

## **Climate Change Related Disasters and Vulnerability: An Appraisal of the Nigerian Policy Environment**

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**Abstract:** Nigeria is a disaster prone country. The disasters which often result into environmental emergencies like flooding are worsened by the degradation of the country's environment and natural resources. Floods, rainstorms and droughts affect households each year in Nigeria and contribute to endemic poverty in most parts. Global climate change and anticipated increases in extreme weather events will exacerbate this. Country level policies affect institutional preparedness and eventual adaptation options available during extreme weather events. One of the major challenges of dealing with climate change issues in developing countries is how to address, simultaneously, the different dimensions of vulnerability of human population that are exposed during a single disaster event. There are for instance, gender and livelihood based vulnerabilities, etc. In such cases, the mandates of existing frameworks are over stretched to address even issues outside their scope. This study attempts an overview of disasters and emergencies in Nigeria with a view to identifying their spatial and temporal dimensions. The study posits using data from government and primary sources that the nature of institutional framework available to deal with emergencies are inadequate and are poorly focused given the fragile nature of peoples livelihood and infrastructures in the country. The study concludes on the need to design local and national emergency response systems that are broad based and capable of addressing the needs of different human groups that may be vulnerable during extreme weather events. Finally, the study draws lessons for developing countries and how some of the recommendations may be replicated in third world countries.

**Key words:** Disasters, vulnerability, adaptation, climate change, emergencies, Nigeria

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### **INTRODUCTION**

The twin-issues of climate change and global warming have attained global dimensions evident by their recurrent discussions at the UN General Assembly, the Bali, Kyoto and other International Meetings. Global climate change driven largely by anthropogenic activities is a growing threat to human well-being in developing and industrialized nations alike leading to a conclusion that significant harm from climate change is already occurring, and further damages are likely (Gwary, 2008). Climate change is a phenomenon with far reaching effects on people and the nation Nigeria is particularly vulnerable to the impact of climate change in many fronts considering its geography, climate, vegetation, soils, economic structure, population and settlement, energy demands and agricultural activities. Events like sea level rise, flooding, erosion, etc are some of the effects of climate change already manifest in Nigeria. One prediction indicates that Nigeria stands to lose up to US\$ 19 billion as a result of catastrophe while at least, 80% of the inhabitants of the Niger Delta are likely to face displacement (Ihedioha, 2003). The location and size of and the characteristic relief

in Nigeria had given rise to a variety of climatic characteristics. The climatic zones range from the tropical rainforest zone along the coast to the Sahel savannah in the Northern parts of the country. Nigeria has a population of about 140 million impacting on the physical environment through various activities within an area of 923,000 km<sup>2</sup>. Climate change leads to a shift in the boundaries of major ecological zones which results in the heightening of drought and desertification in the marginal arid zones of the country. It also aggravates soil erosion and flooding in areas of higher rainfall and salt water intrusion along the coastal belt. Climate change also alters animal and plant composition in different regions (Gworgwor, 2008). The issue of climate change in Nigeria is therefore a major challenge to development and poverty reduction efforts. This is because such strategies often overlook climate change risk.

### **ENVIRONMENTAL EMERGENCIES IN NIGERIA: AN OVERVIEW OF VULNERABILITY**

Emergency situations arising from disasters-natural and human-made in Nigeria are common and vary in

space, time and magnitude. The natural phenomena include tropical storms, land erosion, windstorms, floods, drought, desertification, human diseases, coastal erosion, livestock diseases, crop pests and diseases, wildfire, harmattan haze and landslides. The major human-made hazards include civil strife; road, water and air traffic accidents and technological hazards such as oil spills, hazardous wastes dumping and industrial accidents as well as structure collapses. The Nigerian Red Cross Society estimates that almost 280,000 Nigerians were affected by various types of disasters in 2001, many of them resulting in serious fatalities (Orebiyi, 2002). A closer analysis of what transforms a natural event into a human and economic disaster reveals that the fundamental problems of development that Nigeria just as in other developing countries, face are the very same problems that contribute to its vulnerability to the catastrophic effects of natural hazards.

The vulnerability to climate change and its associated impacts in developing countries is caused and/or aggravated by several household community level and institutional factors. At the household level, the income generating activities are not diversified and are often characterized by heavy reliance on the biophysical environment. Thus with a magnitude alteration in the equilibrium of the biophysical parameters, the impacts re-vibrate in the livelihoods systems of many households. In Nigeria, a significant proportion engages in such activities as farming, fishing, livestock rearing and forestry. There are no deliberate institutional arrangements to provide cushion for households and individuals when disasters strike. This also borders on the clear absence of social safety nets like social security, unemployment allowances, etc. All these increases the vulnerable groups and the group can become large depending on the nature and severity of disaster. The dimension of vulnerability in developing countries that is often emphasized is the vulnerability of the poorest because of their already extremely low security and few options for income generating activities (Ulstrup *et al.*, 2008). A disaster event like rainstorm and flood produces devastating effects on livelihood systems of people. During such events, farmlands and homes are destroyed. A typical victim is not just a victim of farmland erosion and flood, the victim's home is also blown off, the wall shattered and the local workshop destroyed. Thus, for a spell, the typical victim is carrying heavy burden of vulnerability due to climate change related stressors. During such multiple vulnerability situations what are the institutional intervention options available and how effective is the available response system? The multiple vulnerability of a victim is clearer and worse in case of a woman who is landless and not entitled to compensation. The case study of the Fadama women farmers in Ilorin is used to illustrate this more clearly. The vulnerability to

frequent environmental emergencies in Nigeria is determined by two major variables: the vulnerability of the elements at risk contained within them. That is the ability of the built physical environment of buildings, site improvements and infrastructure in them to withstand the stress imposed by natural hazards. The hazards of their locations. This indicates the extent to which people are exposed to environmental emergencies as a result of the circumstances of their location. Furthermore, the roots of the urban vulnerability in Nigeria are human beings and their actions. For example, the urban population in the country has been growing at the rate of between 2-5% per year since the 1990s (Olokesusi, 2004). Overall, the growth is adding several thousands of people each year to cities and towns of the estimated total population of over 140 million. About 45% reside in urban centers with highest concentration in the large metropolitan areas like Lagos, Ibadan, Kano and Port-Harcourt. The environmental problems associated with uncontrolled expansion and poor management has increased the vulnerability of these cities to major disasters.

Large contingent of low-income migrants have settled on the poorest most vulnerable land in cheap, dilapidated and over-crowded houses constructed on land subject to floods and landslides. Poverty and lack of innovative approaches to urban management contribute to acute shortage of social infrastructure services in the urban areas in general and in the low-income neighbourhoods in particular. The combination of physical development on unsuitable lands such as wetlands, slopes, flood plains and other environmentally sensitive areas and over-crowding, all exacerbate environmental degradation and vulnerability to environmental and anthropogenic hazards. Blocked drainage channels in urban areas worsen the externalities associated with flooding. The rural condition is not in any way better. Little wonder then the rampant incidences of flooding in major cities like Ibadan, Abuja, Benin City, Port Harcourt and in the rural areas too. Flooding incidences in rural areas is becoming increasingly worrisome because of the large loss of crops and agricultural land associated with them.

Nigeria is thus a disaster-prone country. In 2000/2001, >200,000 people were displaced by anthropogenic and environmental emergencies. These included >1,000 deaths. Several homes, farm crops, fishing sites and businesses were destroyed. In the flood disaster events in Kirfi local government area in Bauchi state, >11,000 were displaced while 500 were displaced in Osun state (Orebiyi, 2002).

Flooding is a widespread environmental emergency in the country affecting all the coastal states and even upland states like Bauchi, Sokoto, Niger and Kwara. The situation is worsened by the degradation of the country's environment and natural resources. In the Sudano-Sahelian states of Kano, Niger Bauchi and

Table 1: Highlights and spatial distribution of major disasters in Nigeria

State	Types of major disasters	Remark
Abia	Rainstorm, soil erosion	Soil erosion is prevalence
Adamawa	Flood, soil erosion	Soil erosion is a prevailing disaster
Akwa Ibom	Flood, rainstorm	Soil erosion is a prevailing disaster
Anambra	Rainstorm and soil erosion	Soil erosion is a prevailing disaster
Bauchi	Windstorm	Windstorm is rampant
Bayelsa	Flood and coastal erosion	Erosion is the commonest problem
Benue	Flooding	Flooding is frequent
Borno	Desertification and flood	Desertification is the major problem
Cross river	Oil pollution	Oil pollution is the major problem
Delta	Flood, rainstorm, oil pollution,	Oil pollution is the major problem
Ebonyi	Soil erosion,	Soil erosion and bush fire are the commonest problem
Edo	Flood and rainstorm, erosion	Erosion is the prevailing problem
Enugu	Soil erosion, rainstorm and flood	Rainstorm and soil erosion are common
Ekiti	Rainstorm, flood	Rainstorm and soil erosion are common
Gombe	Desertification	Desertification and rainstorm are common
Imo	Rain and windstorm, soil erosion	Soil erosion is the major problem in the area
Jigawa	Flood, windstorm and flood	Desertification is the major problem
Kaduna	Rainstorm, windstorm and flood	Rainstorm common
Kano	Flood, fire, windstorm	Flooding is frequent
Katsina	Windstorm and flood	Desertification is the major problem
Kebbi	Windstorm and flood	Desertification is the major problem
Kogi	Flood and rainstorm	Rainstorm and bush fires are the major problem
Kwara	Flood and rainstorm	Rainstorm and bush fires are the major problem
Lagos	Erosion and flooding	Flooding are annual events,
Nasarawa	Bush fires	Bush fire is the major problem in the area
Niger	Rainstorm, flooding	Flooding is common in the area
Ogun	Flooding	Flooding is common in the area
Ondo	Rainstorm and erosion	Flooding is common in the area
Osun	Rainstorm,	Rainstorm too frequent
Oyo	Flooding, rainstorm, erosion	Rainstorm and flooding
Plateau	Erosion	Rainstorm
Rivers	Erosion, oil pollution and flooding	Erosion is a major problem
Sokoto	Flood, qualla birds and windstorm	Windstorm, drought
Taraba	Desertification drought	Desertification is a major problem
Yobe	Drought, bush fire and flood	Drought is common
Zamfara	Flooding and Windstorm	Occasional flooding is not uncommon
FCT	Windstorm and flooding	Windstorms are frequent

Table 2: Summary of various disasters reported and its damages in Nigeria (2001-2008)

Years	Nature of disasters in the 36 states and FCT	No. of LG affected	Nature of losses/damages	Displaced persons	Deaths recorded
2001	Flood, rainstorm, fire, landslide, oil spillage windstorm, drought and desertification	120	Destruction of houses, cars, public schools, submerged of lands/farm crops	Up to 1.6 m people	2000
2002	Fire, rain/windstorm, erosion, pest invasion, flood	130	Houses destroyed vehicles, crops, schools market, food items	67,118	7600
2003	Flood, communal clashes oil spillage, kerosene explosion, armed banditry, fire wind/rainstorm	145	Farm land/crops building, vehicles, crops, schools	1.2 million people	4,131
2004	Flood, gully, erosion and wind storm	148	Shops, vehicles, clash and other valuables, schools, farmlands, livestock food stuff	351,782	1,628
2005	Flood, fire, erosion, wind/rainstorm, communal clash, pest invasions landslide, oil spillage, boat mishap	163	Shops, vehicles, schools, farmlands, crops, bridge, cash, private/public buildings	108,119	899
2006	Oil pipeline explosion, building collapse, plane crash, flooding, market fire, armed banditry	355	Destruction of houses, cars, public schools, submerged of lands/farmcrops	8,6445	1,862
2007	Pipeline explosion, rainstorm, flooding, spillage, market fire, landslide, road accidents	416	Shops, vehicles, clash and other valuables, schools, farmlands, livestock food stuff	774,887	1,443
2008	Pipeline explosion, rainstorm, flooding, spillage, market fire, landslide, road accidents	304	Shops, vehicles, private/public buildings, schools, farmlands and other valuables	335	220

Researchers compilation from newspaper sources, Olokesusi, (2004) and from; NEMA's Website (www.nema.org.ng)

Sokoto, the situation is precarious due to sparse vegetation hence, any unusually heavy rainfall results in severe floods and soil erosion (Olorunfemi *et al.*, 2009). Available literature shows the existence of spatial differences in the nature of disasters in Nigeria. As shown in Table 1 while oil and gas pollution is largely a Niger Delta problem, drought and qualla birds infestation occur

in the Sudano-Sahelian states (e.g., Kano, Sokoto, Katsina, Borno and Yobe). However, soil erosion, rainstorm and flood disasters are prevalent in virtually all the states. The information shown in Table 1 shows that more than two thirds of disasters in all states of Nigeria are weather related. A chronology of major disasters in Nigeria since year 2001 is also shown in Table 2.

The results in Table 2 reveals that the frequency and intensity of disasters have increased considerably in recent years.

**DISASTER IN URBAN NIGERIA: A CASE STUDY**

The report by O'Brien *et al.* (2008) raised and addressed several interrelated questions using a developed country lens. In this section, we try to illustrate how a climate change event can generate multiple and interacting stressors, thereby aggravating the vulnerability of poor people. Secondly, also examine the adequacy or otherwise of available response system.

**THE STUDY SETTING AND METHODS**

The study setting is Ilorin; the administrative and political headquarter of Kwara state (Fig. 1). It is one of the fastest growing urban centres in Nigeria located on latitude 8°30'N and longitude 4°35'E. The mean annual temperature is about 26.80°C with 5 h average daily sunshine. The mean annual rainfall is about 125 mm. The dormant streams are Asa, Aluko, Okun, Amule and Agba. As shown in Fig. 2, the rainfall peaked in 2004 with 1600.23 mm leading to the over flowing of these streams. The rainfall recorded in 2004 was the highest except for 1997 when rainfall reached 1704.13 mm. The vegetation, in most parts is guinea savanna interspersed by trees of different species. The situation of the city between the

dry North and the wet South of Nigeria gave Ilorin the apt description as the gate way between the North and the South of the country. The climate is therefore tropical wet and dry characterized by a distinct wet and dry seasons.

The growth of the city both physically and in terms of the population have been documented by other researchers (Olorunfemi *et al.*, 2009). Evidences from these study attest to the rapid and continuous growth in size and strength from the colonial period as a provincial headquarters to 1976 as a state headquarter. A major aspect of the population of Ilorin is its ethnic plurality. It contains about 766,000 inhabitants by the year 2006 at a growth rate of 2.84% annually.

The factors of urbanization and development of the modern commercial/industrial economy as well as the multiplier effects of these had produced a typically dynamic population within the city.

The metropolis is divided into 20 traditional wards for the purpose of political administration in the city. It is important to note that the above locational and physiographic characteristics possess (sometimes significant) implications for human health on one hand and economic and social development on the other. Ilorin is a typical traditional African city whose urban history predates colonialism in Nigeria.

The city therefore, falls into the category of third world cities described as reputed for their dualistic internal structure. The data used in this study

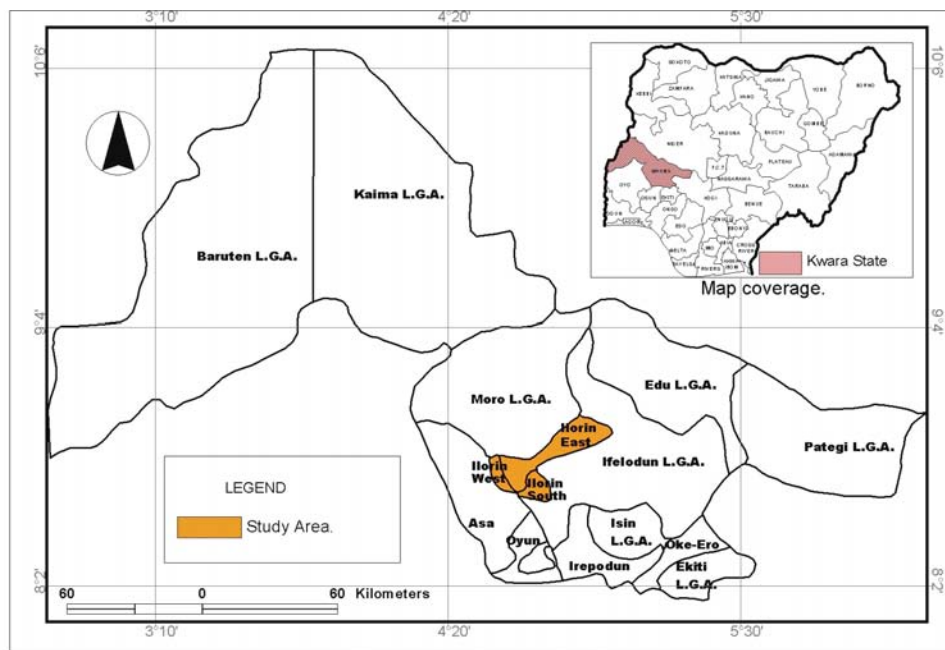


Fig. 1: Map of Kwara state showing the study area

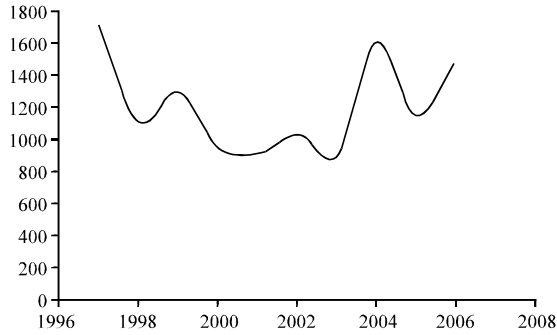


Fig. 2: Rainfall intensity in Ilorin Metropolis (1996-2006)

Table 3: Socio-economic characteristics of women fadama farmers in Ilorin

Socio-economic characteristics	Frequency	Percentage
<b>Age (Years)</b>		
<20	11	9.2
20-35	28	23.3
36-45	40	33.3
46-55	24	20.0
Above 55	17	14.2
Total	120	100.0
<b>Marital status</b>		
Single	14	11.6
Married	75	62.5
Divorced	21	17.5
Widowed	10	8.4
Total	120	100.0
<b>Land acquisition</b>		
Self owned	17	14.2
Belong to husband	28	23.3
Rented	53	44.2
Permission without payment	22	18.3
Total	120	100.0

was collected during a survey of 120 women farmers along three streams in Ilorin metropolis. The women comprised of urban itinerant farmers who cultivate river banks with vegetables during dry seasons and onset of rains. Structured questionnaire was administered to the women on their experience during the flood event of the previous year. The socioeconomic characteristics of the women are as shown in Table 3.

As shown in Table 3, majority of the women farmers were in the age bracket 20-45 years as this age group together formed 56.6% of the total respondents in the survey. Majority of the women were also married with 62.5%. Some 21 (17.5%) and 10 (8.4%) women were either divorcees or widows. Some of these socio-economic characteristics indicate the peculiar needs of the respondents not as only as women but also as either aged or single women who require social supports and safety nets. Moreover, the survey also sought to know the cost of land acquisition by the women. Only 14% of the women owned the land on which their farms were personally while in 23.35 of the respondents, the land was owned by their husbands. The land was rented at various monthly or annual costs by 53 women (44.2%). About 18% of the

respondents claimed that they only obtained the permission of the land owners pending the time the owner would be ready to use the land. The implication of some of these land acquisition processes is that in most cases, there is absolute lack of security of tenure for the use of land by the women as land owners do not need any long notice before ejecting the women from the land.

### **RAINSTORM AND FLOODING: THE MULTIPLE IMPACT OF SINGLE EVENT**

Rivers Asa, Amule, Aluko are among the major streams on which women carry out their farming activities particularly during dry seasons. Cultivation is deliberately planned to coincide with the dry season and harvesting is done usually before the onset of the rain or at most before the first two rains. During the early rains of 2006, 47 respondents (39.2%) lost farmlands estimated to be up to three-quarters of the total farm cultivated during the period. Indeed about 23% of the women lost the whole farmland they cultivated during the period. Moreover, 51 women or 42.5% indicated that their houses were also affected. Hence, this group of women lost both the farm and their homes were also devastated by the rainstorm that accompanied the rain. The intervention by government agents being the only institution that intervened included the distribution of relief materials to the victims. This included mainly building materials and some household items. Only 19 women or about 16% of the sampled women indicated that they received any for relief material.

### **INSTITUTIONAL FRAMEWORK FOR DISASTER MANAGEMENT AND FUNDING IN NIGERIA**

The local chapter of the National Emergency Management Agency (NEMA) was the agency saddled with the responsibility for the distribution of the relief materials. In response to the upsurge in disasters, the Federal Government of Nigeria through, Decree No. 12 of 1999, established the National Emergency Management Agency (NEMA) as the apex public sector agency for emergency management. This legal instrument was fashioned after the United States Emergency Management Agency (USNEMA) law. The enabling legislation contains concepts like co-ordinate, liaise, monitor and collect, etc. which presupposes that NEMA is a co-ordinating agency. Yet, the Director-General of the agency in his welcome address to a conference on emergency management noted that the management of emergency no matter how small is the agency's responsibility. This raises the fundamental question on

Table 4: Revenue allocation to the ecological fund: 1998-2006

Year	(₦ billion*)	Percentage of total
1998	4.858	5.97
1999	9.125	11.22
2000	21.021	25.85
2001	25.491	31.35
2002	2.711	3.33
2003	0.000	0.00
2004	18.100	22.28
2005	19.234	20.05
2006	18.428	21.22
Total	81.306	100.00

\*1 US\$ currently exchanges for 147 Naira; Central Bank of Nigeria; Statistical Bulletin Dec. 2003; CBN Annual Reports and Statement of Accounts for 2003-2006

which other units should be liaising with or coordinating. Although, Nigeria has signed up to the United Nations Framework Convention for Climate Change (UNFCCC) and is widely recognized to be vulnerable to climate change (Olokesusi, 2004) much still needs to be done to develop local awareness, knowledge and expertise. Whereas NEMA is structurally incapacitated, the situation is worse at the state and local levels. Although, the 1999 NEMA Decree directs each state to have a fully equipped emergency management agency, this has not been realized. Furthermore, a National Disaster Response Plan was prepared about 3 years ago, it has not been put to use. It is however, quite heartening that the Nigerialsat-1 (satellite) is now gathering data on environmental conditions and resources what is of utmost concern is the application of such data for participatory and sustainable environmental emergency management.

Funding of disaster management programmes is presently a major responsibility of the Federal Government. The primary source of financing NEMA and its activities is a proportion of the ecological fund (Table 4) (a certain proportion of oil revenue set aside to tackle environmental problems and emergencies). Between 1998 and 2004, about ₦82 billion accrued to this fund from which NEMA received its annual capital and recurrent budgetary allocations (Table 3). Despite the Supreme Court judgement on the constitutionality or otherwise of the special fund, deductions from the federation account, other tiers of government have not shown appreciable commitment towards disaster mitigation. Although, it is true that under the current revenue allocation system, the lion's share goes to the Federal Government, it is an inalienable fact that disasters occur and could re-occur in all states of the federation with their attendant adverse economic, political, environmental and social impacts. Moreover, the entire pool of funds in the Federation Account and the proportion allocated to each tier of government are all subject to the vagaries of oil pricing in the global market. This because Nigeria depends largely on oil revenue the price of which is not stable in the

international oil market. Therefore, for a country striving strenuously to avoid these significantly debilitating negative externalities, comprehensive disaster mitigation financing policy and programme become imperative.

Another important effort aimed at tackling natural disasters in Nigeria by the Federal Government is the production of eco-climatic atlas map. The Federal Government has invested N100 million (\$769230.77) in the production of eco-climatic maps to help in the monitoring of natural disasters in all the states of the federation.

## CONCLUSION

The growing trend of disasters in Nigeria has implications for national sustainability. This is because disasters, irrespective of the causal factors are associated with diverse externalities such as mortalities, loss of income, home, farmlands, social networks, livelihoods and infrastructure.

The climate change and variability are likely to worsen the prospects for poverty eradication unless action is taken to become response-capable. This requires a focus on reducing vulnerability, achieving equitable growth and improving the governance and institutional context in which poor people live.

In effect, the existing poverty reduction strategies are continuously challenged by climate change which often time deepens poverty. The country lacks capacity to anticipate and respond to climate change and variability related risk (Gwary, 2008; Kumuyi *et al.*, 2008). There is no adequate information on seasonal forecast of climate variability to enable preparedness to climate related disaster and thus early warning facilities are grossly underutilized.

Strategies to reduce vulnerability should be rooted in vulnerability analysis and greater understanding of both household-level and macro response options that are available to decrease the poor's exposure to climate risk. Increasing the response-capability of Nigeria will require information on seasonal forecast to enable the preparedness to climate variability as well as longer term climate prediction data to ensure that strategies to reduce vulnerability also reflect the underlying longer-term climate trends.

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