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Climate Change Policy and Rural Livelihood Impact Assessment

Dr Seema Agrawal

Assistant professor, Political Science

Central Sanskrit University, Jaipur campus, Jaipur

drseemaagrawal23@gmail.com

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ABSTRACT

Among the major challenges of our time, climatic changes have an uneven distribution of its effects. They tend to be mostly felt in rural communities, which is mainly due to the fact that most of their economies are dependent on land, water, and trends of the season, which are increasingly becoming unpredictable. The droughts arrive earlier, floods occur more severely, and the amount of rainfall becomes erratic, making it much harder to make any decisions on the issue of planting. Farming families who are already operating with thin margins quickly find themselves affected by these changes in lost crops, unreliable income and a rise in food insecurity. In This research paper, a thorough evaluation of the climate change policies and its effects on the rural livelihoods is carried out, especially in the third world economies that rely heavily on agriculture, e.g. India. The study uses secondary data which was sourced out of credible sources such as the World Bank, Food and Agriculture Organization and Intergovernmental panel on climate change and compares the effectiveness of the policy frameworks in promoting the adaptive capacity and vulnerability reduction. The discussion shows that although climate policies have positively impacted awareness, technology uptake, and resilience-building, there are still considerable inequalities in terms of accessibility, inclusiveness, and effectiveness in implementing the policies. The transformative potential of these policies is still limited by structural issues including institutional fragmentation, lack of financial resources and socio-economic inequalities. The research highlights that it is necessary to have integrated, participatory and context-specific policy interventions that resonate climate adaptation strategies with the rural development objectives. Finally, the paper adds to the emerging discussion of sustainable development, by emphasizing the importance of critical overlap between the environmental policy and livelihood security in rural settings.

Keywords: Climate Change, Rural Livelihoods, Climate Policy, Adaptation Strategies, Vulnerability Assessment, Sustainable Development, Agricultural Resilience, Food Security.

1. Introduction

Climate change has become a phenomenon of the twenty first century, which has radically changed ecological systems, economic models and social relationships on the planet[1]. It has its most significant effects on the rural population, as rural livelihoods are largely reliant on climate sensitive sectors like agriculture, forestry, fisheries and livestock rearing. Where a large percentage of the population lives in

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Research Article

the rural areas and subsists by agriculture, such as in India, climate variability is a direct threat to the economic stability and human welfare. The global warming, changing rainfall, and the growing frequency of extreme weather have contributed to the reduction in crop crop, the degradation of soil, water shortage, and reduction in biodiversity. Such environmental changes do not only reduce agricultural productivity but also contribute to poverty[2], food insecurity, and distress in the rural areas.

The importance of the climate change is not only related to the negative effects on the environment but also to the socio-economic susceptibility. The rural families tend to have insufficient financial resources, technological advances and institutional support systems thus limiting their ability to transform with the changing climatic conditions. As a result, small climatic shocks may entail disastrous and sudden livelihood consequences, which will lead to indebtedness, migration, and social unrest. Government and international organizations have realised these challenges, and have come up with various policies to address climate change that are geared towards mitigation and adaptation. These policies aim to achieve sustainable agriculture, improve resilience and provide security of livelihood in the long term.

The usefulness of these policies is indeed a controversial topic. Some interventions have brought great productivity and resilience improvements which are worth rewarding. Some have however been stumbling, undermined with feeble execution, haphazard syncing of efforts or the sheer negligence of engaging key stakeholders in the conversation late in the day.[3]

This paper attempts to get into that complexity as opposed to sweeping it off impulsively. The idea is to consider the relationship between climate change policy and rural livelihoods in a deliberate manner, examine what the evidence suggests about the effects of policies, and consider what are possible and better approaches to policies, in practice. Empirical evidence as well as theoretical foundations are applied all along.

2. Aim and Objectives

The main aim of the paper is to assess the effectiveness of climate change policies towards the reduction of risk and resilience among rural communities. The discrepancy between what the policies assure, on the one hand, and what rural families face, on the other, is often annoying, and this study seeks to take that gap seriously.[3] Climate change is, in reality, not a purely ecological problem. It cuts across with economic stability, social structures, and institutional capacity in a manner that a narrow environmental policy lens tends to ignore.[4]

The objectives are based on this situation. The first point of interest is to examine the specifics of the effect that climate change has on rural livelihoods, focusing on agricultural productivity, income stability, and food security. This includes the short-term impacts such as loss of crop value as a result of erratic monsoons and less obvious impacts such as lack of resources that lead to distress migration or even a worsening of existing socio-economic vulnerability.[5]

The second aim is to look at existing climate policy frameworks, at both international and national levels, in terms of their structure, scope, and implementation. It includes major global agreements like the Paris Agreement, or country-by-country plans, like the National Action Plan on Climate Change in India which can be viewed as an informative case study on how world commitments are realized, or sometimes not, within local efforts.

In addition, the study will also explore the efficacies of adaptation and mitigation measures in dealing with rural vulnerabilities. This will include examining how well policies have enabled the implementation of the climate resilient agricultural practices, access to resources and strengthening the institutional support systems[6].

Journal of Information Systems Engineering and Management
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Research Article

The other important goal is to find out the challenges and limitations of the policy implementation such as the problems of governance, financial problems and social inequalities. Lastly, the research will present evidence-based policy suggestions to be effective, inclusive, and sustainable in improving climate interventions in rural settings.

3. Problem Statement

Even though the global interest in climate change and the need to develop a policy to address it is rising, rural populations remain particularly vulnerable and face disruptions in livelihoods. The main issue that will be discussed as part of the research is the lack of association of policies that are created regarding climate change and their real effects on the rural population. Many policies and programs have been put in place to encourage climate resilience and sustainable development but in most cases, the implementation processes are not effective due to structural, institutional, and socio-economic problems [7].

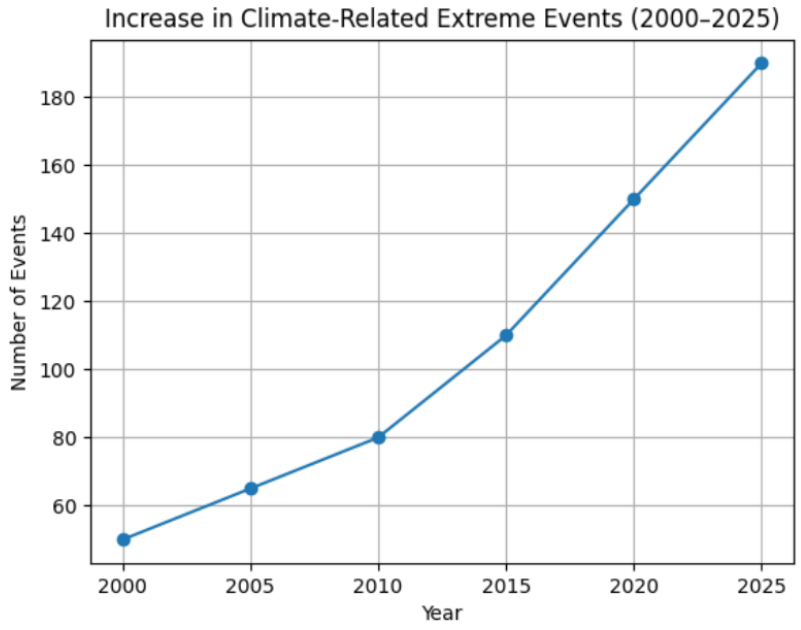

Fig. 1: Climate Events Trend.

The uneven distribution of policy benefits is one of the most important problems and is more likely to offer benefits to relatively better-off farmers and those regions that have more robust institutional frameworks. The disadvantaged members of society such as the smallholder farmers, landless laborers and women have a tendency to have obstacles in accessing information, resources and financial assistance [8]. This worsens the existing disparities and restricts the effectiveness of climate interventions in general. Also, due to the absence of coordination between the various government agencies and stakeholders, there is a fragmented implementation, which diminishes the effectiveness and efficacy of the policy actions.

The problem is greatly exacerbated by economic constraints and a lack of technology. In most parts of the world, rural households lack access to crop covers, cheap credit and even basic weather prediction equipment and therefore are left out in a big way meaning that they struggle to respond effectively to climate shocks. When a crop is wiped out in Odisha by a flood or when small farmers in Rajasthan lose their crop due to a prolonged drought, the families that are not insured or saved in any manner are effectively on their own. Another barricade is awareness. The spread of sustainable agricultural

Journal of Information Systems Engineering and Management
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https://www.jisem-journal.com/

Research Article

practices cannot occur without some form of targeted extension work or community education; without such efforts, many households still do not know they have a choice.

These problems in countries like India are in a complicated system of strain on populations, dearth of resources and a great level of socio-economic inequality. Policy is not in a vacuum. It comes in certain complex, historically charged situations, and it is crucially important that it is effective and that which is not. [9]

The crisis of immediate action is, thus, real. What is needed are powerful, genuinely inclusive, and context-sensitive policy measures not grounded on an ideal of the rural community imaginable rarely realized.

4. Literature Review

Available literature highlights that rural communities are one of the worst hit by climate variability because of the reliance on natural resources and low ability to adapt. The literature gives a detailed insight on the effects of climate change on agricultural productivity, income stability and food security as well as investigates the role of policy interventions in alleviating the effects.

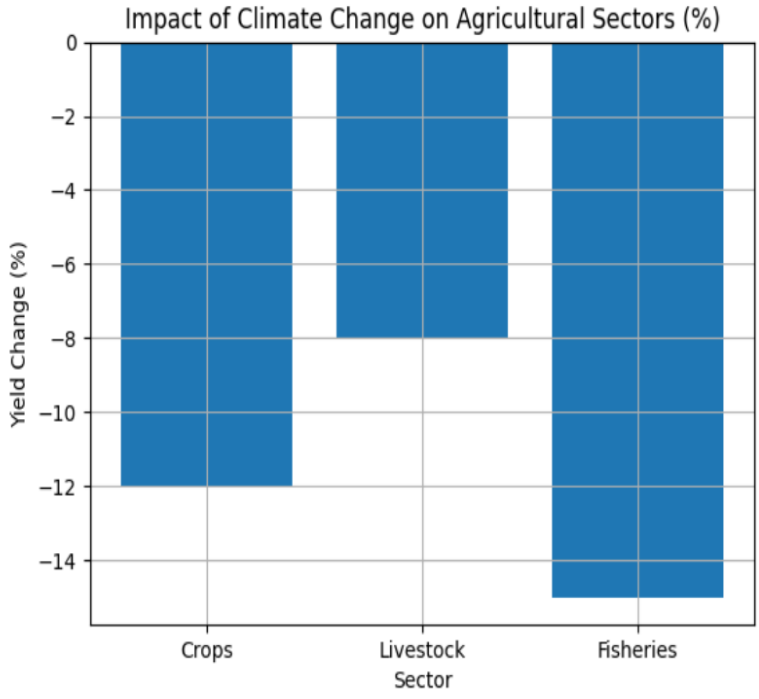

Fig. 2: Agricultural Impact

There is a considerable amount of research on the effects of climate change on agriculture, which is the major means of livelihood of rural people in the developing world. Research has shown that an increase in temperature and alteration in precipitation patterns have resulted into low crop yields, pest infestations and degradation of soil. The direct impact of these changes on environmental issues is income stability and food security, especially in smallholder farmers who have no access to modern technologies and financial resources. The literature also sheds light on the rising number of extreme weather occurrences that further generate more risks and uncertainties in agriculture[11].

The other critical area of research is that of livelihood vulnerability which is a resultant attribute of a

Research Article

combination of environmental, economic and social pressures. There are numerous models that have been used by scholars to evaluate vulnerability such as Sustainable Livelihood Framework and the Vulnerability Assessment Framework. These models put more emphasis on the role of assets, capabilities and institutional support to define the resilience of the rural communities. According to the literature, adaptive capacity can be greatly increased by diversifying the sources of income, access to information and education, and good social networks[12].

Along with the vulnerability mapping, the study identifies an almost homogeneous diversity of the adaptation measures that rural people have implemented: sowing crops, developing better water harvesting, planting of seed varieties that are resistant to different types of climate, and taking advantage of the existing weather counseling. These are not strange solutions. A small-scale farmer in northern Ghana who has switched to drought-resistant forms of sorghum is making a viable, low-tech decision that exhibits a demonstration of need and ingenuity.

Policy backing for such strategies is, however, patchy. Financial assistance, technical assistance, and institutional guidance are also identified as required but there is also an open discussion in the literature about the shortcomings of existing policies, particularly in areas of gaps in implementation, marginalized groups, and poor monitoring mechanisms.

When taken as a whole, the literature is quite convincing about integrated and participatory approaches where climate adaptation and its link-up with the wider developmental goals are taken into consideration as opposed to looking at the field of environmental policy as a beacon in the vacuum.

5. Theoretical Framework

The current research is based on the analysis, which was largely based on two frameworks: the Sustainable Livelihoods Framework and the Vulnerability Framework. The two models are not perfect and scholars have criticised them as being overly simplistic but they, in combination, give a somewhat comprehensive view of how rural communities cope with the climate crisis and the impact that policies have on their ability to cope with climate crises or hinder it.[14]

The Sustainable Livelihoods Framework does not consider livelihood as a single entity but as a set of different types of capital. Human capital is an aspect of education, skills and well-being, and basically, it is what an individual brings to their productive life. Natural capital includes land, water and ecological capital, which are already becoming visibly impaired by climate change in places like the Sahel or coastal Bangladesh. Financial capital is financial resources (savings and credit accessibility), social capital entails membership within the community and ties with institutions, and physical capital incorporates infrastructure and equipment. The framework is valuable because it is able to show the impact of a change in one capital on others. Long droughts not only damage the crops, but also drain away the savings, tear apart social networks and can lead to a debt trap that may not be out of the cycle in years.[15]

The Vulnerability Framework looks at the same scene a bit differently. It breaks down vulnerability in three components namely exposure, sensitivity and adaptive capability. Exposure is an extremely easy process, which means how much a community is exposed to climate changes like rainfall that is not predictable or rising temperatures. The sensitivity is a measure of how effective those changes are. A fishing community located near the shore is more impacted by the changing sea-level conditions compared to a manufacturing community that is situated inland. The most applicable to policy of the three is probably the adaptive capacity, which encompasses whether households and communities have the resources, knowledge, and institutional support to adapt. This is the place where the framework really becomes brilliant, because the adaptive capacity is unevenly distributed, and these occurrences are not really accidental most of the time.[16]

Journal of Information Systems Engineering and Management
2023, 8(3)
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https://www.jisem-journal.com/

Research Article

A combination of the two frameworks will allow for analyzing policy efficacy more thoroughly. The integrated approach encourages more provocative questions indeed, than asking whether the policy is in place at all, what kinds of assets the policy improves, to what communities the policy benefits in reality, and what governance structures are needed to make adaptation not temporary. This point of view views the climate policies as just focusing on environmental outcomes without considering the socio-economic determinants as fixing symptoms, rather than the underlying causes. This theoretical support is not just academic support, but it affects the type of questions asked and consequently, the type of answers disclosed.[17]

6. Methodology

The approach employed in this research is mostly descriptive and analytical in an attempt to understand the implications of climate change policies on rural livelihoods in different contexts. Given the complexity and contextuality of this question, it appeared as a more authentic and pragmatic solution and would require a qualitative method that emphasizes the analysis of secondary data. Even though primary fieldwork would be more in-depth, incorporating the already collected empirical data on various situations would facilitate a wider perspective on comparison that cannot be done in one case study.

The sources of information were different institutional materials that have been found credible: the materials of the World Bank, FAO, and the IPCC evaluation were used as the core, supplemented by the national policy resources, governmental reports, and academic articles. It was no accident that the net should be thrown over these various sources. Not a single reports disclose a holistic picture, and the comparative analysis of the results in different organizations with different methodological procedures would make such results more reliable than relying on the same source to find the answer to the question.[18]

With that said, the analysis of secondary data is not without limitations and these limitations need to be acknowledged at the outset. The evidence provided can be correlated back to the same research and readings that have been done in previous research and is therefore relevant to the previous gaps in literature hence corresponding gaps in this analysis. Certain regions, particularly the low-income countries with less developed research systems are virtually underrepresented. These limitations have been taken into consideration in the following discussion.

The study has an analytical framework of comparative analysis of various climate policies and their results in the rural setting. This involves policy objective evaluation, implementation processes and indicators of the impact. A case study approach is also involved in the study as it concentrates in rural areas in India to give context-specific insights. Case study approach permits an in-depth study of the implementation of policies on the local level and the impact of these policies on various groups of people.

Table: Impact Assessment of Climate Change Policies on Rural Livelihoods

Policy Type	Primary Focus	Impact on Livelihoods	Implementation Challenges
Adaptation Policy	Resilience Building	High	Funding limitations, lack of awareness

Journal of Information Systems Engineering and Management
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https://www.jisem-journal.com/

Research Article

Mitigation Policy	Emission Reduction	Moderate	High technology cost, limited accessibility
Mixed Policy	Integrated Approach	Very High	Coordination issues, institutional gaps

The interpretation of data was done using thematic analysis, and results were summarized on several recurring themes: agricultural output, income consistency, food security, and adaptive capability. These motifs were later added to the broader theoretical statements above, which gave a structural sense to the analysis.[19]

There are however disadvantages to relying only on secondary data and it would be false to look the other cheek. Existing literature may neglect local differences, recent changes and so, new field work may not be done. This problem is at least partially alleviated by cross-referencing many different sources that do not provide an easy answer, but those are helpful.

7. Climate Change Policies

The policies of climate change have been changing considerably in the last several decades as the necessity to treat climate change as a worldwide issue that should be addressed by joint efforts became increasingly obvious. Internationally, frameworks like the Paris Agreement have been very instrumental in the formulation of national and regional policies. The Paris Accord highlights the importance of curbing global warming and enhancing adaptation and resilience especially in the vulnerable areas. It also emphasizes on the need to provide financial aid and transfer of technology to the developing nations, which are more challenged to deal with climate change.

On national level, nations have come up with their national policy frameworks to tackle climate change based on their socio-economic and environmental backgrounds. The National Action Plan on Climate Change in India is a holistic climate policy framework, which has several missions that include; sustainable agriculture, water conservation and renewable energy. The following policies will be used to help increase resilience and sustainable development, especially in rural regions where the effects of climate change are most evident.

A combination of mitigation and adaption measures is usually incorporated in climate policies. Mitigation plans aim to cut down the emission of greenhouse gases by undertaking projects like development of renewable energy sources, energy saving and afforestation. The adaptation strategies on the other hand are intended to mitigate the vulnerability and increase resilience through encouraging agricultural activities that are resolute to climate change, water management and strengthening the disaster preparedness systems[22].

Effective climate policies are rare, but they can be made to work in the best of conditions. Poor governance, poor inter-agency cooperation and constraints on budgets always undermine the most effective structures. The more subtle problem, however, is that of top-down design. Communities should be involved in the development of the interventions that should be provided to them; at this, the policies must reflect the local realities and thus fail to elicit any meaningful impact at the places where it is most needed.

On the whole, climate change policies are a very important instrument in environmental concerns as far as curbing the effects of climate change are concerned. Their effectiveness however, is determined

by how much they are positioned to local contexts, inclusive of their approach and backed by sufficient resources and institutional processes.

8. The Climate Change and its effect on the Rural Livelihoods.

Climate change has diverse effects on the livelihoods of the rural people in terms of economic, social and environmental aspects[25]. The agricultural sector is one of the most vulnerable sectors that have experienced one of the greatest impact due to climatic changes. The variation in temperature and rainfall patterns have caused a decrease in crop yields, high levels of pests and diseases and poor quality of soil. The direct impact of these changes is on the income and food security of the rural households, especially those households that depend on subsistence farming.

Besides effects on agriculture, climate change has other economic effects to the rural communities. The variations in agricultural output result in instability in income and households cannot afford to access their fundamental needs as well as invest towards long term development[26]. This usually leads to the augmentation of indebtedness and inability to depend on informal sources of credit and it exacerbates financial vulnerability further. This is aggravated by the fact that there are no other sources of livelihood in the rural regions and people are therefore not able to diversify their income sources.

There are also social impacts which are also considerable as climate change affects migration patterns, health and social cohesion. Agricultural productivity often reduces and in most instances, this results to people migrating to cities in search of job opportunities, thus breaking the family structure and community connections. There is also increased health risks because of the dissemination of diseases which are climate sensitive and the limited access to sanitation and clean water.

The problems are further aggravated by environmental degradation whereby natural resources are depleted which makes rural livelihoods less sustainable[27]. Deforestation, water scarcity and loss of biodiversity minimise the supply of the basic resources and it becomes more challenging to maintain the livelihoods of communities. All these interrelations reveal the necessity of holistic and combined solutions to the problems of climate change in the rural setting.

9. Evaluation of the effects of climate policies.

The evaluation of climate change policies is a complicated matter of successes and shortcomings. On the positive note, there have been numerous policies that have led to rise in awareness and practice of climate resiliency among the rural communities. Efforts towards sustainable agriculture, water conservation and renewable energy have assisted in increasing the adaptive capacity and minimizing the vulnerability. Such interventions have also helped to access new technologies and information that can lead to informed decision making and productivity by farmers.

Nonetheless, the advantages of climate policies do not share equal benefits and there are great gaps in terms of access and results. The smallholder farmers and women, who are part of the marginalized groups, tend to have obstacles in acquiring resources and support services. This restricts the possibility of them enjoying the benefits of policy interventions to worsen the existing inequalities. Moreover, climate adaptation measures can be very expensive and this may be a significant limitation especially to the resource poor population.

The other significance of impact assessment is the assessment of the policy effectiveness in regard to long-term sustainability. Although certain interventions have shown short term effectiveness, their effectiveness in the long term is unknown due to aspects like climate variability, market fluctuations and institutional issues. This highlights the importance of constant monitoring and reviewing to make certain that policies are also relevant and effective with time[28].

Journal of Information Systems Engineering and Management
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Research Article

Taken together, all the data show that climate policies have already had actual progress towards increasing the resilience of rural areas, but there is still a lot to work on. The more difficult, unattractive target remains inclusiveness. Policies with seeming effectiveness, but ignoring the lowest echelons in society, like landless workers, small farmers, and female-headed families, tend to promote the inequalities they are intended to address. This will only be possible by establishing interventions that are practical and sustainable and not just expressed as intentions.

10. Problems of Policy Implementation.

There are several challenges facing rural climate policies. Institutional fragmentation is one of the more frustrating factors: agriculture ministries, environmental agencies and local authorities often operate separately leading to similar programs being implemented separately and inconsistently at the local level. There is no preparation and communities become confused or disregarded.[29]

Another limitation that is chronic limitation is cash. It is indeed expensive to adapt to climate change and most developing countries are stretched thin in terms of budgets among other priorities. The expression of accessing climate finance funds through the global system like the Green Climate Fund seems attractive in concept but when it comes to application processes it is widely known that procedures are extremely complex leaving many small countries locked out.

The other important factor that affects the outcomes of policy is socio-economic inequalities. The marginalized groups in many cases do not have the resources and ability to enjoy the fruits of policy interventions resulting in unequal sharing of fruits. Moreover, a lack of recognition and education on climate change and the ability to adapt to changes prevents the use of sustainable practices.

These are some of the challenges that show the necessity of both inclusive and extensive policies to implement to tackle both structural and socio-economic obstacles to policy implementation.

11. Discussion

The result of the present research shows that climate change policies and the outcome of rural livelihoods are linked in a subtle and complex manner, which highlights the potential of the policy-based frameworks to change and the limitations of their capacity to do so. Conceptually, climate policy aims to minimize the exposure and maximize the resilience of rural populations to climate change through the support of adaptive behavior, resource optimization and increased institutional support provision. But, the empirically tested evidence reviewed in this study indicates that the policy goals and their translation into the ecstatic livelihoods are imbalanced and contextual.[30]

Adaptive capacity always proves to be a key factor in the efficacy of climate change policies in real life. When rural settings have sufficient access to financial resources, skilled human resource and well-developed social networks, they can be better places to ensure a successful policy intervention.

They find themselves in a better position to experiment with drought resistant crops, adopt new technologies in agriculture or even take up the available government aid programs. The situation however, looks quite different to the smallholder farmers in the rain-fed regions of sub-Saharan Africa or landless agricultural laborers in South Asia. Hurdles at the structural level limitations on land rights, financial marginalization, inefficient local government undermine any policy structures that are theoretically present. These prevailing socio-economic divides should never be viewed as a footnote to any meaningful discussion on climate policy equity.[31]

Policy implementation remains a great challenge. Many governments have developed detailed and serious climate action policies. Nonetheless, the gap between a policy document and its implementation

Research Article

is often enormous, as it depends on the institutional insufficiency, a lack of coordination between agencies, and continuous underfunding.

Perhaps a neglected issue is that policy-making activities tend to be horizontal, as those formulated in large urban areas by experts who may know little to nothing about the local communities that they are addressing. Consequently, local expertise - the understanding of a farmer of the seasons or methods known for centuries in a community or the preservation of water, which are ancient and have grown with that community- will often be overlooked. The problem with policies is that they are irrelevant simply because they were not developed keeping in mind who the intended beneficiaries are.[32]

It is also highly debated that the purposeful linkage between climate policy and broader development objectives should occur. Climate change is not in isolation; it is intertwined and overlaid by economic inequality, food security, and environmental degradation. Ecosystems that mainly target the policies only at the level of emissions or reforestation quotas but ignore the livelihood problems that in the first place contribute to the unsustainable land use, tend not to be sufficient. Rural development plans that are based on climate adaptation seem to be a more sustainable approach, at least in theory.

Finally, monitoring needs more significant attention than it typically receives. Weather patterns change. Community needs evolve with time. A five-year-old policy may no longer be applicable in what is happening now. Regular, systematized assessment processes, ideally with localized feedforwarding and supported over time by remote sensing or data analytics, could help discover these anomalies in time. Put in another way, adaptive supervision is needed to align with adaptive policies.

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