EDITORIAL

On the IPCC's Sixth Assessment Report

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The reports of the Intergovernmental Panel for Climate Change (IPCC) have come to carry significant weight in the political conversation on how to mitigate, and adapt to, human-induced climate change.

The IPCC's Working Group II (WG-II) released its Sixth Assessment Report (AR6), titled *Climate Change: Impacts, Adaptation and Vulnerability*, in February 2022. The report assesses the latest scientific literature on the current and future impact of climate change, climate risks, the vulnerability of human and natural systems, the available options for adapting to these changes, and the conditions for building resilience to climate change.

The Report unequivocally establishes that the increase in average global surface temperature of about 1.09°C as compared to pre-industrial levels has led to more frequent and intense extreme events, which, in turn has caused widespread adversity. It is clear that the losses and damage to nature and people caused by human-induced climate change are far beyond those that occur because of natural climate variability. This will have severe consequences in developing countries by limiting opportunities for development and increasing the costs of adaptation and the costs of recovery from extreme climate events.

Further, the report highlights that climate change – including increases in the frequency and intensity of extremes – has exposed millions of people to acute food insecurity and reduced water security, with the largest impact observed in different locations in Africa, Asia, Central and South America. Climate change has increased malnutrition in many communities, especially small-scale food producers and low-income households. For developing countries, both climatic and non-climatic factors affect vulnerability and exposure to climate change. The Report also emphasises the fact that regions with substantial development constraints such as poverty, limited access to basic services and resources, and a high level of dependence on climate-sensitive livelihoods, such as smallholder farmers,

pastoralists, and fishworkers, are highly vulnerable to climate hazards. South Asia, West, Central and East Africa are some of the hotspots of severe vulnerability. Moreover, future human vulnerability will continue to concentrate where the capacities of local, municipal, and national governments, communities, and the private sector are least able to provide infrastructure and basic services.

For developing countries, the urgent need to pursue socioeconomic development is further highlighted by the Report's conclusion that in the near term (2021-2040), the projected level of risk depends more strongly on concurrent near-term trends in vulnerability, exposure, level of socioeconomic development and adaptation than on differences in the intensity of climate hazards under different levels of future global warming.

The Report notes that, without adaptation, or at low levels of adaptation, in the mid to long-term (2041–2100), increases in the frequency, intensity, and severity of droughts, floods, heat waves, and continued sea level rise will increase risks to food security. These will be concentrated at locations with higher global warming levels, such as Sub-Saharan Africa, South Asia, Central and South America and in small island nations. While the results of the report are broadly intuitive, they must not be interpreted in bits and pieces as is often done in sensational media headlines. It is clear that improvements in socio-economic conditions, technological change in agriculture, and improved access to scientific knowledge for adapting to changes in climatic systems are critical for ensuring food security and well-being. For example, it is clearly observed that human mortality from extreme climate events (except in the case of heat waves in some developed countries) is reducing with improved socio-economic conditions in most parts of the world. It is therefore possible to protect human lives and livelihoods despite increasing climate change if appropriate enabling conditions are ensured.

At the same time, the report does note that, despite some progress, serious adaptation gaps exist, especially in developing countries, between current levels of adaptation and the levels needed to reduce climate risks. Adaptation is an undertaking that involves high costs, which current global financial allocations do not meet. With the overall level of climate finance far lower than necessary, what is available has been targeted largely at climate mitigation and not adaptation. Since the data also show that adaptation efforts undertaken so far have largely been funded through public expenditure, the report emphasizes the role of public intervention and expenditure as key enablers of adaptation action. This is important because many adaptation interventions in the most vulnerable countries do not provide adequate financial return on investments and can therefore only be funded with highly concessional public finance.

An approach to adaptation currently gaining popularity in academic and policy discourse that the IPCC report mentions is ecosystem-based adaptation (EBA). This

refers to the use of ecosystem management activities to increase the resilience and reduce the vulnerability of people and ecosystems to climate change. The summary for policymakers (SPM) of the Report highlights the effectiveness of EBA in reducing a range of climate change risks to people, biodiversity and ecosystem services with multiple co-benefits. However, this summary statement should be considered alongside the full set of findings in the full report. Notable among these is the finding that the evidence base for EBA is mostly drawn from the Global North. There is also a lack of robust, site-specific investigations of the effectiveness of interventions compared to possible alternative approaches. Further, EBA itself is vulnerable to the impact of climate change with effectiveness declining with increased global warming.

The Report recognises the important current and future role of irrigation in reducing climate risks. The report states that irrigation is effective in reducing drought-risk and climate-related impacts in many regions and has several livelihood benefits, but needs appropriate management to avoid potential adverse outcomes. Along with irrigation, measures such as on-farm water management, water storage, soil moisture conservation are some of the most common adaptation responses and provide economic, institutional, or ecological benefits and reduce vulnerability. This is an important finding for regions such as India and other parts of the developing world, where irrigation coverage is low, and large yield-gaps associated with low levels of input use and mechanisation exist. Seen together with the summary statements on food security, it is clear that improving agricultural productivity through technological change, including through enhanced access to irrigation, is very important. Future interventions in this regard must, however, account for changing weather patterns, beyond natural variability, to ensure that these interventions are effective in reducing human vulnerability.

Further, the report lists a range of effective adaptation options including cultivar improvements, agroforestry, community-based adaptation, farm and landscape diversification, which, together with supportive public policies can enhance food availability and stability and reduce climate risk. However, there are trade-offs and barriers associated with these options. For example, crops can have adaptation limits beyond which additional adaptation measures may be too expensive. The feasibility of many of the options is also dependent on the capacities of national and regional institutions to support primary producers as well as the financial and technological capacities of communities themselves to implement these options. Access to inputs and markets, the capacity to access and process new knowledge and management techniques are also subject to a range of social, economic, and institutional constraints. The report states that "integrated, multi-sectoral solutions that address social inequities" are needed to effectively utilise the range of adaptation options available. But it must be remembered, as also stated by the report that solutions vary based on local situations and contexts. It is therefore important for local, regional, and national governance and regulatory institutions to design

policies and interventions that are most effective at enhancing food security and nutrition in the face of changing climatic patterns. For countries of the Global South, with varied agro-climatic conditions, small holder farms, widely varying patterns of cultivation and access to inputs, limited institutional, economic, and technological capacities, this presents a significant challenge. For countries such as India therefore, the urgent need to focus resources towards adaptation is emphatically clear.

India's contribution to total historical cumulative emissions – which have led to 1.1 deg. C of warming from pre-industrial levels – is very low. On the other hand, India is already facing the impacts of climate change, and its adaptation burden under future scenarios of warming is significantly high. The pressure on India to devote the limited resources it has to climate change mitigation, when it is clear that its adaptation challenge is enormous, highlights the continuing need to emphasize the principles of equity and justice in the political negotiations under the United Nations Framework Convention on Climate Change (UNFCCC). The WG-II report notes that pathways of climate resilient development are influenced by historical and ongoing patterns of inequity, including by colonialism. The report notes that opportunities for climate resilience are not equitably distributed across the world. This understanding is at the centre of the negotiating positions of developing countries, including that of India. The report of WG-II clearly establishes the centrality of the principles of equity and justice in informing global climate action.

Whether in the contentious world of the UNFCCC, the developed countries will pay heed to these findings and assessments – which provide powerful support to the case of the global South – remains to be seen.