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Strategies in disaster risk reduction, including those related to climate change adaptation, for sustainable development

Integrating disaster risk reduction and climate change adaptation for sustainable development

Note by the secretariat

Summary

The present document contains highlights of the key challenges faced by the region due to climate-related disasters, and a discussion on how climate change may exacerbate the frequency and severity of these events. Issues relating to the synergistic relationship between disaster risk reduction and climate change adaptation are outlined, along with strategies and policy measures to address the challenges that countries face when planning and delivering disaster risk reduction and climate change adaptation programmes.

The Committee is invited to discuss good practices on these issues and consider options for strengthening regional cooperation on disaster risk reduction and climate change adaptation for sustainable development. The Committee may also wish to consider promoting a regional undertaking of such integration and provide the secretariat with guidance on its future strategic direction.

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I. Introduction

1. The countries of Asia and the Pacific are among the most exposed to natural hazards globally. Though in recent years, the death toll from disasters in some subregions has been decreasing, the region's exposure to disaster risk is growing more rapidly than its ability to build resilient communities.[1]

2. In many ways, disaster events represent tipping points from which the coping capacity of households, communities and nations are overwhelmed. Tipping points involve a rapid collapse of a system from one state to another, the effects of which often cascade across other economic, social and environmental systems and threaten development gains. Adding climate change to the equation brings the risk that these shocks would become even more devastating and frequent.

3. Climate change effects, if not stringently managed, may heighten the risk of breaching ecological tipping points, which would have repercussions far beyond local or national borders. These implications need to be identified and rectified now. An initial approach entails ensuring that risk analysis is integrated into development planning. In fact, good environmental management in general should be a key component for addressing the underlying risks of disasters. Disaster risks could be reduced if societies invested in good management of their natural resources.

4. Many measures that have been proven to be effective for climate change adaptation are similar to, and aligned with, those for disaster risk reduction. A primary difference in approaches is that disaster risk reduction is based on an analysis of historical disaster data, while those used for climate change adaptation tend to be more forward-looking and are based on climate change projections, which varies depending on the scenario.

5. Strategies related to climate change, disaster risk reduction and sustainable development are being pursued in most countries but, unfortunately, often on parallel tracks. Attempts are being made to integrate these issues, but for the most part, they are often analysed and implemented separately by different sectoral ministries. International organizations and funding agencies often reinforce this fragmentation by transferring their own segmented administrative requirements and policies for funding to the recipient.

6. At the household and community levels, however, there is no delineation between climate change adaptation, disaster risk reduction, economic development or survival. Food scarcity could be due to a major economic crisis thousands of miles away or the result of a local drought or flooding which has destroyed the season's crop. Either way, the short-term coping mechanisms for poor households are often the same — sell off livestock or assets, eat less, take children out of school or migrate to other areas or cities. These actions compound the vulnerability of households over the long term, eroding their resilience to successive shocks, whether they are from disasters or from other factors. Thus, a major part of disaster risk reduction and climate change adaptation has to do with reduction of communities' vulnerabilities whose underlying factors, in fact, often rest in the development deficit, requiring that the deep structural issues at the core of inequity and poverty in a country are addressed.

[1] United Nations Office for Disaster Risk Reduction and the Economic and Social Commission for Asia and the Pacific, *Asia Pacific Disaster Report 2012: Reducing Vulnerability and Exposure to Disasters* (ST/ESCAP/2639).

7. Finally, disasters and potential climate impacts may be transboundary. Actions taken in one country could significantly affect other countries further downstream, as often is the case with large water catchments. A number of international agreements and forums have been established to address these transboundary issues, with varied success. Member States in Asia and the Pacific need to agree on the regional platforms and mechanisms for supporting national and local efforts to facilitate collective advocacy, collaboration and coordination mechanisms to advance strategies related to disaster risk reduction and climate change resilience. This is particularly important for addressing issues of a regional nature or that have a risk of contagion across borders.

8. In the present document, under the overarching framework of building resilience, the secretariat focuses on issues related to disaster risk reduction and the link with climate change adaptation. The document contains brief discussions on the likely impacts of climate change on the region, the key challenges to an integrated approach to disaster risk reduction and climate change adaptation, some good practices and programmes undertaken by various Asian and Pacific countries, and potential options for regional collaboration to support national efforts.

II. Likely climate change impacts

9. The projected impacts of climate change have been discussed at length from the national to international level and are likely to have significant implications on the ability of member States to develop in a sustainable manner. The World Bank estimates that the cost of adapting to climate change will range from $75 billion to $100 billion per year for a temperature rise of 2 to 4 degrees, with Asia and the Pacific likely to bear the brunt of the burden.[2] It has been shown previously that disasters can undo development gains and set countries back from achieving the Millennium Development Goals.[1] Climate change impacts would further undo these successes, unless significant action is taken to address these challenges.

10. The Special Report of the Intergovernmental Panel on Climate Change on disaster risk and climate adaptation points to increased disaster risk as more vulnerable people and assets are exposed to weather extremes due to rapid, unplanned urbanization, even without considerations for the impacts from climate change. The authors of the report conclude that climate extremes will play an increasingly significant role in disaster impacts and highlight the need to improve existing risk management measures.[3]

11. The effects of climate change are projected to have adverse impacts on most countries of the region, with those located in South and South-East Asia and small island developing States seen to be the most vulnerable. In South Asia at a 4 degree global warming, a greater frequency of floods and droughts are predicted, with a 100-cm sea level rise by 2090, reducing arable land and eroding the quality of that land due to salt intrusion. Extreme monsoons that currently occur once every 100 years are likely to strike every 10 years by the end of the century.[2]

[2] World Bank, *Economics of Adaptation to Climate Change* (Washington, World Bank, 2010).

[3] Intergovernmental Panel on Climate Change, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (New York, IPCC, 2012).

12. In mountainous areas, climate change has resulted in receding glaciers and less snowfall, which presents a major problem for countries that rely on these two sources of water. An increased risk of glacial lake outburst flooding can be seen in the Himalayas. Notably, during summer, glacier melts and snow cover loss would be greater along with heat extremes. In Central Asia and Mongolia receding glaciers has led to increased mudflows and avalanches.

13. The projected increase in air temperature in North-Western China, for example, is likely to result in a 27 per cent decline in glacier area, a 10 to 15 per cent decline in frozen soil area and an increase in flood and debris flow. Elsewhere in China, temperature rise and rainfall decline have already caused lakes and rivers to dry up.[3]

14. A gradual reduction in rainfall during the grass growing season has led to greater aridity in Central and West Asia. The barren ground exacerbates this by increasing the reflection of solar radiation, resulting in greater soil moisture evaporation, which, in turn, contributes to the acceleration of grassland degradation.[3]

15. The water supply stress already felt by many South Asian countries will potentially worsen. In 2010, an estimated 380 million people in the Asia-Pacific region lacked access to clean water; approximately 164 million of them were in South Asia. This growing water scarcity will add even more pressure to agricultural production and stimulate greater political tensions. In fact, it is estimated that by 2050, water availability in Pakistan and Nepal will be so low that food production will no longer be self-sufficient.[4]

16. Some countries are likely to see an increase in the severity of tropical cyclones and storm surges over the twenty-first century.[3] The Bay of Bengal, for example, is expected to experience an increase in the frequency of the high storm surges.[5] Moreover a further increase in economic damage is expected on the back of the development of more valuable infrastructure in areas exposed to hazards, such as coastal areas and flood plains, as a result of economic growth.

17. Deltaic regions and coastal cities are particularly at risk from a combination of pressures, including, among them, increased temperatures, flooding, sea level rise and intense cyclonic activity. South-East Asia is projected to become much more exposed to the slow onset of sea-level rise, ocean warming and acidification, coral bleaching and biodiversity loss, which when combined with increased cyclones and other extreme weather events will have an even greater impact on coastal infrastructure and livelihoods. In the Mekong River Delta, the primary rice growing area of South-East Asia, the sea level is estimated to rise about 30 cm, which would reduce annual rice production by 11 per cent using the 2011 production level as the base.

18. Cities, such as Bangkok, Ho Chi Min, Jakarta and Manila, would be particularly vulnerable to flooding and sea level rise, which is likely to most affect the poorest segments of the population. Without adaptation measures,

[4] World Bank, *Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience* (Washington, 2013). Available from www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/06/14/000445729_20130614145941/Rendered/PDF/784240WP0Full00D0CONF0to0June19090L.pdf.

[5] A.S. Unnikrishnan, R. Kumar, S.E. Fernandez, G.S. Michael, and S.K. Patwardhan, “Sea Level Changes along the Indian Coast: Observations and Projections”, *Current Science India* 90: 362-368, 2006.

under a 4 degree warming scenario, 40 per cent of Bangkok is projected to be inundated by the 2030s and 70 per cent by the 2080s.[6]

19. Small island developing States are particularly vulnerable. Sea level rise is expected to be greater closer to the equator, with countries such as Maldives at risk of facing severe inundation. Sea level rise in the country is estimated to be between 70 and 125 cm, depending on the degree of global warming. The infrastructure of many of the small island developing countries is clustered around coastal areas. As a result climate change is already affecting strategic sectors of those countries' economies. Also, ocean acidification and water temperature changes are expected to have significant impacts on marine biodiversity and ecosystems, threatening fish and coral populations.

20. Australia and New Zealand are facing greater water and agricultural stress, with ecosystems showing changes and less seasonal snow cover. In addition, extreme events, such as wildfires, heat waves, cyclones, droughts and flooding, are increasing in frequency.

21. In Northern Asia, the combined effects of climate change, extreme weather events and human activities are likely to increase the frequency of forest fires.

III. Challenges to the integration of disaster risk reduction and climate change adaptation into sustainable development

22. The ability to effectively plan and implement activities related to climate change adaption and disaster risk reduction is limited by a number of fundamental ideological, practical and institutional barriers. Among them are the following:[7]

(a) *Lack of appropriate political, technological and institutional framework*: Climate change adaptation and disaster risk reduction cannot be undertaken independent of the country's development. As such, they must be integrated across all sectors and levels of government and other organizations. Institutional weakness and a lack of knowledge and/or capacity to do this are major barriers in the efforts of many member States to carry out this activity;

(b) *Insufficient and/or not sufficiently shared information:* Often data, such as rainfall monitoring, run-off patterns or soil conditions, are not adequately monitored, making it difficult to predict and adapt to potential future hazards. When available, they may not be shared with the various organizations and/or countries that need the information or are easily accessible. The data may also not be inclusive, as often informal settlements are neglected from national databases. Furthermore, due to a lack of monitoring and observation systems, historical climate records may be insufficient while other factors, such as local adaptation strategies and social information, are often also lacking;

[6] World Bank, *Climate Change Impact and Adaptation Study for the Bangkok Metropolitan Region* (Washington, World Bank, 2009). Available from http://beta.worldbank.org/climatechange/node/5360.

[7] Cap-Net, and others, *IWRM as a Tool for Adaptation to Climate Change: Training Manual and Facilitator's Guide* (Pretoria, South Africa, 2009). Available from www.cap-net.org/sites/cap-net.org/files/CC&%20IWRM%20_English%20manual_.pdf.

(c) *Overwhelming scale of people or assets located in areas exposed to hazards*: With Asia and the Pacific being the most populated region of the world, member States are often confronted by the reality of large numbers of vulnerable people with complex circumstances. Being overwhelmed tends to induce a sense of paralysis and inhibit any incentive to take appropriate risk reduction and adaptive interventions. This hinders decision-making and severely limits the number of policy options;

(d) *Lack of social equity in decision-making*: Involvement of the most appropriate stakeholders, particularly at the community level, in an equitable manner, is a major prerequisite for developing effective adaptation measures. Local communities are often the most aware of the conditions, barriers and potential solutions to the hazards they face. Local involvement should also ensure that proposed measures are gender balanced and that other potential minority groups, such as children, the elderly and people with disabilities, are taken into consideration;

(e) *Lack of subnational, subregional and regional cooperation, including integrated water management*: Major river basins are often transboundary and, therefore, appropriate water management must account for the considerable political difficulties that are sometimes faced by countries within a catchment area. Even at the national and local level, lack of cooperation can hinder efforts of one municipality or community to reduce disaster risk if the activities of another one undermines these efforts. For example, deforestation upstream by one institution may result in more severe floods downstream;

(f) *Policymaker blind spots:* Though many agree that prevention is better than a cure, often policymakers fail to effectively plan for and invest in disaster risk reduction and climate change adaption. Unfortunately, most policymakers focus only on events that have recently happened, such as an earthquake or cyclone, but over time memories fade and people seldom give weight to the needs of future generations. In addition, people tend to underestimate the extent of their ignorance of an issue and the uncertainty, or likely hazards, in the world they live, yet overestimate their ability to predict the future. Policymakers are particularly likely to fall victim to the wisdom of hindsight. They know they will be blamed for decisions that work out badly, but get little credit for successful planning that may prevent a catastrophic event.

IV. Good practices in integrating disaster risk reduction and climate change adaptation into sustainable development

23. The Intergovernmental Panel on Climate Change defines climate change adaptation as an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities....”.[3] Adaptation measures should be coordinated not only across institutions, but should consider community perspectives, including informal settlements, matched with national or local legislation.

24. Adaptive responses can be technical, such as infrastructure development, managerial, such as farming or water consumption practices, policy oriented, such as developing planning or building codes, or behavioural, such as choices of food or transport. Adaptation strategies are

often formulated at the local or even household level and then are supported or hindered by higher level policies or institutions.[8]

25. Adaptation measures for flooding, for instance, may include increasing water retention areas, such as dams or natural wetlands, improving urban development or redesigning infrastructure to improve urban drainage and allow the flow of water through urban areas without unduly damaging infrastructure. For storm surges and severe storms, afforestation and coastal ecosystem maintenance helps provide a buffer to coastal areas. Early warning systems and cyclone shelters help protect vulnerable populations during the most extreme events, though ultimately retrofitting and redesigning buildings, including improving local building codes, will do more to withstand the impacts of severe storms. Rainwater harvesting and efficient use of water, integrated watershed management, utilizing traditional and local knowledge and improving surveillance and monitoring of water and other natural resource use and quality are some key strategies for tackling increased drought uncertainty.

26. Bangladesh is one of the world's most exposed countries to climate changes, suffering from frequent monsoon floods and tropical cyclones. The country has invested more than $10 billion over the past three decades into public awareness and reducing public vulnerability to hazards by integrating disaster risk reduction and climate change adaptation into multiple sectoral development plans. The investment has resulted in a significant decline in disaster losses, however, more funds must be allocated for this purpose to keep up with changing climate scenarios. Due to likely climate change impacts, the adaptation costs for flood and storm threats are estimated to be twice as large as the costs would be if climate change were not a concern.[9] The total additional investment for adapting to tropical cyclones and storm surges up to 2050 is estimated to be $2.5 billion, with a $50 million annual maintenance cost. In addition, adaptation for inland flooding is estimated to cost $2.7 billion with an annual maintenance of $54 million. The main cost elements are associated with the construction of polders and cyclone shelters and increasing the height and drainage capability of transportation systems. By comparison, during the 1990s, the average yearly cost derived from disasters, in terms of damage to infrastructure, livelihoods and economic losses, ranged between 0.5 and 1 per cent of the country's GDP, with a peak of almost 5 per cent in 1998, when flooding inundated two-thirds of Bangladesh and caused more than $2 billion worth of damage.[2]

27. In Nepal, considerable investment is being made to improve community-based disaster management. The short-term aims of the national programme are information gathering and map drawing, while over the long term, the main objective is to limit the negative effects of a potential increase in floods due to rising temperatures. Investment will be made in forest and ecosystem management for supporting innovation, water resource management and clean energy supply. In addition, considerable investment will be directed towards enhancing climate smart urban settlements and adapting climate change in public health. The National Adaptation Programme of Action (NAPA) of Nepal aims to improve community-based adaptation through the integrated management of agriculture, water, forest and biodiversity. Enhancing adaptive capacities for vulnerable communities

[8] Economic and Social Commission for Asia and the Pacific, *Climate Change Adaptation for Water Management in a Green Economy* (Bangkok, United Nations, 2013).

through improved agricultural techniques and access to services related to agricultural development should stimulate innovation in the agriculture sector.[10]

28. Viet Nam has reduced the effects of climate change on agriculture by changing the sowing dates, switching to drought-tolerant crops, adaptation of salinity-tolerant varieties of rice and switching to rice-fish cultivation. The total cost of adaptation has been calculated to be $210 million per year, and should avoid losses of between 1.3 and 1.6 per cent of the GDP.[11] Similar strategies for agriculture have been proposed for Indonesia, along with the construction of seawalls to protect against sea level rise and storm surges. The estimated costs are high at about $5 billion per year up to 2020, but the expected losses should be reversed by 2050 and improve the GDP by 1.6 per cent by 2100 with only 0.12 per cent of GDP expended to maintain these measures.[12]

29. Small island developing States are adapting to climate change and reducing disaster risks through infrastructure protection, the construction of coastal polders, coral protection which helps reduce storm impacts and the introduction of salt resistant plants and fish, which helps combat intrusion during storms and sea level rise.

30. Faced with an estimated loss of between $103.4 million and $212.4 million, depending on rainfall scenario projections for the country,[13] Samoa has adopted a key strategy to limit the damages to buildings and infrastructure caused by high speed winds and strong precipitation during. The revision of design standards and associated planning increase resilience to these types of natural hazards. Design standards for storms are developed based on scenarios of the likely frequency of a storm of that severity returning, with the longer return periods indicating more severe storms. Comparing storms that are likely to occur every 10 years versus 50 years, shows that designing for the longer period reduces the likely impact of climate change by 80-90 per cent.[13] Moreover, despite an initial increase in adaptation costs, the long-term annual expenses for addressing climate change will be lower than staying with the 10-year standard currently used.

31. The small island State of Kiribati is expanding its climate change adaptation measures across the whole country, with a focus on the sectors most vulnerable to disasters. The measures entail improving the water supply, coastal management protection, strengthening laws for reducing coastal erosion and population settlement planning to reduce personal risks. An estimated $10 million-$11 million will be needed to carry out these measures.

32. Disaster risk reduction and climate change adaptation interventions