THE JOURNAL OF RESEARCH REVIEW

P-ISSN: 3006-2632 | E-ISSN: 3006-2640
Vol. 3. No. 01 (Jan-Mar) 2026 | Page 737-747
https://doi.org/10.5281/zenodo.21469698

Climate Change: A Threat to the State and National Security of Pakistan: Challenges, Implications, and Strategies for

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Abstract: *One of the biggest non-traditional security risks that states around the world are currently facing is climate change. In contrast to traditional security issues, climate change has an impact on many aspects of national security, such as political stability, public health, energy security, food and water security, economic stability, and environmental sustainability. Despite making up less than 1% of the world's greenhouse gas emissions, Pakistan is one of the nations most at risk from climate change. The nation is more vulnerable to climate-related calamities due to its geographic location, reliance on the Indus River system, vast agricultural sector, quickly expanding population, inadequate institutional capacity, and socioeconomic disparities. Climate change is no longer just an environmental problem but a serious national security risk, as evidenced by recent climate catastrophes, especially the devastating floods of 2022, protracted droughts, rapid glacier melting, and an increase in heatwaves. Widespread displacement, infrastructure destruction, food insecurity, financial losses, and heightened strain on governance institutions are the outcomes of these catastrophes.*

This study investigates the multifaceted effects of climate change on environmental, economic, social, and political systems as a potential danger to Pakistan's state and national security. It examines the body of research to determine Pakistan's main vulnerabilities and evaluate the connection between security and climate change. The article goes on to address adaptation and mitigation techniques that can enhance national resilience through better governance, climate-resilient infrastructure, sustainable resource management, disaster risk reduction, technological innovation, regional cooperation, and institutional reforms. According to the study, long-term stability and sustainable development depend on Pakistan's national security framework incorporating climate security. To reduce vulnerabilities and improve adaptive capacity, government agencies, international organizations, civil society, and local communities must work together to address climate change.

Keywords: Witness Testimony, Witness Credibility, Eyewitness Evidence, Witness Reliability Judicial Assessment

Background of the study:

One of the most important global issues of the twenty-first century is climate change, which puts human civilizations, ecosystems, and national security at previously unheard-of threats. According to the Intergovernmental Panel on Climate Change (IPCC, 2023), human-caused

greenhouse gas emissions have clearly warmed the atmosphere, oceans, and land, increasing the frequency and severity of extreme weather events, retreating glaciers, rising sea levels, biodiversity loss, and disturbances in ecological systems. All countries are impacted by climate change, but developing countries are more vulnerable because to their limited ability to adapt, inadequate governance, limited resources, and reliance on climate-sensitive industries including agriculture and water resources (IPCC, 2023).

Over the past thirty years, there has been a substantial shift in the notion of national security. National security has historically concentrated on defending states against external threats and military assault. However, non-traditional security issues including climate change, pandemics, food instability, cyber threats, and transnational terrorism are becoming more widely acknowledged in contemporary security studies (Barnett, 2003). Because it intensifies pre-existing social, economic, and political vulnerabilities, climate change has become a "threat multiplier" that raises the risk of instability, conflict, migration, and humanitarian crises (United Nations Development Programme [UNDP], 2022). Pakistan is among the nations most at risk from climate change worldwide. Over the past 20 years, Pakistan has continuously been included as one of the nations most impacted by extreme weather events in the Global Climate Risk Index (Eckstein et al., 2021). Due to its geographic location, reliance on glacier-fed river systems, rapidly expanding population, pervasive poverty, and weak institutional resilience, Pakistan suffers greatly from global warming even though it contributes less than 1% of the world's greenhouse gas emissions (World Bank, 2022).

Pakistan's climate varies greatly, with arid deserts in the south and glaciated mountains in the north. With more than 7,000 glaciers—the largest concentration outside of the polar regions—the nation is especially vulnerable to glacier melt brought on by warming temperatures (International Centre for Integrated Mountain Development [ICIMOD], 2023). In the end, accelerated glacier melting threatens long-term water supplies, hurting agriculture, hydropower production, and food security. Initially, this raises river flows and flood hazards.

Pakistan's economy still revolves around agriculture, which makes a significant contribution to employment, rural livelihoods, and national income. However, consistent weather patterns are crucial for agricultural output. Crop yields and animal output have been negatively impacted by rising temperatures, unpredictable rainfall, extended droughts, shifting monsoon patterns, and a rise in pest infestations (Food and Agriculture Organization [FAO], 2021). Food security, poverty alleviation, and economic growth are directly threatened by climate-induced declines in agricultural production since agriculture employs a sizable share of the workforce. Another significant issue with climate security is water scarcity. The Indus River Basin, which is dependent on seasonal monsoon rainfall and Himalayan glacier melt, is a major source of freshwater for Pakistan. Hydrological cycles are being altered by climate change, leading to erratic precipitation patterns and an increase in the frequency of both droughts and floods (World Bank, 2022).

Water stress is exacerbated concurrently by fast urbanization, population increase, groundwater depletion, and ineffective irrigation systems. Public health, energy production, agricultural productivity, and interprovincial resource management are all significantly impacted by water scarcity.

The catastrophic floods of 2022 serve as an example of the complex security ramifications of climate change in Pakistan. A third of the country was submerged due to exceptionally heavy monsoon rainfall and glacier melt, affecting over 33 million people, killing over 1,700,

destroying millions of homes, and causing economic losses exceeding US$30 billion (Government of Pakistan, 2022; World Bank, 2022). Beyond the immediate humanitarian disaster, the floods threatened macroeconomic stability, increased inflation, and interfered with transportation, healthcare, education, and agricultural production.
Human instability and internal relocation are other consequences of climate change. Communities impacted by environmental degradation, droughts, and floods are frequently compelled to relocate in quest of better living circumstances and employment possibilities. According to the International Organization for Migration [IOM], 2023, such displacement puts additional strain on housing, employment markets, healthcare facilities, and urban infrastructure, which may exacerbate social tensions and governance issues. As a result, migration brought on by climate change has grown in significance within Pakistan's national security narrative.
Another aspect that is directly related to climate change is energy security. Hydropower, which is vulnerable to variations in river flows and precipitation patterns, is a major source of electricity in Pakistan. In addition to damaging fuel supply chains, transmission lines, and power infrastructure, extreme weather events can cause protracted power outages that have a negative impact on economic competitiveness and industrial productivity (Asian Development Bank [ADB], 2021). Concurrently, rising temperatures increase the need for electricity since cooling systems are used more frequently, further taxing the country's energy infrastructure. Climate change is a national security issue that is further reinforced by its effects on public health.

The frequency and intensity of heatwaves have increased, leading to greater death rates, especially for vulnerable groups like children, the elderly, and people with pre-existing medical disorders (World Health Organization [WHO], 2023). Floods deteriorate sanitation infrastructure, contaminate drinking water supplies, and accelerate the spread of waterborne illnesses such cholera, diarrhoea, dengue fever, and malaria. The already limited healthcare systems are severely burdened by these medical situations.
Political and institutional stability are also impacted by climate change. If disaster response procedures are seen as unfair or inadequate, environmental deterioration, resource shortages, and economic losses associated with disasters can erode public confidence in government institutions. Particularly in climate-vulnerable areas, weak governance competence may worsen social complaints, increase regional inequality, and diminish governmental legitimacy. As a result, sustaining political stability and guaranteeing sustainable development now depend on efficient climate governance.
Pakistan has launched a number of policy efforts in response to these new issues, such as the National Adaptation Plan, the National Climate Change Policy, and revised Nationally Determined Contributions under the Paris Agreement. These frameworks place a strong emphasis on ecological restoration, renewable energy expansion, disaster risk reduction, climate adaptation, and institutional capacity building. However, effective climate action is still hampered by implementation gaps, funding restrictions, governance issues, and poor institutional coordination (Ministry of Climate Change and Environmental Coordination, 2021).

Theoretical Framework:

Theoretically, the increasing incorporation of environmental concerns into national and international security frameworks is reflected in climate security. More and more security experts contend that rather than being a singular source of conflict, climate change serves as a catalyst that exacerbates pre-existing vulnerabilities (Barnett & Adger, 2007). Therefore, examining the relationships between environmental degradation, socioeconomic inequality, governance capability, demographic pressures, and geopolitical dynamics is necessary to comprehend Pakistan's climate-security nexus.
It is therefore essential to incorporate climate adaptation into national security planning due to Pakistan's growing vulnerability to climate-related disasters and its strategic geopolitical importance in South Asia. In order to build resilience, institutions must be strengthened, climate-resilient infrastructure must be invested in, disaster preparedness must be improved, sustainable water management must be promoted, agricultural adaptation must be improved, renewable energy must be expanded, and regional collaboration over shared natural resources must be encouraged. These steps are crucial for national security, social cohesion, economic growth, and environmental sustainability.

Significance of the study:

This study is important because it looks at climate change from a national security perspective rather than just an environmental one. Few studies thoroughly examine how climate-induced environmental changes interact with political stability, human security, governance, and state resilience in the Pakistani context, despite the fact that a significant amount of research has concentrated on the ecological and economic effects of climate change. By combining interdisciplinary research and proving that climate change acts as a multifaceted danger multiplier impacting almost every area of national development, this study aims to close that gap.
By combining knowledge from climate science, political science, economics, disaster management, and international relations, the study adds academically to the growing body of work on environmental security and non-traditional security studies. It offers a thorough framework for comprehending how climate threats affect public health, energy systems, migration, socioeconomic development, state capability, and resource governance. Theoretical knowledge of climate security in developing nations is improved by such an interdisciplinary approach.
Policymakers in charge of national security, environmental governance, catastrophe risk reduction, water resource management, agriculture, and economic planning can benefit from the study's evidence-based insights. The results highlight how important it is to include climate risk assessments in Pakistan's development plans, public investment objectives, and national security policy.

The report helps more successful climate adaptation and resilience-building programs by identifying crucial vulnerabilities and institutional obstacles.
International development organizations, humanitarian groups, and climate finance organizations looking to assist Pakistan's adaption efforts will find the findings equally pertinent. Pakistan makes a strong argument for climate justice, international cooperation, and equitable climate financing because it is one of the nations most exposed to the effects of climate change despite contributing very little to global emissions. As a result, the study

contributes to conversations on sustainable development, loss and damage, and global accountability.

Lastly, this study emphasizes how crucial proactive climate governance is to ensuring Pakistan's long-term stability and prosperity. It contends that lowering vulnerabilities and guaranteeing sustainable development require bolstering institutional capacity, making investments in robust infrastructure, encouraging sustainable natural resource management, and incorporating climate considerations into national security planning. For academics, professionals, and decision-makers involved in tackling the intricate connection between climate change and national security in Pakistan, the report is therefore an invaluable scholarly and policy resource.

This is the first part of your review of the literature.

Literature Review:

There has been much scholarly discussion in the fields of environmental science, political science, international relations, economics, and development studies as a result of the rising understanding of climate change as a multifaceted security concern. Prior studies mainly viewed climate change as an environmental problem, but more recent research views it as a major non-traditional security threat that jeopardizes economic growth, human security, state stability, and geopolitical relations (Barnett, 2003). According to the literature, climate change acts as a "threat multiplier" by aggravating pre-existing socioeconomic vulnerabilities, institutional flaws, and resource scarcity rather than directly causing insecurity or conflict.

Pakistan occupies a prominent position within climate-security scholarship because it ranks among the world's most climate-vulnerable countries despite contributing less than one percent of global greenhouse gas emissions. The country's dependence on climate-sensitive sectors, rapidly growing population, fragile ecosystems, weak governance structures, and exposure to recurrent floods, droughts, glacier melt, and heatwaves have attracted increasing academic attention. Consequently, researchers have increasingly examined climate change through the broader framework of environmental and human security rather than limiting analysis to environmental degradation alone. Theoretical Framework:

The late 20th century saw the growth of security studies beyond military threats and the conceptualization of climate change as a security issue. Conventional realist ideas see interstate conflict, military might, and territorial sovereignty as the main components of national security. Scholars contended that resource shortages, food insecurity, infectious diseases, and environmental degradation all constituted serious threats to state stability after the conclusion of the Cold War (Barnett, 2003).

Securitization was first proposed by the Copenhagen School of Security Studies, which contends that problems become into security concerns when political actors are able to portray them as existential threats that call for drastic policy measures. According to this framework, because climate change has the potential to jeopardize political stability, economic stability, and human well-being, it has been increasingly securitized through international organizations like the United Nations Security Council and the Intergovernmental Panel on Climate Change (IPCC). More recent research warns that securitization should promote inclusive, flexible governance that boosts resilience rather than being used only to defend emergency measures. Barnett (2003) contends that as climate change primarily challenges the social, economic, and political systems that support human societies, environmental security should not be understood only through military institutions. In a similar vein, Barnett and Adger (2007) argue

that climate change undermines human security by limiting access to public services, food, water, and livelihoods while also diminishing the ability of the state to efficiently handle emergencies. Their "threat multiplier" paradigm is still frequently used in studies looking at developing nations and has grown to be one of the most important theoretical stances in climate-security research.

By focusing on individual welfare rather than territorial defence, human security theory expands the analytical framework even further. This viewpoint holds that human security is threatened by climate change because it makes people more susceptible to environmental disasters, hunger, illness, displacement, and unemployment. Through social unrest, degraded governance, and decreased economic production, these human insecurities may eventually result in more significant national security issues. In a similar vein, the IPCC states that rather than functioning as a stand-alone cause of conflict, climate change interacts with poverty, inequality, weak institutions, and bad governance to heighten systemic risks.

International Research on National Security and Climate Change:

According to international research, one of the biggest new security issues of the twenty-first century is climate change. Anthropogenic climate change has already made heatwaves, floods, droughts, glacier retreat, sea level rise, biodiversity loss, and extreme weather events more severe in almost every part of the planet, according to the IPCC Sixth Assessment Report. Food systems, water availability, infrastructure, public health, migration, and political stability are all significantly impacted by these environmental changes.

According to Busby (2023), research on climate security has progressed from theoretical discussions to empirical evaluations of the ways in which climate hazards intersect with institutional resilience, development, and governance. Modern research stresses probabilistic links in which climate shocks intensify pre-existing political and socioeconomic tensions rather than forecasting inevitable war. This viewpoint reflects the increasing understanding that whether climatic stress leads to resilience or instability is mostly determined by institutional efficacy, adaptive capability, and governance quality.

In a similar vein, Arnall (2023) notes that whereas violent conflict was a major emphasis of early climate-security research, human agency, adaptive governance, and resilience-building have become increasingly important in recent work. This perspective holds that, with the help of strong institutions, funding, and inclusive policymaking, communities have a great deal of capacity to adapt. As a result, climate security should be viewed as enhancing social resilience and lowering vulnerability in addition to averting conflict.

Several empirical investigations show that armed conflict is rarely caused by climate change on its own. Rather, poverty, poor governance, ethnic divides, demographic pressures, and competition for limited natural resources all interact with climate stress. While politically vulnerable regimes frequently suffer more severe social and economic repercussions after environmental disasters, regions with robust institutions typically show higher resilience despite having identical climate threats.

The Climate Vulnerability of Pakistan

In terms of climate vulnerability research, Pakistan has emerged as one of the most studied nations. Climate change affects natural and social systems in a variety of ways due to the country's geographical diversity, which includes the Himalayan glaciers, the Indus River Basin, dry deserts, and a long coastline.

One of Pakistan's main vulnerabilities, according to researchers, is its reliance on agriculture. Despite being mostly dependent on glacier-fed irrigation systems and seasonal monsoon rains, agriculture makes a significant contribution to employment and rural life. Crop productivity, livestock output, and rural incomes are at risk due to rising temperatures, shifting precipitation patterns, extended droughts, and an increase in the frequency of floods. Strategies for reducing poverty, employment, and food security are all impacted by these climatic shifts. The literature also focuses a lot on Pakistan's glacier systems. Outside of the polar areas, the Hindu Kush-Karakoram-Himalayan region has one of the highest concentrations of glaciers. The possibility of Glacial Lake Outburst Floods (GLOFs) has increased due to the acceleration of glacier retreat caused by rising temperatures. Long-term decreases in glacial volume endanger water availability, hydropower production, irrigation systems, and ecological sustainability, even while glacier melt momentarily enhances river discharge. Long-term water resource management and national planning face difficult obstacles as a result of these dynamics.

Researchers studying climate change also highlight Pakistan's growing vulnerability to extreme weather. The devastating floods of 2010 and 2022 illustrated the profound effects of climate-related disasters on people and the economy.

Floods disrupt education, healthcare, agriculture, transportation, and industrial activity in addition to causing immediate fatalities and destroying infrastructure. They also increase public spending and delay economic growth. These domino effects show how environmental catastrophes create complex security issues that go well beyond the actual physical devastation brought on by flooding.

Pakistan's Threat Multiplier: Climate Change

The idea of the "threat multiplier" is now essential to comprehending Pakistan's relationship between climate change and security. Climate change exacerbates pre-existing structural vulnerabilities like poverty, unemployment, water scarcity, food insecurity, fast urbanization, and institutional instability rather than directly causing insecurity. Climate shocks so put further strain on governance systems that are already struggling with development. According to academics, Pakistan's fast expanding population greatly increases the country's vulnerability to climate change. Declining environmental resources and rising climate variability are correlated with rising demand for food, water, housing, and energy. Particularly in densely populated cities where informal settlements frequently lack proper drainage, sanitation, and emergency services, urban expansion increases vulnerability to floods, heatwaves, and infrastructure failures.

Additionally, a number of studies highlight institutional capacity as the primary factor influencing climate resilience. Following climate disasters, nations with strong governance, disaster preparedness, scientific monitoring, early warning systems, and coordinated policy implementation typically suffer significantly reduced human and economic losses. On the other hand, despite comparable degrees of climate exposure, susceptibility is increased by disjointed institutions, poor planning, budgetary limitations, and poor coordination. This conclusion is especially pertinent to Pakistan, where policy formation often outpaces policy implementation. Overall, the studied literature shows that there is widespread scholarly agreement that one of Pakistan's biggest non-traditional security threats now is climate change.

However, scholars are increasingly arguing that the country's capacity to improve institutional efficacy, foster sustainable development, strengthen governance, and increase adaptive capacity will be more important in determining the severity of future climate-security risks than climatic hazards themselves.

Ideas and Techniques for Adapting to Climate Change

Pakistan's environmental sustainability, economic growth, human security, and national stability are all impacted by the multifaceted threat posed by climate change. An integrated approach that incorporates institutional reforms, technical innovation, climate adaptation, mitigation, and regional collaboration is needed to address this issue. International best practices and current climate-security literature serve as the foundation for the following suggestions.

Planning for National Security in Light of Climate Change

Pakistan's national security plan should include climate change as a fundamental element. Defence planning, disaster preparedness, infrastructure development, and economic policymaking should all take climate risk assessments into account. To enhance policy coherence and emergency response, an integrated climate-security coordination system should be established by the National Security Division, Ministry of Climate Change and Environmental Coordination, National Disaster Management Authority (NDMA), and provincial governments. According to research, poverty, food insecurity, migration, and governance vulnerabilities are all made worse by climate change, which acts as a threat multiplier. Therefore, rather than just being an environmental issue, climate resilience should be prioritized as a national security issue.

Strengthening Disaster Risk Reduction and Early Warning Systems

The devastating floods that struck Pakistan in 2010 and 2022 highlight the pressing need to improve disaster preparedness. Modern meteorological forecasting systems, satellite monitoring, flood forecasting, glacier monitoring, and community-based early warning systems should be the main areas of investment. Better collaboration between federal, provincial, and local authorities is necessary for disaster management organizations. To guarantee prompt evacuation and emergency response, public awareness campaigns and community disaster preparedness initiatives should be increased. Future disaster-related losses will be greatly decreased by constructing climate-resilient infrastructure, such as flood-resistant roads, bridges, hospitals, schools, and drainage systems. The "Build Back Better" concept should guide post-disaster recovery, making sure that rebuilding strengthens resilience rather than just replacing damaged infrastructure.

Management of Sustainable Water Resources

One of Pakistan's biggest climatic challenges is still water security. Water-saving technology like drip and sprinkler irrigation must replace ineffective flood irrigation in the nation's irrigation systems. Long-term water supply will be improved by lining irrigation canals, strengthening groundwater control, encouraging rainwater collection, and developing water storage facilities. National water policy should be guided by Integrated Water Resources Management (IWRM), which promotes provincial collaboration and enhances scientific

monitoring of river flows and glacier dynamics. Resilience against floods and droughts will increase with the successful implementation of the National Water Policy and climate adaption strategies. (Knowledge Portal on Climate Change)

Encouraging Climate-Smart Farming

Climate change continues to pose a serious threat to agriculture. Therefore, it should be a national goal to develop climate-smart agriculture. boosting drought-resistant crop types, increasing irrigation efficiency, growing agricultural extension services, bolstering farmer weather advisory systems, and boosting crop diversification are all examples of this. The development of climate-resilient seeds that can tolerate increased temperatures and water stress should be the primary focus of funding for agricultural research institutions. Artificial intelligence, remote sensing, precision farming, and digital agriculture can all increase agricultural output while consuming less resources. Financial tools like crop insurance and climate risk finance help shield farmers from losses brought on by climate change.

Increasing Energy Security and Renewable Energy

While increasing energy efficiency in all areas, Pakistan should quicken its shift to renewable energy sources including solar, wind, and hydropower. Renewable energy lessens reliance on imported fossil fuels, improves energy security, and lowers greenhouse gas emissions. Through tax breaks, concessional finance, and public-private partnerships, the government should promote private investment in renewable technologies. Distributed solar systems can increase resilience against climate-related disturbances, decrease transmission losses, and improve energy access, especially in rural populations.

Enhancing Institutional Capacity and Climate Governance

Strong institutions, open policymaking, and coordinated execution are necessary for effective climate governance. The Ministry of Climate Change and Environmental cooperation should be strengthened in Pakistan by boosting financial resources, improving cooperation with provincial governments, and developing technical skills. To make sure that infrastructure investments take future climate risks into account, annual development planning should incorporate climate budgeting. Universities and research institutes should provide scientific data to assist evidence-based policymaking, and monitoring and evaluation mechanisms should routinely evaluate how policies are being implemented.

Increasing Climate Education and Public Awareness

A key component of effective climate adaption is raising public knowledge. Curricula in schools and universities should include climate education with a focus on water conservation, disaster preparedness, environmental sustainability, and responsible resource management. Information about climate hazards and adaptive behaviors that is supported by science should be shared by community organizations, social media campaigns, and mass media. Because adaptation measures are more successful when they take into account local priorities and knowledge, empowering local communities through participatory planning increases resilience.

Increasing Regional and International Collaboration

International cooperation is necessary to address the transboundary issue of climate change. Pakistan should keep participating in international climate initiatives under the Paris Agreement while enhancing collaboration with its neighbors on scientific research, river basin management, glacier monitoring, and catastrophe forecasting.

Climate-resilient infrastructure, renewable energy projects, ecosystem restoration, and disaster risk reduction should all be supported by international climate finance, such as the Green Climate Fund, Adaptation Fund, and multilateral development banks. Pakistan makes a stronger argument for more international financial and technical support based on the idea of climate justice because of its minimal contribution to global emissions.

Conclusion:

One of the biggest non-traditional security risks facing Pakistan in the twenty-first century is climate change. The nation continues to be particularly vulnerable to rising temperatures, glacier retreat, floods, droughts, heatwaves, and water scarcity despite making a negligible contribution to global greenhouse gas emissions. Food security, water availability, energy systems, public health, economic growth, infrastructure, and political stability are all more under risk from these climate dangers.

The literature shows that by exacerbating already-existing socioeconomic disparities, governance issues, and resource limitations, climate change acts as a threat multiplier. As a result, climate security should be seen as a multifaceted problem that impacts state resilience and national development rather than just an environmental one. The catastrophic floods that struck Pakistan in 2010 and 2022 serve as examples of how climate-related disasters have long-term economic and humanitarian impacts as well as cascading repercussions on several societal sectors. (World Bank)

Comprehensive policy changes that incorporate climate adaptation into national security planning, enhance disaster risk reduction, modernize agricultural and water management, increase renewable energy, fortify institutions, and advance evidence-based governance are necessary to strengthen climate resilience. Reducing future risks requires investments in scientific research, technical innovation, robust infrastructure, and community involvement. Furthermore, given Pakistan's disproportionate cost of climate impacts in comparison to its historical contribution to global emissions, international cooperation and climate finance remain essential. Climate resilience is a crucial part of Pakistan's long-term development strategy since national security and sustainable development are becoming more intertwined.

In conclusion, government agencies, academic institutions, the commercial sector, civil society, and foreign partners must work together to combat climate change. Pakistan can lower climate-related risks while boosting national resilience, safeguarding human security, and guaranteeing a more sustainable future for future generations through proactive governance, institutional strengthening, and sustainable resource management.

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