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## A Current Look at Adaptation to Climate Change: A Brief Review

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**ABSTRACT:** Climate change is already an evident reality and an issue discussed globally. Natural and water resources are declining in most basins, sea levels are rising; and even if it is possible to reduce the emissions of greenhouse gases (GHG) that cause climate change, and thus avoid its most serious consequences, the negative trends will continue in the coming decades due to the inertia of the climate system (UN 2022). Today, no country is free from the bio-physical impacts of climate change; additional costs are also generated, with both the most vulnerable people and ecosystems being most affected. Adaptation is a top priority for developing countries, including more resilient agricultural practices and migration to safer places. The mitigation actions that the Member States of the United Nations have committed to undertake are not enough to achieve the reduction in greenhouse gases necessary for climate stabilization. So, to achieve climate adaptation the climate costs and the management of sustainable and resilient development require an enormous number of new resources.

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### INTRODUCTION

Meeting the challenge of climate change and, at the same time, maintaining a high rate of economic growth accompanied by improvements in social conditions and care for the environment has been a global concern. This implies important transformations to the current style of development and the application of a set of public policies consistent with sustainable and resilient development. And, although several efforts to implement public policies related to mitigation and adaptation to climate change are currently observable, these actions are not enough to stop and even less reverse the effects of CC (Sánchez and Reyes, 2015). In addition, according to World Bank studies, CC could lead to the displacement of 216 million people within their respective countries by 2050, with critical areas of internal migration emerging as early as 2030, spreading and intensifying thereafter (Clement et al. 2021). It could also lower crop yields, especially in more food-insecure regions. At the same time, agricultural and forestry activities and land-use changes are responsible for around 25% of greenhouse gas (GHG) emissions. Therefore, the agriculture and forestry sector is critical to addressing the climate challenge. The ACC protects people from rising temperatures, stronger storms, flooding caused by unpredictable rains, and more acidic oceans. The aggravating factor that some people are more vulnerable to these effects, such as those living in poverty and extreme poverty.

Reducing emissions and becoming more resilient to CC requires major social, economic, and technological changes. But priorities for climate action also differ significantly across countries and sectors. The challenge for our countries in the South is that they no longer have an opportunity to develop first with a high carbon intensity and then clean up and decarbonize. And yet, at the local level, they have carried out small-scale actions aimed at curbing climate change and seeking to enable people to lead safer, more prosperous, inclusive, and sustainable lives. If well-designed and implemented, countries' low-carbon and resilient growth policies could also help them address poverty and inequality. Current national contributions to CC mitigation and adaptation in Ibero-American countries are not relevant; attributable to the fact that adaptation to climate change is an issue whose implications for the region have not been addressed in its entirety (Gligo et al., 2020).

**Is adaptation enough to face Climate Change?**

Climate change adaptation measures aim to limit impacts, reduce vulnerabilities, and increase the resilience to climate change of natural and human ecosystems, including biodiversity, forests, coasts, cities, agriculture, industry, etc., including sustainable environmental management practices. The challenge is that adaptation measures must also find ways or models of growth with low levels of greenhouse gas (GHG) emissions and reliable and viable environmental management to maintain ecosystems resilient to CC disturbances.

In response to the great challenge, various approaches have been considered in the process of adaptation to CC, among which can be listed: a) **Ecosystem-based adaptation (EbA):** As adaptation solutions also can be found in nature, this has given rise to the concept of Ecosystem-based Adaptation (EbA), that was defined by the Convention on Biological Diversity (CBD) in 2009. It refers to the use of biodiversity and ecosystem services, as part of a broader adaptation strategy, to help people adapt to the adverse effects of climate change. The concept has been incorporated by international and non-governmental organizations across the globe, and EbA projects have flourished, and also figure on the agendas of national and international policymakers and donors (FEBA, 2017; Martin, 2016; UNEP, 2019a, 2019b); b) **Adaptation based on human communities:** Human communities have demonstrated adaptability to various environmental and social challenges. This adaptability can be observed in both biological and cultural aspects, as humans have the ability to respond to changing conditions and develop strategies for survival and well-being. Its primary objective is to improve the capacity of local communities to adapt to climate change. It requires a comprehensive approach that combines traditional knowledge with innovative strategies, which not only seek to reduce current vulnerabilities, but also increase the adaptive capacity of people to face new and dynamic challenges. It also seeks to protect and sustain the ecosystems on which people depend (Thornton et al. 2019); c) **Disaster risk reduction:** The object of disaster risk science research is the “disaster system” consisting of the geographical environment, hazards, and exposed units, with features of regionality, interconnectedness, and complexity. It denotes the strategic actions and instruments used to anticipate disaster risk; reduce existing exposure, hazard, or vulnerability, as well as improve resilience; considering that environmental stability, hazard threat, and socioeconomic vulnerability together determine the way that disasters are formed, establish the spatial extent of disaster impact, and generate the scale of losses (Shi et al. 2020); d) **Adaptation actions must respond to the problems identified in the corresponding diagnoses:** The prioritization of adaptation actions has to be related to the problems identified in the climate agenda and to the analysis of current and future vulnerability, these measures must consider the participation of social actors. Consequently, it is suggested to meet the following characteristics: 1) Feasible; (2) Budgeted; (3) Synergistic; (4) Co-benefits; (5) Aligned; (6) Evaluable; (7) Equity; (8) Credibility; (9) No Regret; and (10) Reversibility.

Monitoring and Evaluation (M&E) of climate change adaptation measures is also a very important step. The M&E will help to know the impact and effectiveness of the implementation of the actions in order to evaluate if it is necessary to consider adjustments, rethink the design or if the actions have the expected results at the beginning of the process. It is important to involve the population in monitoring the progress achieved if the evaluation is transparent and if it is disseminated among the population. The priority measures will be those that respond to the problems identified associated with climate change. There are different types of prioritization, such as a cost-benefit analysis; cost-effectiveness or multicriteria analysis.

**Strategies for adaptation to climate change**

Many strategies for adaptation to CC can be found in the literature, among them we can mention: a) Reducing vulnerability to the effects of climate change; b) Land use planning; c) Protect and restoring key ecosystems; d) Supporting smallholder farmers; e) Promoting green energy; f) Combating the health effects of climate change; g) Implement early warning systems for extreme weather events; h) Developing climate-resilient infrastructure; and, i) Strengthening the capacity of communities to adapt to the impacts of climate change. These strategies are just a few examples and other measures can be taken to address climate change. In addition, both mitigation and adaptation strategies are needed to address the impacts of climate change and reduce greenhouse gas emissions. It is also important to mention that the issue of adaptation to CC has been considered in international financial organizations. The International Monetary Fund (IMF) has a recent publication "Climate-Sensitive Management of Public Finances" (Gonguet, et al., 2021), which states that in response to the growing urgency to fight climate change, green financial management public policies ("Green PFM") are needed in which existing financial management practices are adapted to support climate-sensitive policies. Given the cross-cutting nature of climate change and broader environmental concerns, they can be a key enabler of an integrated government strategy to combat climate change.

**NEW SCENARIOS**

**The Effect of Wars on Adaptation to Climate Change**

From the dumping of defoliants in the forests of Vietnam to the oil wells burned during the Gulf War and the contamination of bombed aquifers in Gaza, environmental destruction has long been a byproduct of war. Despite this reality, war emissions are not considered in international climate treaties, starting with the 1997 Kyoto Protocol. And even less understood are the far-reaching

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impacts on climate. The war equipment, weapons, planes, tanks, and trucks that fuel conflicts contribute direct emissions, are difficult to quantify, considering that they are not taken into account in the Paris Agreement's goal of limiting global warming to 1.5 degrees Celsius (Braun, 2022, Michelowa et al., 2022).

Wars are not limited to fighting, they have a huge environmental impact, from the destruction of infrastructure to the use and loss of natural resources, leaving vast areas of land unusable. On the other hand, from the 1940s, the testing and use of nuclear weapons caused radioactive contamination; it not only killed plants and animals but also created long-lasting health problems for humans. The IPCC warns that "urgent, effective and equitable mitigation and adaptation actions" are required; and that, "We must move from climate procrastination to climate activation," according to the executive director of the United Nations Environment Program – UNEP (Planelles, 2023, Roberts, 2023).

A recent European Union study concludes that addressing the global climate crisis requires transformative action over the next decade. And that, all sectors are under greater scrutiny to reduce their greenhouse gas (GHG) emissions. This includes the military, which remains a large consumer of fossil fuels, most notably through the operation of fighter jets and warships, the management of military bases, the acquisition of resource-intensive equipment, and the conduct of war activities. The military is often exempt from publicly reporting its GHG emissions. In fact, there is currently no consolidated public reporting of GHG emissions for EU national armies and no overall reduction targets incorporating military emissions (Parkinson et al., 2023).

### FINAL CONSIDERATIONS

It is clear that confronting climate change will require variations in current development styles in all sectors. The transport sector is an example of the kinds of variations that will need to be made. Diesel and gasoline consumption and vehicle fleets are growing rapidly in Latin America. These trends lead to higher greenhouse gas emissions, which also increase costs for fuel consumption, time lost in traffic congestion, and air pollution, in addition to the impacts on the health and productivity of the population. Another significant sector is agriculture and livestock, which are an emitting source of GHG due to the production of methane by ruminants and nitrogen oxides by the fertilization of crops and pastures. The industrial sector (also called Industrial Processes and Use of Products or IPUP) is also responsible for a significant part of global GHG emissions, which are produced by a wide variety of industrial activities that transform raw materials by chemical or physical means, it represented 4% of the GHG balance in 2020. In the same year, its emissions reached 6,930 kt CO<sub>2</sub> eq, increasing by 267% since 1990 and by 11% since 2018 (UN-ECLAC, 2014; Ritchie et al., 2020).

To prevent severe climate change, it is necessary to rapidly reduce global greenhouse gas emissions. The world emits around 50 billion tonnes of greenhouse gases each year [measured in carbon dioxide equivalents - CO<sub>2</sub>eq] (Ritchie et al. 2020).

Finally, the mitigation measures that the Member States of the United Nations have committed to undertake are not enough to achieve the reduction in greenhouse gases necessary for climate stabilization (UN-ECLAC, 2014).

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