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Climate Change in the WAEMU: Trends, Macro-criticality and Options Going Forward

Can Sever

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Climate Change in the WAEMU: Trends, Macro-criticality and Options Going Forward

Prepared by Can Sever*

Authorized for distribution by Luca Antonio Ricci
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ABSTRACT: This paper focuses on the trends in climate change in the WAEMU, assesses the criticality of climate change for the region, and reviews the related policy and financing options going forward. Climate change has been increasingly affecting the lives and livelihoods in the WAEMU. Temperatures have risen significantly, and climate-related disasters have hit the region more frequently in recent decades. Climate change can exacerbate the current challenges and hinder long-term economic prospects by threatening economic growth, food security, fiscal and external sustainability, and social outcomes in the region. Macroeconomic policies, structural reforms and cooperation among different parties remain critical alongside regional efforts, in particular to have access to necessary financing and bolster adaptation efforts.

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SELECTED ISSUES PAPERS

Climate Change in the WAEMU: Trends, Macro-criticality and Options Going Forward

WAEMU

Prepared by Can Sever[1]

[1] I thank Luca Antonio Ricci for useful comments and suggestions. I also thank Peter Lindner, Luc Tucker and my colleagues in the WAEMU country teams for feedback and inputs.

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CLIMATE CHANGE IN THE WAEMU: TRENDS, MACRO-CRITICALITY AND OPTIONS GOING FORWARD[1]

This paper focuses on the trends in climate change in the WAEMU, assesses the criticality of climate change for the region, and reviews the related policy and financing options going forward. Climate change has been increasingly affecting the lives and livelihoods in the WAEMU. Temperatures have risen significantly, and climate-related disasters have hit the region more frequently in recent decades. Climate change can exacerbate the current challenges and hinder long-term economic prospects by threatening economic growth, food security, fiscal and external sustainability, and social outcomes. Macroeconomic policies, structural reforms and cooperation among different parties remain critical alongside with regional efforts, in particular to have access to necessary financing and bolster adaptation efforts.

A. Climate Trends in the WAEMU

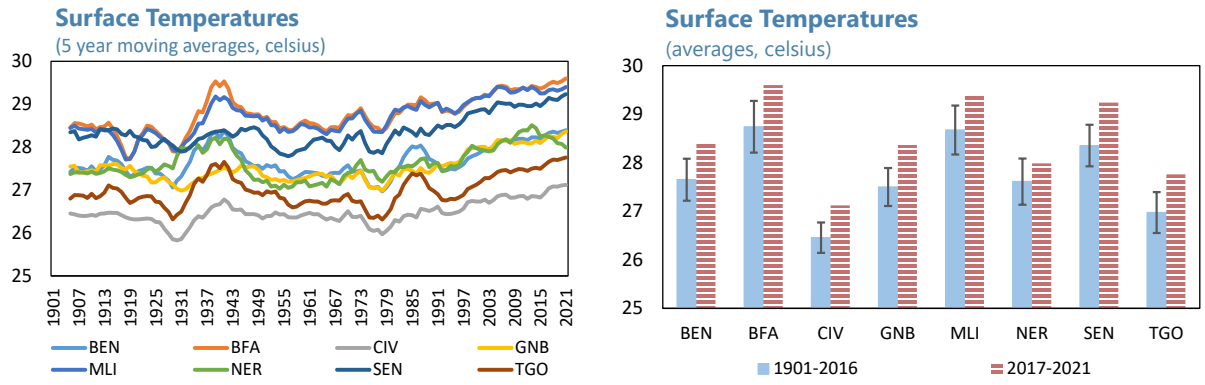
1. Climate change has been increasingly materializing in the WAEMU in the form of rising temperatures, as well as more frequent and larger climate-related disasters. Temperatures have been rising in the region, particularly starting from the 1980s, and the trend does not show signs of a deceleration. For instance, average temperatures during the last 5 years of available data (2017-2021) were higher by 0.4-0.9 Celsius in all WAEMU countries, compared to the long-run averages, i.e., since the 1900s (Figure 1). Moreover, there were 232 climate-related disasters in the WAEMU countries over the period of 1966-2022, and such events have become more frequent since the 2000s (Figure 2). About 65 percent of those disasters (151 out of 232) took place during the last 23 years (i.e., since 2000), and only 35 percent of them hit the region during the first 34 years of the sample (i.e., 1966-1999). This means about 7 disasters per year in the region since the 2000s, whereas this ratio was around 2 in the pre-2000 period. Such shocks are widespread in the WAEMU, where all countries except Guinea-Bissau experienced more than 15 events since 1966.[2] Regarding the types of events, droughts and floods are the most common forms (218 events out of 232). Strikingly, many of these events were large, with about two-thirds of the disasters (150 out of 232) estimated to affect the lives and livelihoods of more than 10,000 people.[3]

[1] Prepared by Can Sever (AFR). I thank Luca Antonio Ricci for useful comments and suggestions. I also thank Peter Lindner, Luc Tucker and my colleagues in the WAEMU country teams for feedback and inputs.

[2] While some of the cross-country variation in the number of events can be explained by different surface areas of the member states.

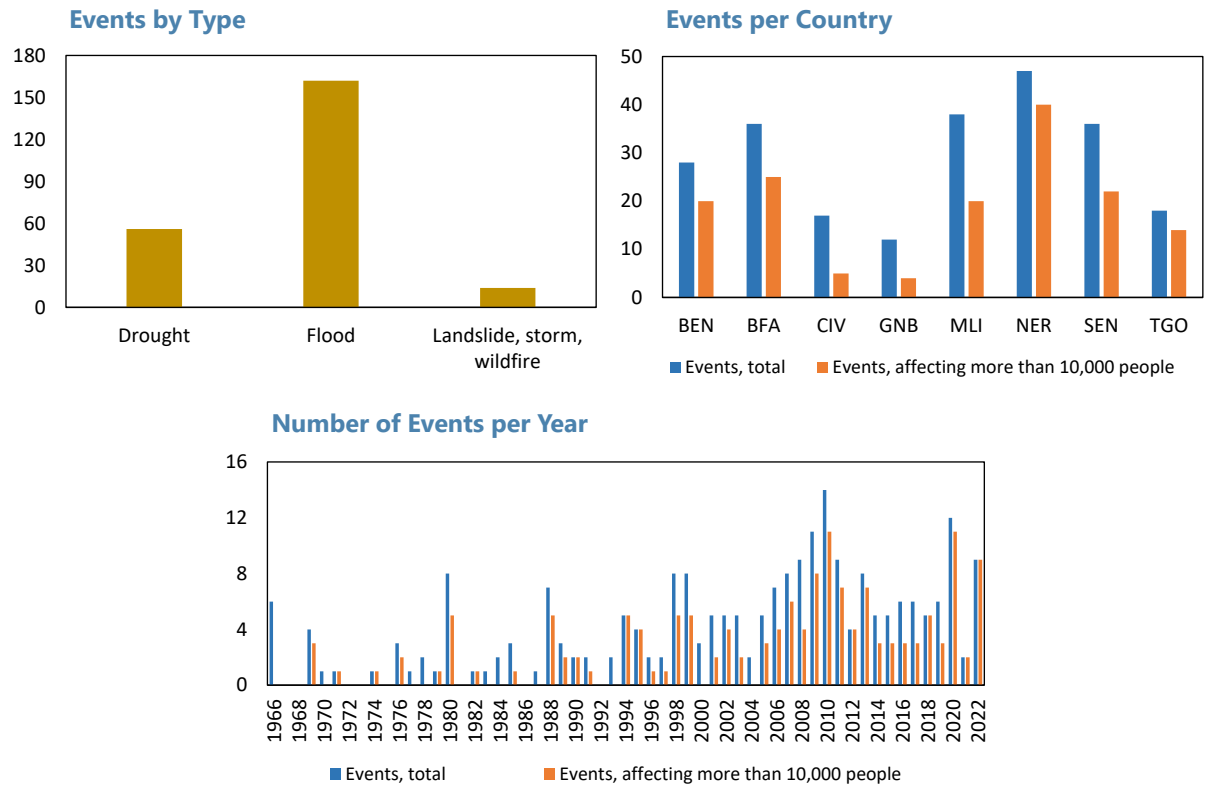
[3] It should also be noted that data on climate-related disasters is generally subject to underreporting.

Figure 1. Temperatures in the WAEMU



Source: World Bank (1901-2021), IMF staff calculations. Vertical lines in the right-hand-side chart indicate one standard deviation interval.

Figure 2. Climate-Related Events in the WAEMU



Source: EM-DAT (1966-2022), IMF staff calculations. Events in EMDAT include drought, flood, landslide, storm and wildfire.

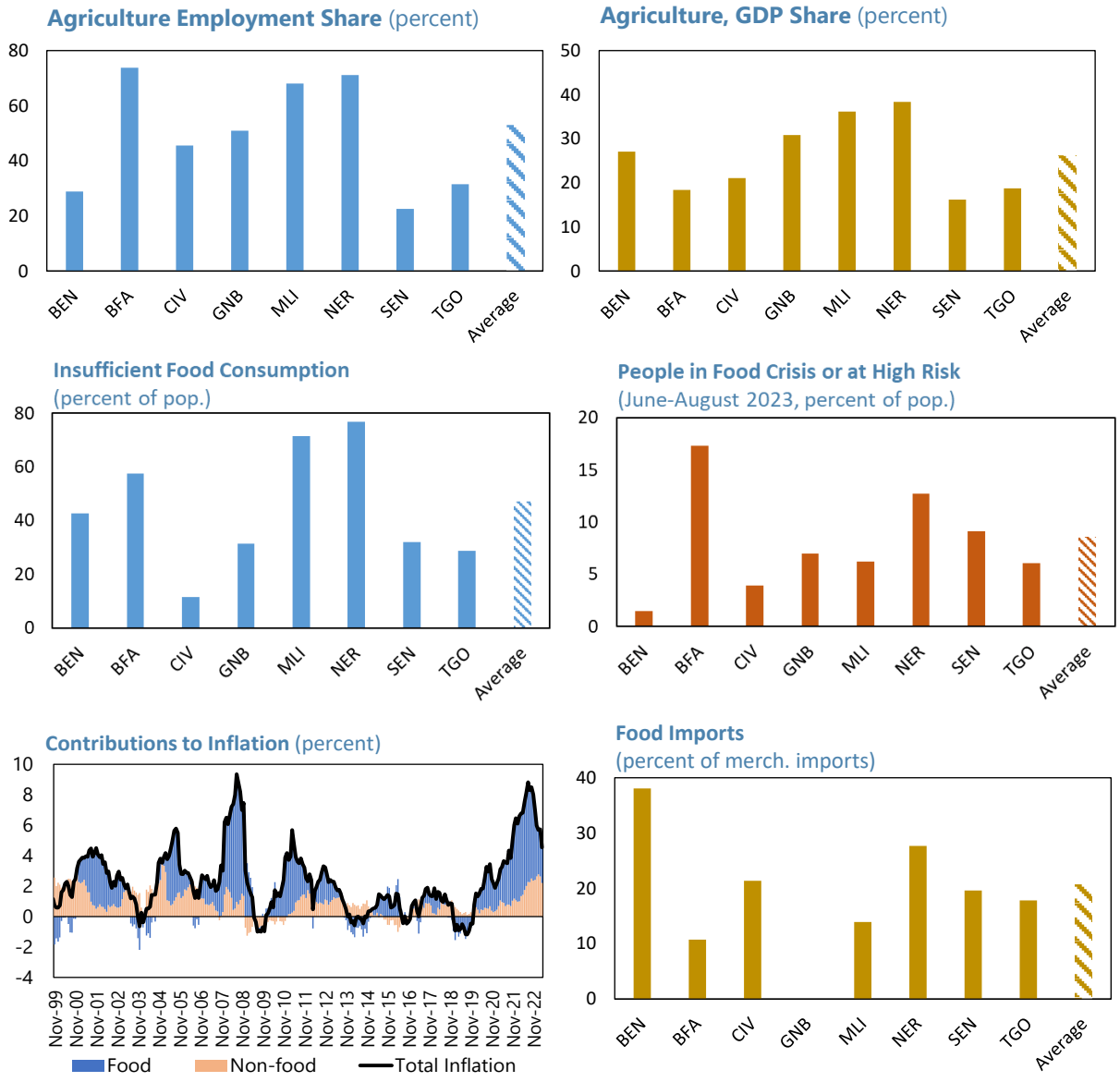
B. Macro-Criticality of Climate Change in the WAEMU

2. Climate change can have particularly large macroeconomic effects in the WAEMU given its high dependence on the agricultural sector. Around 53 percent of the WAEMU population is estimated to depend on agricultural employment, with this rate particularly being high for Burkina Faso, Mali and Niger (Figure 3). The agricultural sector is also a key contributor to the region's GDP (26 percent). The evidence from developing countries suggests that a 1 Celsius increase in temperatures is associated with a 3-percentage points reduction in agricultural production (Dell et al. 2012). Analysis based on sub-Saharan Africa similarly suggests that monthly economic activity in the region would decline by 1 percentage point, if the temperatures go above the long-run average by 0.5 Celsius. This effect is larger relative to developing economies in other regions, reflecting sub-Saharan Africa's limited resilience and coping mechanisms, large agricultural dependence and high sensitivity of its crops to the rainfall (IMF 2020).[4] It is also projected that GDP losses can be as large as 7 percent in Burkina Faso, 11 percent in Mali and 12 percent in Niger by 2050 without any adaptation policies to address the impact of climate change (World Bank 2022). This corresponds to a 3 percent GDP loss in the WAEMU, stemming only from these 3 countries (representing about 30 percent of the regional GDP). Moreover, climate change is estimated to lead to around 30-40 percent loss in the agricultural productivity in the WAEMU countries (Ortiz-Bobea et al. 2021).

3. The effects of both higher temperatures and more frequent floods and droughts on the agricultural production can exacerbate the already high food insecurity in the WAEMU. Survey data suggest that around 47 percent of the WAEMU population faced insufficient food consumption in 2022-23 (Figure 3). Around 9 percent of the WAEMU population (about 11 million people) is estimated to be either facing extreme food crisis or being at risk of it as of mid-2023. Analysis based on sub-Saharan Africa shows that food insecurity intensifies significantly (by 5–20 percentage points) following floods or droughts (IMF 2020). The disruptions to the agricultural production due to rising temperatures and frequent climate-related disasters can also add to inflationary pressures on food products—a major contributor to overall inflation—which further hinders food insecurity. WAEMU countries are also likely to be vulnerable to climate shocks elsewhere in the world regarding food security, since the member states tend to rely heavily on food imports for their consumption needs, and external shocks can restrict global supplies while pushing up the prices of globally traded goods (Table 1).

[4] In addition, Diallo (2023) uses data from household surveys in Niger—the second most agricultural dependent country in the WAEMU (as shown by Figure 3)—and finds that a decline in rainfall lowers the households' income by 11 percent on average. Also, see IMF Mali Selected Issues Paper (2023) for an assessment of climate vulnerabilities in Mali (prepared by Luc Tucker).

Figure 3. Agricultural Production and Food Insecurity in the WAEMU



Source: World Bank, UN, World Food Programme, Food Security Cluster, BCEAO, IMF staff calculations. "Average" reports the population-weighted average in the WAEMU. Data on food imports is not available for GNB.

Table 1. WAEMU: Main Agricultural Products, Exports, and Imports in the WAEMU Countries

Country	Main agricultural products	Main agricultural exports	Main agricultural imports
BEN	Yam, cassava, maize, cotton	Cotton, cashews, pineapple	Rice, meat, fish
BFA	Sorghum, millet, cowpeas, maize, sugar cane, cotton, peanut, sesame seed, rice, cashew nuts, karite	Cotton, cashew nuts, sesame seeds, vegetables	Rice, cereals (wheat, corn)
CIV	Cocoa, cassava, yam	Cocoa, rubber, cashew nuts	Rice, wheat, essential oils, vegetal extracts.
GNB	Cashew, rice, fish	Cashew nuts, fish	Rice, wheat flour, soy oil
MLI	Cotton, cereals (including corn, rice, millet and sorghum), livestock (meat, dairy products)	Cotton, livestock, shelled groundnuts (including karite)	Cereals, sugar, leather
NER	Millet, cowpeas, sorghum, livestock	Onion, cowpeas, livestock	Cereal (rice, millet, maize), palm oil, sugar.
SEN	Millet, rice, corn	Cotton, tomato, green beans	Rice, wheat, milk, soybean
TGO	Cassava (manioc), yams (igname), corn (mais)	Cotton, palm oil, cocoa	Rice, wheat, palm oil

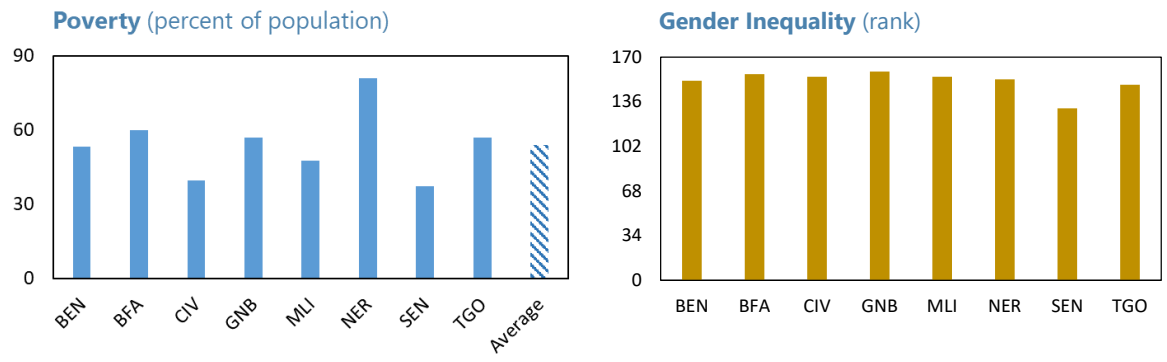
Source: IMF country teams.

4. Together with its adverse impact on growth, climate change can heighten the current pressures on fiscal and external balances. Climate-related shocks lead to a persistent decline in economic growth by around 1 percentage points in sub-Saharan Africa, estimated to be much larger than the impact on developing economies in other regions (IMF 2020). Besides a decline in government revenues driven by lower economic growth in the aftermath of climate-related disasters, those shocks force governments to increase spending due to the damage to the infrastructure, as well as the emerging needs for social and health spending. These pose risks to fiscal sustainability in the WAEMU, and point to the need for rebuilding fiscal buffers. Regarding external balances, foreign financial assistance or remittances following disasters rarely fully offset the drag on external positions from the decline in agricultural exports and the increase in imports for post-disaster reconstruction spending. Consistently, the evidence shows that the countries in sub-Saharan Africa experience an increase in both current account and fiscal deficits following climate-related disasters (IMF 2020).

5. Climate change can hold the WAEMU back from achieving long-term development goals through its long-lasting impact on economic and social outcomes. Climate-related events likely have long-lasting effects on economic growth through several channels such as the damage to infrastructure (IMF 2020). They can also undermine the role of financial development in long-term growth by putting financial stability at risk, to the extent the financial sector is dependent on climate-sensitive sectors, such as agriculture. Poverty and income inequality can be affected by

climate change, given the limited financial buffers, low levels of education, lack of social safety nets, and lack of wide-spread and accessible healthcare, which overall limit the ability of the poor to adapt, making them more prone to food insecurity, income losses, and unemployment (Islam and Winkel 2017) (Figure 4). In addition, climate change likely worsens the WAEMU's already high gender-based disparities, since the burden of disasters is likely to fall on women, due to their roles in the household and possible segregation in the labor market due to gender-based disparities in education (UNDP 2014) (also see the Selected Issues Paper). Climate-related shocks can lead to migration waves (within and across the member states), local conflicts, and social unrest in the region (Diallo and Tapsoba 2022). Finally, the disruptions to the much-needed accumulation of human capital from deaths, malnutrition, or lower school enrollment in the aftermath of disasters pose a drag to economic development (Caruso et al. 2023).

Figure 4. Poverty and Gender Inequality in the WAEMU



Source: World Bank, UN, IMF staff calculations. "Average" reports the population-weighted average in the WAEMU. Poverty reports the headcount ratio at 3.65 USD a day (2017 PPP). The global sample for the gender inequality includes 170 countries

C. Climate Adaption and Financing

6. Efforts regarding climate change typically involve mitigation and adaptation. Generally, for many countries globally, mitigation efforts include (i) reducing greenhouse gas emissions (i.e., transition to a greener economy, for instance, by introducing carbon taxes, or emissions trading), and (ii) alleviating the impact of existing greenhouse gases on climate (e.g., through forestation and other technologies). Adaptation measures consist of (i) building resilience (to address the exposure and vulnerability to climate change), and (ii) enhancing coping mechanisms (such as disaster relief).

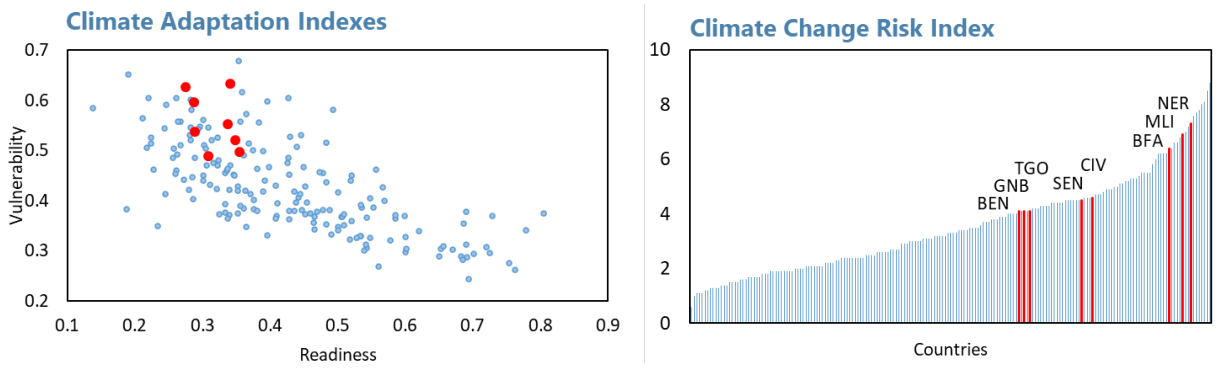
7. In terms of mitigation, the WAEMU can consider stepping up efforts, for instance, through introducing carbon taxes, phasing out energy subsidies, transforming the existing energy sources to green ones, making efforts for reforestation, and implementing necessary regulations to restrict investment in polluting capital.[5] The choice of specific measures in each

[5] It is also important to evaluate the risks to the economy and financial sector associated with such policy options (e.g., see Sever and Perez-Archila (2021) for a review of the risks in financial sector arising from carbon tax).

member state should align with the commitments in the Nationally Determined Contributions (NDCs) and development objectives. In the current juncture, some examples of these policies for the WAEMU countries include phasing out the subsidies for polluting energies (which is a cost-effective mitigation measure) and increasing the share of renewable energy in the energy mix.

8. However, adaptation strategies likely play a greater role in the WAEMU considering its limited impact on global emissions and its immediate needs. Despite being responsible for only about 0.4 percent of global greenhouse gas emissions (according to the data from the Word Bank), WAEMU countries are assessed to be at substantial risk of humanitarian crises led by climate change, with low performance regarding the two key dimensions of adaptation compared to the rest of the world, high vulnerability to climate-related shocks (including an assessment of exposure, sensitivity and adaptive capacity), and high limitations on the readiness to adapt quickly (including an assessment of economic, institutional and social constraints) (Figure 5). In this context, adaptation policies remain crucial in the WAEMU, and also in the rest of the sub-Saharan Africa, since (i) high dependence on climate-sensitive sectors (particularly agriculture) poses immediate needs to safeguard against the effects of climate change, and (ii) rapid implementation of adaptation policies can promote economic growth in the short-term allowing the region to accumulate resources for mitigation policies going forward.

Figure 5. Climate Risks and Adaptation in the WAEMU



Source: ND-GAIN (Notre Dame Global Adaptation Initiative), INFORM, IMF staff calculations. Vulnerability and readiness indexes range between 0 and 1. Higher values of the readiness index (vulnerability index) represent high readiness (high vulnerability). Climate change risk index ranges from 0 to 10, higher values indicating greater risk for humanitarian crises triggered by climate change. Charts report global sample versus WAEMU countries.

9. Although implementing adaptation measures is likely to be more cost-effective and sustainable compared to frequent disaster relief in general, adaptation to climate change is expensive, posing a challenge for the WAEMU countries given current financing pressures and other development needs. Policies for adaptation range from building buffers (such as fiscal and international reserves) and extending the social safety nets to strengthening institutions and frameworks that promote structural transformation aimed at building resilience and enhancing coping mechanisms. Overall, adaptation costs are estimated to be large in general, e.g., in sub-Saharan Africa, around 2-3 percent of regional GDP on average each year over the next decade,

while the cost of inaction is estimated to be even larger, as it will increase the need for frequent disaster relief (IMF 2020). Amid tight financial conditions, current pressures on public and external balances, and the ongoing security and political issues in the region, it is challenging for the WAEMU governments to allocate resources for such spending. Moreover, it is crucial to do so by ensuring that adaptation efforts aimed at addressing the impacts of climate change and the ongoing food insecurity do not crowd out other spending needs in development sectors, such as in education and health.

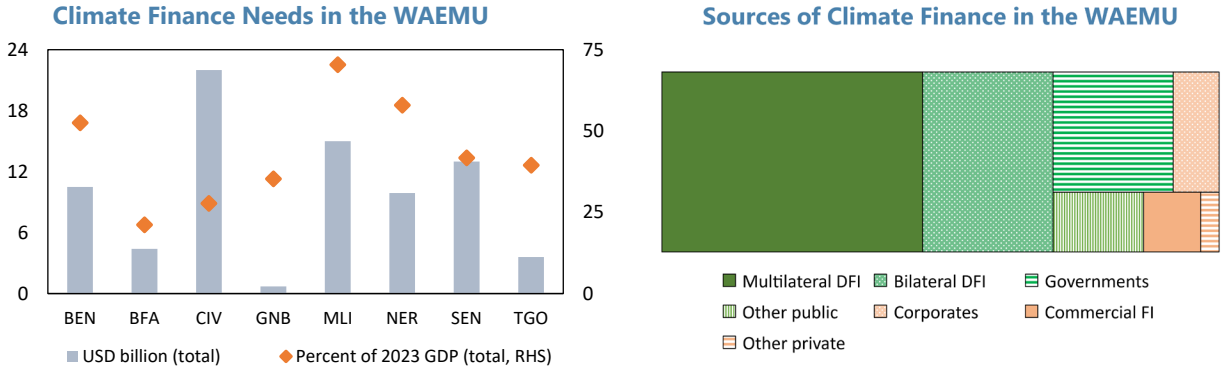
10. Financing options generally include (i) concessional financing, (ii) private finance via climate-linked debt instruments, and (iii) climate-related insurance products (Belianska et al. 2022, IMF 2023). Development partners need to expand support beyond disaster relief and should target building resilience and coping mechanisms (including insurance products). In this context, development partner–financed resilient infrastructure is estimated to achieve the same welfare level as frequent disaster relief, with the associated costs being at least a 30 percent lower (Cantelmo et al. 2019). It is also important that climate finance provided by the international community should be in addition to current aid flows. International financial institutions also have an important role regarding unlocking financing for adaptation via a range of instruments (including loans and guarantees) and by reducing investment risk.

11. Climate financing in the WAEMU remains much lower than the needs, and is dominated by flows from public sources, calling for mobilizing private climate finance to fill the gaps going forward. Implementing nationally determined contributions (NDCs) in the WAEMU is estimated to cost about $79 billion (encompassing both adaptation and mitigation) in total over the medium-term.[6] This corresponds to about 39 percent of the 2023 regional GDP, ranging from 21 to 70 percent of the 2023 GDP across the member states (Figure 6). However, climate finance flows to the WAEMU remain limited compared to the needs estimated above, e.g., about $3.6 billion in 2020 with almost 90 percent of it being from public sources that encompass multilateral development finance institutions (including the World Bank and African Development Bank), bilateral funding and other donors, according to the June 2023 Technical Report by SPARC.[7] Dominance of public sources of climate finance in the WAEMU points to the need for new mechanisms to mobilize private investment, potentially at the regional level, such as making use of green finance, bolstering local and regional debt markets, de-risking approaches (i.e., via blending public and private sector finance), or debt-for-nature swaps. Multilateral development banks and development finance institutions can help design and implement innovative financial instruments to provide risk absorption capacity and to leverage investment by the private sector (IMF 2022). Moreover, reform measures supported by the IMF's Resilience and Sustainability Facility (for Benin and Senegal so far, with Cote d'Ivoire in the pipeline) also aim to attract more private climate finance flows to the region.

[6] Based on the UNFCCC NDC Registry. Available at https://unfccc.int/NDCREG.

[7] However, it is worth noting that tracking private climate finance are subject to some challenges, as explained by the Climate Policy Initiative (CPI) here.

Figure 6. Climate Finance in the WAEMU



Source: World Bank, Country NDCs (Nationally Determined Contributions), CPI (as adopted from the SPARC Report), IMF staff calculations. DFI stands for development finance institutions. Right-hand-side chart illustrates the share of each source in total climate finance in the WAEMU based on the data from 2020. Green colors in the right-hand-side chart represent public resources.

12. Building awareness of the links across adaptation and economic outcomes can be a first step for the WAEMU governments to develop comprehensive strategies. For instance, improved seeds, insecticide, fertilizer, irrigation, and reliable access to electricity and water, are important for adaptation. Better access to finance (to provide financial buffers to the most vulnerable) and telecommunication services (to improve access to early warning systems), and robust housing and sanitation boost the resilience of households to climate-related shocks. Such efforts are found to reduce the likelihood of post-shock food insecurity in sub-Saharan Africa up to 30 percentage points (IMF 2020). Moreover, strong institutions should support the enforcement and effectiveness of the regulations aimed at addressing weather sensitivity of infrastructure and production activities. Improving the social safety nets (e.g., for poorer households and small and medium enterprises) helps the most vulnerable build resilience to climate shocks. The WAEMU can also benefit from climate-relate stress tests to assess the risks from climate change in the financial system. Macroeconomic policies and structural reforms to create fiscal space, build external buffers and promote economic diversification (e.g., addressing high reliance on agriculture) can help the WAEMU not to forgo other development needs while limiting and mitigating the effects of climate shocks.

13. Cooperation and coordination, including at the WAEMU level, should also play a role in the adaptation efforts. Effective adaptation encompasses a continuous process of identifying climate risks, planning of adaptation, implementing necessary measures, and monitoring and evaluating those measures (UNFCCC 2020). An effective operationalization of these stages requires coordination within the government (including across the Ministries of Finance, Agriculture, Education, Environment, and Health, and other agencies responsible for specific infrastructures) and with development partners (IMF 2020). Regional coordination and cooperation remain crucial as well. These can include, but are not limited to, the following:

- Regional guidelines on the appropriate institutional and legal frameworks, as well as the roles and responsibilities of the bodies in charge of adaptation and mitigation measures, can help synchronize efforts with potential synergies across the member states. In this context, capacity building efforts at the WAEMU level can accelerate the implementation of climate strategies at the national levels.

- At the WAEMU level, regional regulations to build resilience can be considered, including launching new directives for setting the standards for climate-resilient public investment management.

- Regional initiatives can also play a key role in overcoming the data limitations which are generally an important impediment to effectively identifying and forecasting climate-related risks and vulnerabilities to inform the adaptation strategy.

- Building on regional data, the next step can be to establish a standardized methodology at the WAEMU-level to assess the magnitude and sectoral distribution of climate finance needs.

- Efforts at the WAEMU level can also include sharing of technologies, expertise, knowledge and institutional practices across the member countries to increase the efficiency and effectiveness of adaptation measures.

- Regional initiatives to facilitate digitalization across the region can help farmers by allowing them to use early warning systems and improving their access to financial resources for adaptation.

- Reforms for greater economic diversification as well as deeper regional (i.e., within the WAEMU) and global trade integration, particularly for agricultural inputs and products and combined with resilient storage and transport infrastructures, can provide new opportunities for the private sector and incentivize climate-resilient investment in agriculture (Baptista et al. 2022).

- Developing regional markets for agricultural products could also lower food prices and help improve food security in the WAEMU.

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