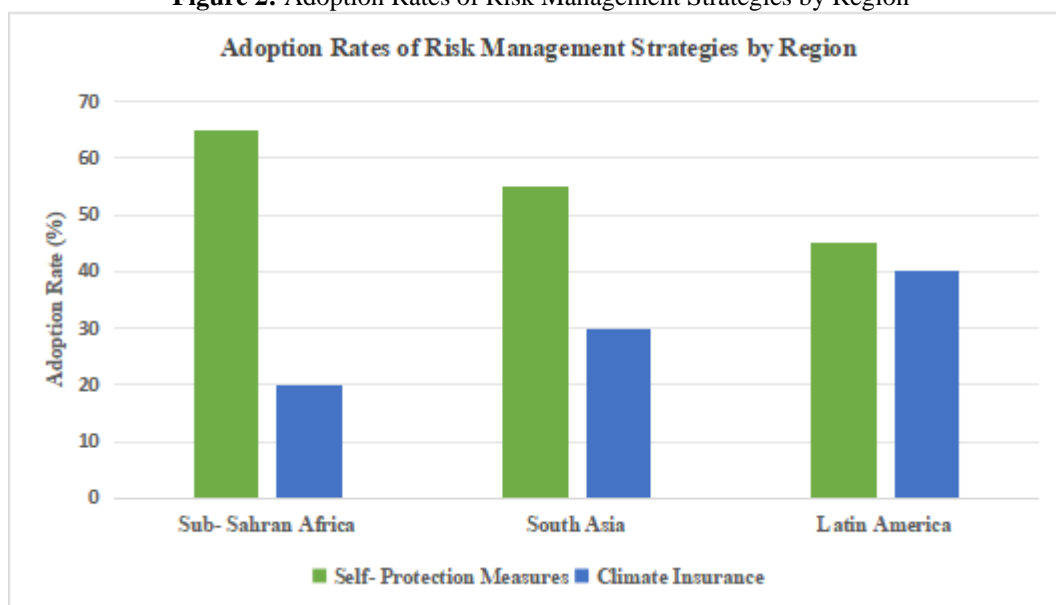
Identified Research Gaps

1. Slightly more research comparing the costs and benefits of self-protection versus climate insurance. (Charoenkit, S., & Kumar, S. (2014)
2. Knowledge gap pertaining to cross section household decision attributes by region and culture.
3. A call for frameworks that encompass both approaches is, therefore, very necessary.

Table 1: Comparative Features of self- Protection measures and climate insurance

Aspect	Self-Protection Measures	Climate Insurance
Cost	High initial investment	Recurring premiums
Accessibility	Locally implemented	Requires formal financial systems
Scalability	Limited to individual households	Broader, community-wide coverage
Risk Transfer	No	Yes
Awareness Requirements	Moderate	High

Figure 2: Adoption Rates of Risk Management Strategies by Region



III. Methodology

This section presents the research methodology, (Peter, R. (2023) data collection technique, analytic tools, and the proposed ethical considerations in this paper’s assessment of household decision-making between self-protection and climate insurance.

Research Design

This research uses both quantitative and qualitative methodological paradigms. This design allows for a good understanding of the kind of preferences the households have and the costs and benefits of protection strategies for climate insurance.

Data Collection Methods

Data was gathered through the following means:

1. Primary Data

- **Household Surveys:** Administered among 1200 households in the Sub-Saharan African, South Asian, and Latin American regions. (Mendelsohn, R. (2012)The surveys sought to obtain information touching on the

following aspects; demography, income, education, risk, and climate change mitigation preferences among the sampled households.

- Focus Group Discussions: The small group discussion involved students from each region to identify qualitative issues likely to affect the business, as well as factors influencing their decisions.
- **Focus Group Discussions:** The small group discussion involved students from each region to identify qualitative issues likely to affect the business, as well as factors influencing their decisions.(Mills, E. (2005)

2. Secondary Data

- This combination was compared with survey findings based on the statistical data of government agencies and departments, national and regional development organizations, and climate research centers.. (Traore, A. (2024)
- Thus, insurance take-up rates, disaster loss figures, and indices of vulnerability were incorporated into the study.(e.g., Traore, A. (2024)

3. Case Studies

- Case studies at the community level were also carried out within each region to understand actual cases of good practice regarding the use of self-protection methods or comprehensive climate insurance.

Sampling Framework

1. Sampling Technique: A proper random sampling technique about stratification was used to guarantee an adequate integration of various types of households and different classes.

2. Sample Size: This study targeted 1200 households, but the population was split equally into three zones:

- **Sub-Saharan Africa:** from rural affected areas of Uganda 400 households.
- **South Asia:** 400 households from cyclone-affected peri-urban communities.
- **Latin America:** 400 families from the affected vulnerable areas by drought.

Tables 2: Data Collected and Sources

Data Type	Variables Measured	Source
Demographics	Household size, age distribution	Household Surveys
Socioeconomic Status	Income levels, education, employment	Household Surveys, National Statistics
Climate Adaptation	Self-protection measures, insurance uptake	Household Surveys, Case Studies
Risk Perception	Awareness of climate risks	Household Surveys
Insurance Accessibility	Proximity to providers, policy terms	Focus Groups, Secondary Data

Hypotheses

The study tests three primary hypotheses:

- It is revealed that climate insurance will be bought more by the high-income groups than by the self-protection measures.
- The higher the risk perception that is under consideration, the higher the probability of using protective measures.
- Availability of insurance services shows a positive relationship with the take up of climate insurance.

Ethical Considerations

- **Informed Consent:** Both written and verbal consent were sought from survey participants upon informing them of the objectives of the study.
- **Data Confidentiality:** Some details such as the participant's name and identification numbers were initially coded out to avoid their recognition.
- **Transparency:** They were also told how their data would benefit the research findings.

Limitations

- **Data Accuracy:** The quality and accessibility of regional data differ.
- **Self-Reporting Bias:** Questionnaire responses can be a result of personal biases.
- **Temporal Scope:** These results represent the current state and possibility thst fail to capture temporal relationships.

IV. Results

This section provides a summary of the research outcomes; specific information on the level of adoption, determinants, and cost-efficiency of self-protection instruments and climate insurance in the sampled areas is provided. The results strengthen an understanding of the emerging interactions between the existing socio-economic background, geographical risks, and guardianship structures in the decision-making at the household level. Analyzing the data that compares the usage of one or another approach across Sub-Saharan Africa, South

Asia, and Latin America, the study investigates how the rates of income, education level, risk perception, and accessibility to insurance services define the preferences for one approach over another. (e.g., Traore, A. (2024) In addition, the comparative cost-benefit analysis explains more of the economic choice opportunities demonstrating their possible immediate and future results for the households. Such evidence can help policymakers design targeted interventions to build resilience and equality among fluctuating resource-constrained households vulnerable to climate change in developing economies.

Adoption Patterns by Region

Table 3: Adoption Rates of Self-Protection Measures and Climate Insurance

Region	Self-Protection Measures (%)	Climate Insurance (%)	Mixed Approach (%)
Sub-Saharan Africa	65	20	15
South Asia	55	30	15
Latin America	45	40	15

Key Insights:

1. As the following section demonstrates, sub-Saharan Africa has a very high usage of self-protection measures as insurance companies and facilities are scarce.
2. Latin America is at the forefront of climate insurance due to improved physical facilities and encouragement by the governments.
3. South Asia occupies the middle ground for the utilization of both strategies, although the trend towards utilizing self-insurance in addition to protection has recently started to emerge.

Factors Influencing Household Decisions

Table 4: Decision Factors and Their Impact on Adoption Choices

Factor	Influence on Self-Protection Measures	Influence on Climate Insurance
Income Level	High for middle- and high-income households	High for middle- and high-income households
Education Level	Limited influence	Strong positive correlation
Risk Perception	Drives immediate action	Encourages proactive planning
Accessibility	Strong for local and community resources	Limited by proximity to insurance providers
Cultural Norms	Promotes community-driven protection	Limited influence

Key Observations:

- Income contributes more to the pattern since affluent households prefer climate insurance because of the greater extent.
- The high perceived climate risks by the households, create a shift towards self-protection to get tangible and observable outcomes.
- The last and most essential barrier is still that of access to underwrite insurance policies and serve clients in rural regions.

Economic Evaluation of Cost-Effectiveness

Table 5: Cost-Benefit Analysis of Adaptation Choices

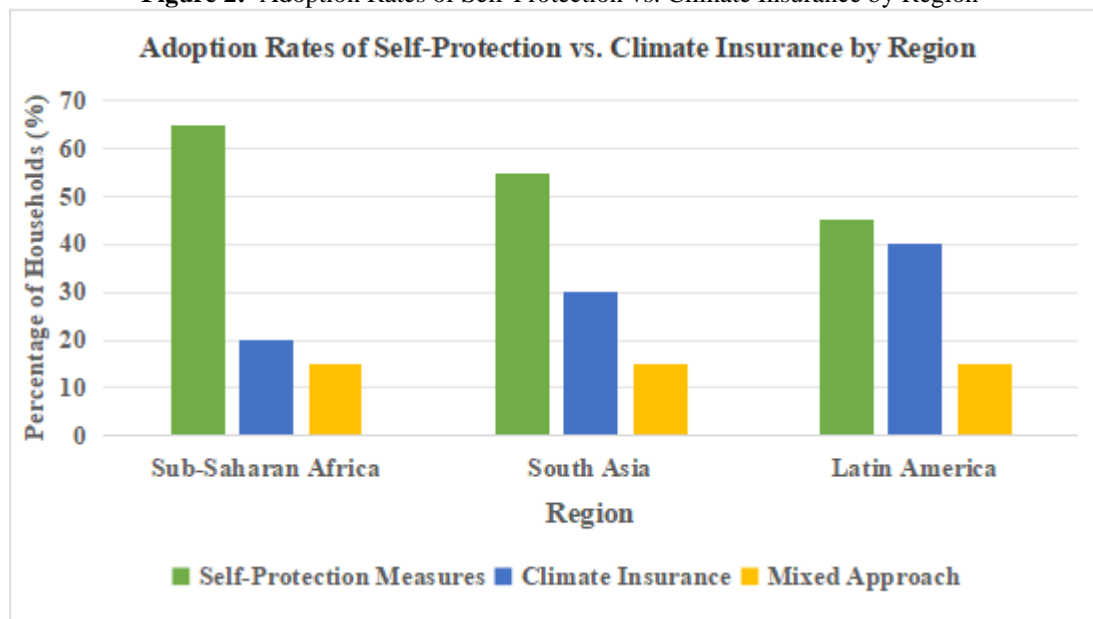
Adaptation Choice	Initial Investment (\$)	Recurring Cost (\$/year)	Potential Savings (\$/year)	Risks Mitigated
Self-Protection	200	30-150	Up to 4,000	Floods, cyclones, and droughts
Climate Insurance	50-300/year	N/A	Claims up to 10,000	Claims up to 10,000

Key Findings:

- Self-protection measures involve a significant initial capital outlay and give measurable and regular returns In essence self-protection measures call for a lot of upfront costs on the part of a business while delivering measurable and consistent rewards.
- Climate insurance is cheaper at this initial stage because the premium depends on the estimated claims, and they can either be delayed or rejected.

Regional Comparison Visualization

Figure 2: Adoption Rates of Self-Protection vs. Climate Insurance by Region



V. Discussion

The findings of this study are of fundamental importance in adding to the knowledge base of economic sustainability and the effectiveness of self-finance mechanisms as opposed to climate insurance for developing countries. The results highlight the fact that though both strategies can propose reasonable solutions to make climate risks more manageable, there is a rather stark contrast between them in terms of efficiency, availability, and effectiveness in the long term.

These findings are a comparative analysis of self-protection measures and climate insurance across the selected countries.

More than relying on insurance claims like social/economic/political protection, topographical protection, and flood protection, it was found that community-oriented adaptation measures, infrastructural adaptation, and pro-risk agriculture were cost-effective solutions in the shorter term. These measures involve substantially less costs at the outset than climate insurance premiums often demand particularly in the areas where insurance markets are still in their relatively infancy or nonexistent. Nevertheless, the effectiveness of self-protection activities depends on follow-up expenses and people's involvement, which can be hardly maintained in the long run.

Climate insurance on the other hand as we can also see is expensive but it offers an immediate and secure form of financial relief in case of any natural disasters. Insurance on the other hand offers large and immediate-hearted compensation for recovery in large-scale situations after extreme events making it more suitable for large-scale economic shocks. Nevertheless, high premiums, insurance that is often too expensive in some areas, and insurance products' diffusive complexity hinder finally the population, and first of all, the low-income population in developing countries.

Policy Implications

The results have important implications for the need to incorporate both individual protection strategies and climate insurance into climate adaptation plans at the national and international levels. There is a need for policymakers to aim at developing the insurance-rider model to achieve the short-term benefit of risk spreading of risks and at the same time adopt sustainable risk self-protection strategies. Adapting these solutions to the settings of developing countries where climate impacts are usually higher and financial conditions are generally more restricted is the only way to enhance their application effectively.

Moreover, the improvement of the availability of climate insurance through subsidized programs, CBISs, and micro-insurance could also improve the coping abilities of vulnerable groups. For the same reason, the funding for capacity development and effective implementation of local adaptation measures will help to mitigate the risk by proposing an insurance solution and minimizing the reliance on insurance products.

Limitations & Area for Future Research

As informative as this study is in comparing the cost-effectiveness of self-protective measures relative to climate insurance there are however some limitations of the study that warrant consideration. First, the data set applied in this study might not embrace all the potential climate risks and relative economic environment in different parts of developing countries. (Hassan, M. A. S., & Alsharaf, O. M. (2024) Further research should be done to investigate the applicability of these approaches in certain parts of the world to establish the nature and extent of climatic risks.

Furthermore, this review has largely been based on cost-effectiveness analysis and may well be complemented by investigations into the psycho-social determinants of the use of personal protection and insurance. Behavioral aspects of climate risk decision strategies could complement the overall inquiry in such a way that examining the facets of decision and choice behavior toward climate risk management could advance a richer and more detailed understanding of the underlying determinants of the success or failure of such strategies.

Summary of the Study

This study fits into the climate risk management literature by distinguishing the relative advantages of self-insurance activities and climate insurance. By presenting the results of a detailed economic comparison of these two approaches this paper contributes to the existing literature by offering an insight into the possible trade-offs between strategies, which can be used by those policymakers and development agencies to make rational financial decisions in the context of climate change adaptation.

VI. Conclusion

This paper has assessed the sustainability of self-insurance measures the climate insurance plans for managing climate risks from developing countries. The findings suggest that all risks identified are manageable with both approaches affording and eluding different benefits and risks and hence, the call for a mixed approach to climate risks.

Personal and community-based precautions, along with safer infrastructure and design interventions are cheaper in the short run and can build long-term disaster-proofing. However, they are capital-intensive, and hence their sustainability may be difficult, especially in low-income settings. However, climate insurance, which addresses the same problem by empowering people to contribute large sums to diversify and spread risks across a vast number of small shareholders, is an even easier solution that retains high premiums, n Traore, A. (2024) limits the number of contracts, and accessibility of those contracts to the direct targets of climate change.

These results imply that using both self-insurance and climate Insurance to manage climate risks in developing economies would be more effective than using the two strategies alone. There are two things policymakers need to do better: first, develop blended strategies that offer immediate reprieve and sustained transformation. The provision of insurance for climate change and supporting insurance protection shall meaningfully contribute to the development of a resilient economy that would be able to buffer alterations in climate conditions that have been potentiated by climate change.

Consequently, climate risk mitigation in developing countries has to be based on a multifaceted approach that addresses the economic imperatives of short-term coverage alongside sound building blocks for appropriate long-term risk management at the community level. The next steps should be to expand the research on these two approaches and design the policies that would tie them together, making both methods widely applicable, efficient, and suitable for a variety of economic and social conditions.

References

- [1] Baethgen, W. E. (2010). Climate Risk Management For Adaptation To Climate Variability And Change. *Crop Science*, 50 , S-70. <https://doi.org/10.2135/cropsci2009.09.0526>
- [2] Bastidas-Arteaga, E., & Stewart, M. G. (2015). Damage Risks And Economic Assessment Of Climate Adaptation Strategies For Design Of New Concrete Structures Subject To Chloride-Induced Corrosion. *Structural Safety*, 52 , 40-53. <https://doi.org/10.1016/j.strusafe.2014.10.005>
- [3] Berrang-Ford, L., Ford, J. D., & Paterson, J. (2011). Are We Adapting To Climate Change? *Global Environmental Change*, 21 (1), 25-33. <https://doi.org/10.1016/j.gloenvcha.2010.09.012>
- [4] Biagini, B., & Miller, A. (2013). Engaging The Private Sector In Adaptation To Climate Change In Developing Countries: Importance, Status, And Challenges. *Climate And Development*, 5 (3), 242-252. <https://doi.org/10.1080/17565529.2013.821053>
- [5] Busch, J., Bukoski, J. J., Cook-Patton, S. C., Griscom, B., Kaczan, D., Potts, M. D., ... & Vincent, J. R. (2024). Cost-Effectiveness Of Natural Forest Regeneration And Plantations For Climate Mitigation. *Nature Climate Change*, 14 (9), 996-1002. <https://doi.org/10.1038/s41558-024-02068-1>
- [6] Charoenkit, S., & Kumar, S. (2014). Environmental Sustainability Assessment Tools For Low Carbon And Climate Resilient Low-Income Housing Settlements. *Renewable And Sustainable Energy Reviews*, 38 , 509-525. <https://doi.org/10.1016/j.rser.2014.06.012>
- [7] Chausson, A., Turner, B., Seddon, D., Chabaneix, N., Girardin, C. A., Kapos, V., ... & Seddon, N. (2020). Mapping The Effectiveness Of Nature-Based Solutions For Climate Change Adaptation. *Global Change Biology*, 26 (11), 6134-6155. <https://doi.org/10.1111/gcb.15310>

- [8] Collier, S. J., Elliott, R., & Lehtonen, T. K. (2021). Climate Change And Insurance. *Economy And Society*, 50 (2), 158-172. <https://doi.org/10.1080/03085147.2021.1903771>
- [9] Finger, R., Hediger, W., & Schmid, S. (2011). Irrigation As Adaptation Strategy To Climate Change—A Biophysical And Economic Appraisal For Swiss Maize Production. *Climatic Change*, 105 (3), 509-528. <https://doi.org/10.1007/S10584-010-9931-5>
- [10] Hassan, M. A. S., & Alsharif, O. M. (2024). Evaluating The Cost-Benefit Analysis Of Climate Adaptation Strategies On Coastal Communities. *Stallion Journal For Multidisciplinary Associated Research Studies*, 3 (2), 18-24. <https://doi.org/10.55544/Sjmars.3.2.2>
- [11] Li, J., Mullan, M., & Helgeson, J. (2014). Improving The Practice Of Economic Analysis Of Climate Change Adaptation. *Journal Of Benefit-Cost Analysis*, 5 (3), 445-467. <https://doi.org/10.1515/Jbca-2014-9004>
- [12] Mendelsohn, R. (2012). The Economics Of Adaptation To Climate Change In Developing Countries. *Climate Change Economics*, 3 (02), 1250006. <https://doi.org/10.1142/S2010007812500066>
- [13] Mertz, O., Halsnæs, K., Olesen, J. E., & Rasmussen, K. (2009). Adaptation To Climate Change In Developing Countries. *Environmental Management*, 43 , 743-752. <https://doi.org/10.1007/S00267-008-9259-3>
- [14] Mills, E. (2005). Insurance In A Climate Of Change. *Science*, 309 (5737), 1040-1044. <https://doi.org/10.1126/Science.1112121>
- [15] Nath, P. K., & Behera, B. (2011). A Critical Review Of Impact Of And Adaptation To Climate Change In Developed And Developing Economies. *Environment, Development And Sustainability*, 13 , 141-162. <https://doi.org/10.1007/S10668-010-9253-9>
- [16] Nobanee, H., Dilshad, M. N., Abu Lamdi, O., Ballool, B., Al Dhaheri, S., Almheiri, N., ... & Alhemeiri, S. S. (2022). Insurance For Climate Change And Environmental Risk: A Bibliometric Review. *International Journal Of Climate Change Strategies And Management*, 14 (5), 440-461. <https://doi.org/10.1108/Ijccsm-08-2021-0097>
- [17] Peter, R. (2023). The Self-Protection Problem. Available At Ssm 4392079. <https://dx.doi.org/10.2139/ssrn.4392079>
- [18] Peterson, S. (2006). Uncertainty And Economic Analysis Of Climate Change: A Survey Of Approaches And Findings. *Environmental Modeling & Assessment*, 11 , 1-17. <https://doi.org/10.1007/S10666-005-9014-6>
- [19] Reguero, B. G., Beck, M. W., Bresch, D. N., Calil, J., & Meliane, I. (2018). Comparing The Cost Effectiveness Of Nature-Based And Coastal Adaptation: A Case Study From The Gulf Coast Of The United States. *Plos One*, 13 (4), E0192132. <https://doi.org/10.1371/Journal.Pone.0192132>
- [20] Resnik, D. B. (2022). Environmental Justice And Climate Change Policies. *Bioethics*, 36 (7), 735-741. <https://doi.org/10.1111/Bioe.13042>
- [21] Salanié, F., & Treich, N. (2020). Public And Private Incentives For Self-Protection. *The Geneva Risk And Insurance Review*, 45 (2), 104-113. <https://doi.org/10.1057/S10713-020-00050-3>
- [22] Seddon, N., Chausson, A., Berry, P., Girardin, C. A., Smith, A., & Turner, B. (2020). Understanding The Value And Limits Of Nature-Based Solutions To Climate Change And Other Global Challenges. *Philosophical Transactions Of The Royal Society B*, 375 (1794), 20190120. <https://doi.org/10.1098/Rstb.2019.0120>
- [23] Shogren, J. F. (1990). The Impact Of Self-Protection And Self-Insurance On Individual Response To Risk. *Journal Of Risk And Uncertainty*, 3 (2), 191-204. <https://doi.org/10.1007/Bf00056372>
- [24] Stage, J. (2010). Economic Valuation Of Climate Change Adaptation In Developing Countries. *Annals Of The New York Academy Of Sciences*, 1185 (1), 150-163. <https://doi.org/10.1111/J.1749-6632.2009.05168.X>
- [25] Surminski, S., & Oramas-Dorta, D. (2014). Flood Insurance Schemes And Climate Adaptation In Developing Countries. *International Journal Of Disaster Risk Reduction*, 7 , 154-164. <https://doi.org/10.1016/J.Ijdr.2013.10.005>
- [26] Traore, A. (2024a). The Impact Of Soybean Adoption On Households' Crop Production Value In Mozambique: A Genetic Matching Approach. *Management And Economic Journal, Everant*. <https://doi.org/10.18535/Mej/V2024.04>
- [27] Traore, A. (2024b). Mitigation Of Short-Term Climate Risks And Uncertainties Through Insurance And Self-Protection: Theory And Application. *International Journal Of Scientific Research And Management (Ijsrm)*, 12 (04), 6239–6277. <https://doi.org/10.18535/Ijsrm/V12i04.Em14>
- [28] Traore, A. (2024c). Understanding The Greenium Between Green And Conventional Bonds: A Simulation Study. *International Journal Of Scientific Research And Management (Ijsrm)*, 12 (04), 6278–6357. <https://doi.org/10.18535/Ijsrm/V12i04.Em15>