NOVEMBER 2025

POLICY BRIEF

# CLIMATE MITIGATION IS UNDER ATTACK: AFRICA MUST PRIORITIZE ADAPTATION

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PB-60/25

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*Africa today has only one real climate priority: adaptation. Africa should still push the rich countries of the Global North to cut emissions. But Africa should not have any illusions. Past mitigation efforts have had some positive effects but have not been sufficient to stay on track with the targets of the Paris Agreement. There is no reason to believe that future efforts will fare any better. Political developments in the United States and Europe do not augur well for global mitigation efforts. Emissions will most likely remain stable or even increase a little, which means that temperatures will probably continue to rise to nearly 3 degrees Celsius above preindustrial levels by the end of the century. Africa must be prepared for this eventuality. It would be irresponsible not to start preparing now for the worst-case climate scenario.*

*This does not mean that Africa should accept the failure of rich countries to mitigate climate change. It must continue to point out their role in creating the climate crisis and to demand justice. Countries of the North have a moral duty to support adaptation efforts in Africa.*

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# 1. THE WORLD APPEARS TO BE HEADING TO A 3°C TEMPERATURE RISE

According to the World Meteorological Organization (WMO), 2024 was the warmest year on record, with global temperatures exceeding those of 1850-1900 by 1.55°C—above the Paris Agreement's target of 1.5°C. Since the official increase in temperature recorded by the International Panel on Climate Change (IPCC) is based on a twenty-year average, it shows a lower figure of about 1.1 °C above pre-industrial levels. But the trend is clearly upward, and the IPCC's 2023 report offers an alarming picture of the state of climate change.

The IPCC explains that global temperature has a nearly linear relationship with the stock of greenhouse gases (GHGs) in the atmosphere, which I shall measure here in terms of CO2 equivalent (CO2e). This relationship can be represented by the following equation:

$$dT = TCRE * E(cum)/1000$$

Where:

- dT is the CO2e induced temperature change relative to the pre-industrial baseline (1850-1900), measured in degrees Celsius (°C);
- E(cum) is the cumulative CO2e emitted up to that time in gigatons (GtCO2e);
- TCRE is the transient climate response to cumulative CO2e emissions. It measures the temperature change per 1000 GtCO2e. The IPCC's best estimate of the TRCE is 0.45, with a likely range of 0.27-0.63.

The above equation indicates that, since the temperature increase is a function of the stock of CO2e in the atmosphere, rather than the flow of new emissions, the temperature increase of about 1.1°C will remain even if the world immediately moves to net zero emissions. This equation also means that it is possible to reduce global temperatures by moving to negative net carbon emissions—e.g. through reforestation.

The IPCC estimates that historical cumulative net CO2e emissions from 1850 to 2019 were 2400 GtCO2e, plus or minus 10%, together with a TRCE of 0.45. This gives the current estimate of a temperature increase in 2020 of approximately 1.1°C compared to 1850-1900. The accumulation of CO2e in the atmosphere is accelerating as emission levels continue to increase. Of the 2400 GtCO2 of cumulative GHGs, 1400 GtCO2 (58%) was emitted in the 140 years between 1850 and 1989 (about 10 GtCO2e/year on average), while 1000 GtCO2e was emitted in the 30 years between 1990 and 2019 (about 33.3 GtCO2e/year on average).

Table 1:

## Cumulative CO2 Emissions and Temperature Increases in Two Scenarios

| Year | E(cum) actual policies in Gt-CO2e | E(cum) NDCs implemented in GtCO2e | Temp rise actual policies °C | Temp rise NDCs implemented °C |
|---|---|---|---|---|
| 2020 | 2,400 | 2,400 | 1.08 | 1.08 |
| 2030 | 2,970 | 2,900 | 1.34 | 1.30 |
| 2050 | 4,110 | 3,900 | 1.85 | 1.75 |
| 2070 | 5,250 | 4,900 | 2.36 | 2.20 |
| 2100 | 6,960 | 6,400 | 3.13 | 2.88 |

Source: UNEP, IPCC and author's calculations. Note: NDCs = nationally determined contributions.

All plausible future scenarios based on current policies, as well as those based on actual promises by countries to implement stronger mitigation measures, indicate a continuous increase in temperatures to about 3°C, or even more, by the end of the century. Table 1 sets out two scenarios using data on new net emissions from UNEP's 2024 Emissions Gap Report, and a cumulative emissions figure for 2020 of 2,400 Gt of CO2 from the IPCC report (see above). The TCRE used is the midpoint estimate from the IPCC report (0.45). The first scenario (actual policies) uses the same assumption as UNEP (2024) that net emissions continue to increase by about 57 Gt of CO2 every year. As shown in Table 1, this implies a global temperature increase approaching 2°C by 2050 and exceeding 3°C by 2100. If countries actually implement all their emissions pledges, as set out in their nationally determined contributions (NDCs), net emissions would, according to UNEP, decline to about 50 GtCO2e annually. As shown in the table this would lead to only a marginal improvement, as the temperature increase by 2100 would reach 2.88°C instead of 3.13°C (Table 1)[1].

Current NDCs are thus clearly not sufficient[2]. And countries are in any case not implementing their NDCs fully, which makes even the unsatisfactory scenario of a 2.88°C temperature rise by 2100 less likely. To keep the temperature increase below 1.5°C, cumulative emissions should be capped at around 3,300 GtCO2e. The probability of the world limiting emissions to this level seems very low. Faced with this situation, Africa must accelerate adaptation efforts.

The evolution of the stock of emissions is largely beyond the control of Africa. As shown in Table 2, all 54 African Union countries are responsible for only 7% of cumulative emissions. That should be compared to 20% for the U.S., and 12% for both China and the European Union (EU). Africa's share of new emissions is only 6%. That is lower than India (8%), the U.S. (11%), and China (30%). The picture is even more striking if one looks at emissions *per capita*. Africa's *per-capita* emissions were 2.2 tCO2 in 2023, compared to 19 tCO2 for Russia, 18 tCO2 for the U.S., 11 tCO2 for China, 7.2 tCO2 for the EU, and 2.9 tCO2 for India.

1. Other estimates, by, for example, the Climate Action Tracker, show very similar results to those I calculate here.

2. I use here data from the 2024 UNEP report. The World Resources Institute has analyzed the 2025 NDCs that have been submitted so far, concluding that they will make only a modest dent in the emissions gap.

Table 2:

Total and Cumulative CO2 Emissions, 2023

| | Total Emissions in MtCO2 | Share of Total (%) | Cumulative Emissions since 1850-1900 in GtCO2 | Share of Total (%) |
|---|---|---|---|---|
| China | 16,000 | 30 | 300 | 12 |
| USA | 5,970 | 11 | 527 | 20 |
| India | 4,140 | 8 | 83 | 3 |
| EU | 3,230 | 6 | 301 | 12 |
| Russia | 2,660 | 5 | 180 | 7 |
| G20 (excluding African Union) | 40,900 | 77 | 1,990 | 77 |
| African Union | 3,190 | 6 | 174 | 7 |

Source: UNEP (2024).

Looking ahead, Africa's level of emissions is hardly growing. It grew by only 0.7% between 2023 and 2022. This is to be compared with the fast-growing economies of India and China. India's emissions grew by 6.1% and China's grew by 5.2%. Emissions from the U.S. and EU have stabilized at their already high levels. Extrapolating using this data indicates that, as the stock of CO2 in the atmosphere increases to exceed 6,000 GtCO2 by the end of the century, country shares of the stock of emissions will change, with increasing shares for India and China, and declining shares for the U.S. and the EU. Africa's share will also decline further.

China is currently the world's largest GHG emitter. Whatever China does will have a significant impact on the global outcome. China has pledged to reduce emissions by 7%-10% from their peak level by 2035, while *"striving to do better"*. This is much less than what is needed to achieve the Paris climate targets. Carbon Brief (2025) explains that this reduction is not sufficient and that experts were hoping that China would pledge a 30% reduction in emissions. On the other hand, given China's advances in renewables and electric vehicles, it is possible that it will over-achieve against target.

The data and arguments presented here should not be interpreted as saying that the Paris Agreement has failed completely, or that the process of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change is useless. It is important to remember that before the Paris Agreement, the world was heading to a 6°C increase over pre-industrial times. Today, the most likely scenario is about a 3°C increase which, while unsatisfactory, is still half of what was expected before Paris. A lot has been achieved. Currently renewable energy accounts for 90% of added electric capacity worldwide, compared to 50% in 2015, and the use of electric and hybrid vehicles is spreading rapidly. However, those efforts are not enough. African countries must prepare for the consequences of a 3°C temperature rise.

# 2. POPULAR PRESSURE AGAINST CLIMATE MITIGATION POLICIES

The projections presented in section 2, which imply a temperature increase by 2100 of close to 3°C, include future policy measures to reduce emissions that countries have announced and have committed to implement. But will those policies really be implemented? Will the world act to slow the growth rate of emissions, as is assumed in the projections in Table 1? Or will emissions grow even faster than in the past, so that the temperature increase will be even higher than 3°C? The answers to those questions depend largely on the political economy of climate mitigation.

Policies to mitigate climate change are not popular. The costs of the policies are felt immediately. There can be no doubt that the costs are real and often painful. Carbon taxes increase prices right away. Environmental regulations constrain producers and could reduce profits in the short run. Closing coal power plants leads to job losses. The benefits, on the other hand, in terms climate mitigation, are felt only in the long run. They are presented in terms of avoiding a negative outcome, or as making the outcome less negative than it would have been otherwise. The benefits sound very hypothetical and far away.

Consequently, climate-mitigation policies are a hard political sell. People all around the world have mobilized from time to time to stop climate-mitigation policies. Protests have not usually been motivated by climate denial. They have been motivated by the economic and social impact of those policies.

The *gilets jaunes* movement in France was a well-known example of a popular rejection of climate-mitigation policies. The movement was triggered by a decision to raise fuel taxes that were considered regressive. The tax especially targeted diesel fuel, which meant that the poorest rural areas, where people depend on older diesel-powered cars, were hit hardest. It was estimated that this carbon tax weighed five times more heavily on the bottom decile than the top, even though poorer households produce much less carbon than richer households. The scope of the protests, which happened from about mid-2018 to mid-2020, quickly expanded to cover other grievances, and became a general rejection of the French government's liberal economic policies. Protests took place every weekend across France, involving blockades of roads and highways, and marches and sit-ins. They sometimes degenerated into clashes with police, use of tear gas, and property damage in major cities. In the end the French government had to rescind its decision to impose higher carbon taxes on diesel fuel.

European farmer protests are another example of popular rejection of climate-mitigation policies. The EU is considered a leader in the battle against climate change. Under its Green Deal, farmers were required to reduce pesticide and fertilizer usage, keep a portion of their land fallow, and comply with a wide array of nature restoration and habitat-protection regulations. Farmers argued that the Green Deal would lead to lower yields and hence lower farm incomes. They mobilized across Europe. The scope of the protests expanded to include rejection of agriculture import policies, especially targeting imports from Ukraine and a free trade agreement being negotiated with Mercosur. Tractor blockades of roads and highways, and manure dumping outside official buildings, occurred in Belgium, the Czech Republic, France, Germany, the Netherlands, Poland, and Spain. As a result, in March 2024, the European Commission rolled back and simplified green measures, reducing environmental constraints on farmers. The EU's climate ambition for the agriculture sector has been greatly diluted.

South Africa also had to delay and dilute its climate ambitions because of socio-economic pressures that were used by the political opposition. In 2019, South Africa agreed a Just Energy Transition Partnership with international partners to decarbonize the power sector through coal plant retirements with concessional financing. So far, only one older power plant (the Komati Power Station) has been taken offline. As a result of political and social pressures, plans to retire several plants by 2027 and 2030 have been postponed. The delays and postponements can be explained by the immediate social costs of coal plant closures. About 90,000 direct coal mining jobs would be lost if stations were shut down.

Beyond direct employment, a whole web of subcontractors, which rely on coal operations, would have to close, with the implied loss of livelihoods. Moreover, South Africa's coal-powered plants are clustered in one province, Mpumalanga. The province and its municipalities depend on revenue from coal plants. Small enterprises in the region are also dependent on business from the coal plants. In addition to economic losses, plant closures would impact community activities in the region, because the plants finance clubs, schools, and cultural institutions. Hence, opponents of plant closures argued that they would also erode the region's social fabric.

Carbon taxation, which has mostly taken the form of taxes (or removal of subsidies) on hydrocarbons, has also faced resistance in Latin America. Ecuador is a good example. On October 1, 2019, the government of Ecuador announced the removal of subsidies on gasoline and diesel, as part of an austerity package agreed with the International Monetary Fund (IMF). As a result, the price of diesel doubled, and the price of gasoline increased by 25%. This sparked public outrage and led to twelve days of violent protest. The government had to rescind its decision and reinstall the subsidies[3]. In September 2025, the government of Ecuador decided once again to remove the diesel subsidies, triggering more unrest and strikes. However, this time it appears that the government will finally succeed in getting rid of the subsidy.

In Canada, the opposition Conservative Party has been campaigning against the consumer carbon tax introduced by liberal Prime Minister Justin Trudeau in 2018. Their 'axe the tax' slogan gained tremendous popularity. Faced with popular pressure and the risk of losing the 2025 elections, Prime Minister Mark Carney (Trudeau's successor as the head of the Liberal Party), announced on taking office in March 2025 that his government would eliminate the consumer carbon tax. Mr. Carney's Liberal Party won the April 2025 federal election, but it will now be more difficult for Canada to achieve its climate targets.

## 3. THE RISE OF POPULISM AND CLIMATE DENIAL IN THE LARGE EMITTERS

Populist political parties in the Global North have used popular rejection of the short-term socio-economic costs of mitigation policies, in addition to the high financial costs of those policies at a time of tight budget constraints, to expand their support base among the groups most impacted by those policies, and to disseminate a message of climate denial. They have sharply increased their support in rural areas and among blue collar workers, arguing that the elites are using climate change as an excuse to impose harsh policies and taxes on the poorer classes. The rise in inequality around the world has helped their message resonate louder. As a result, the world is seeing the rise of many populist politicians and parties, who promise to end climate-mitigation policies.

3. For more on Ecuador's 2019 experience and lessons learned, see IISD (2019).

Populist leaders have come to power in the United States and in Italy. In both countries they have diluted or rolled back many climate mitigation policies. In other G7 countries—France, the United Kingdom, and Germany—populist parties with anti-mitigation agendas are gaining popularity, and are impacting the debate on climate policies, even without being in power. The picture for climate mitigation and limiting global warming to 1.5°C or 2.0°C is not very encouraging.

President Donald Trump and his MAGA movement are clear in their opposition to climate policies. In his address to the United Nations in September 2025, President Trump said that *"climate change is the greatest con job ever perpetrated in the world,"* and that *"the carbon footprint is a hoax made up by people with evil intentions and they're headed towards a path of total destruction."* He discouraged the production of renewables, which he said were: *"a joke. They don't work. They are too expensive."* President Trump's attack on climate mitigation has gone beyond the borders of the United States. He advised countries around the world to drop green policies, saying *"all green is all bankrupt."* The Trump administration has pressured countries to withdraw support from a global carbon tax on maritime transport. At home, the administration has rolled back tax incentives for wind and solar installations, and for electric vehicles. It has also rolled back regulations that would have made it more expensive to continue operating fossil-fuel plants, and has canceled grants that support renewable energy. As a result, the International Energy Agency lowered its projections for renewable energy production in the United States by 50%.

The Brothers of Italy (*Fratelli d'Italia*) of Prime Minister Giorgia Meloni came to power in Italy after the September 2022 elections with a populist agenda that included diluting climate mitigation policies. Their position on climate is more nuanced than that of President Trump and the MAGA movement in the U.S. They frame the climate agenda in terms of national interest and energy security. They call for a pragmatic approach that balances climate and national economic interest, and consider that the European Green Deal represents *"climate fundamentalism"*. Once in power they changed the name of the Ministry of Ecological Transition to the Ministry of Environment and Energy Security, to signal an emphasis on energy resilience over aggressive decarbonization. They also weakened or delayed many environmental and climate measures.[4]

In France the populist opposition *Rassemblement National (RN)* of Marine LePen has become the largest political party, with a share of about one-third of the total vote. Like its colleagues in Italy, the RN takes a nuanced position and call for *"a commonsense ecology, based on scientific realities, that protects the standard of living of the French people and guarantees national independence."* They also oppose the European Green Deal, which they consider a tool of *"punitive ecology"* that burdens French citizens, and have called on the French government to renounce it. The RN builds a contrast between *"elite climate agendas"* and the *"everyday life of ordinary citizens"*, and opposes measures such as thermal retrofit obligations, low emission zones, and bans on diesel cars on the basis that they penalize ordinary people. They clearly frame climate policy as part of an 'elite vs. people' or 'urban vs. rural' divide.

In the UK, Nigel Farage and his populist Reform UK party have become the de facto main opposition party overtaking the Tories, who remain the formal parliamentary opposition. Polling at 31%, they are even 10 points ahead of the Labor Party, which is currently in power. Farage uses climate skepticism to rally alienated working class and rural voters

4. For example, see Clean Energy Wire (2025)

against *"arrogant urban elites"*. He is against the UK's zero-carbon target which he calls *"lunacy"*, and argues that it would destroy jobs and increase household energy bills. Farage has also said that it is *"absolutely nuts"* to call carbon dioxide a pollutant. Reform UK's policy, therefore, is to do away with all carbon targets, to encourage fossil fuels and tax renewables.

The populist Alternative for Germany (AfD) has become the country's most popular party, polling 26% support. Its stance on climate policies is more extreme than any of the other European parties. It explicitly rejects mainstream climate-mitigation policies, and it continues to challenge the scientific consensus on the drivers of climate change. It frames climate policy as ideological overreach, rather than a scientific and evidence-based necessity. Like other populist parties, it argues that climate regulations are a burden on ordinary citizens, imposed by detached elites.

# 4. DIFFICULTY OF FINANCING CLIMATE-MITIGATION POLICIES

Achieving the targets of the Paris Agreement requires large investments and entails a huge financial cost. The Independent High Level Expert Group on climate finance (IHLEG) estimates global investment requirements of $6.3 trillion to 6.7 trillion per year by 2030. Of this, $2.7 trillion to $2.8 trillion will be in advanced economies, $1.3 trillion to $1.4 trillion in China, and $2.3 trillion to $2.5 trillion in other developing countries.

The discussion in the previous sections indicates that it would be very difficult, maybe even impossible, to raise the financing needed in developed countries, because of citizens' rejection of the short-term social cost associated with climate action, and the rise of populist political parties. In developing countries, the financing is simply not available. Rich countries have made many promises to fund climate action in developing countries, but reality has not kept up with the promises.

Using the mid-point estimate of $2.4 trillion dollars required for developing countries every year, the needs can be broken down into about $1.6 trillion for the clean-energy transition, $0.5 trillion for adaptation and loss and damage, $0.3 trillion for natural capital and sustainable agriculture, and $0.04 trillion for fostering a just transition. It is important to note that the highest investment costs for developing countries are for mitigation, a global public good.

The IHLEG suggests that domestic financing, public as well as private, could cover about $1.4 trillion per year of the required $2.4 trillion. This optimistically assumes that developing countries will be able to increase domestic climate financing by a multiple of 3.6 at a time when they are facing a high debt burden and huge needs in health, education, and social protection. Just as in developed economies, the problem facing developing countries is whether they are willing to sacrifice some of their social and developmental goals to support the global fight against climate change. What is different is that while developed countries contributed to, and are continuing to contribute to, the climate crisis, developing countries (excluding China) have not. This is particularly the case for African countries. Many in developing countries argue that today's rich countries have developed their economies by emitting GHGs into the atmosphere, and therefore they should be the ones paying to clean it up.

Table 3:

## IHLEG Suggestion for the Distribution of Foreign Financing for Climate Measures in Developing Countries ($ billion/year)

| | Actual Gross Flows | Required Flows | Increase |
|---|---|---|---|
| Private financing | 40 | 475 | x 12 |
| Multilateral Banks (MDBs) | 80 | 270 | x 3.4 |
| Bilateral Donors | 40 | 90 | x 2.25 |
| South-South | 20 | 40 | x 2 |
| Other concessional | 10 | 150 | x 15 |

Source: IHLEG and author's calculations.

Table 3 compares the actual level of international climate financing flowing to developing countries (excluding China) with the levels that the IHLEG believes is necessary. It should be noted that actual climate financing flowing to developing countries now is only around $190 billion, which means that the IHLEG assumes a more than five-fold increase in foreign financing to reach $1 trillion.

In the IHLEG scenario, private financing is multiplied by a factor of twelve. It is very difficult to see how this will happen in current circumstances. In 2023, net private financing to developing countries was negative $68 billion. That is, the international private sector took $68 billion more out of developing countries than it put in. The data indicates that it is highly unlikely that gross foreign private financing for climate in developing countries can be multiplied by twelve, unless there is a major structural change, such as the creation of an International Green Bank that would be a public-private partnership, and would focus exclusively on financing private sector mitigation projects in developing countries.

The assumption that financing from bilateral donors will more than double, and that it would be accompanied by a fifteen-fold increase in concessional financing, does not seem realistic either. Despite agreeing in 2024 at the COP29 summit to triple international climate finance, the world's largest donors are now cutting back their support for developing countries. The OECD projects a 9% to 17% reduction in official development assistance (ODA) in 2025. This comes on top of a 9% drop in 2024. For the first time in nearly thirty years, France, Germany, the UK, and the U.S. all cut their ODA in 2024, and have announced further cuts in 2025. ODA in 2027 is projected to fall back to 2020 levels. According to the OECD, sub-Saharan Africa is projected to see a 16% to 28% fall in net bilateral ODA in 2025, following a 2% decline in 2024. Since climate finance is part of ODA, it is hard to see how it could be increased by several multiples while overall ODA is falling.

The IHLEG's assumption of a more than doubling of climate financing from multilateral development banks (MDBs) is clearly very ambitious. It also raises two important questions. First, MDB financing takes the form of loans. Does it make sense to further increase developing countries' debts to finance a global public good such as climate mitigation? This question is even more pertinent because those developing countries, especially African countries, have contributed very little to GHG emissions. Second, since MDB lending resources are finite, increased climate mitigation financing must imply less financing for

other activities, such as health and education. Given the state of poverty in developing countries, and growing international inequality, does it make sense to divert resources away from economic development to finance climate mitigation? Developing countries have always insisted that financing for climate must be additional to development financing. On the other hand, MDBs should increase support for climate-adaptation projects, which are a national, rather than a global, public good, and which contribute to development, in addition to adapting to climate change.

The trillions needed to finance climate mitigation do not appear to be forthcoming. The current government of the largest economy in the world, and historically the largest donor to developing countries, does not believe in climate change. Moreover, it has closed its foreign aid agency. Other rich-country governments face pressure from populist parties, and have more pressing priorities than climate and development. They are diverting money from foreign aid and climate mitigation to defense. Faced with those realities, responsible African policymakers must plan under the assumption that global temperatures will rise by about 3°C above pre-industrial levels by the end of the century. Since ODA is becoming scarcer, Africa should ask its foreign partners to prioritize adaptation.

# 5. THE IMPACT OF CLIMATE CHANGE ON AFRICA[5]

According to the IPCC, Africa is one of the regions most vulnerable to climate change. Temperatures on the continent are projected to rise faster than the global average. If the global temperature increase reaches 3°C above pre-industrial level, temperatures in Africa will be much higher than the average observed during the period 1994-2005. The increase compared to 1994-2005 will be on average 3.3°C in Southern Africa, 2.6°C in Northern Africa, and 2.1°C in the rest of the continent.

Around 25 African cities will have over 150 days per year of extreme heat (temperatures above 40.6°C) at 1.7°C global warming, increasing to 65 cities for 4.4°C. Across Africa, urban population exposure to extreme heat was estimated to be 2-billion-person-days per year on average in 1985-2005. This will increase to 45 billion person-days for 1.7°C of global warming, and 95 billion person-days for 2.9°C.

Rainfall projections are more uncertain and exhibit greater subregional variability than temperature projections. The Mediterranean region of North Africa and Southern Africa will experience declines in precipitation by the end of the century. However, rainfall is likely to increase in Central and Eastern Africa. Africa contains the second largest population living in drylands among all continents. Dryland populations exposed to water stress, heat stress, and desertification are expected to reach 1.3 billion in Africa by the end of the century, if global warming reaches 3°C.

Rising sea levels pose a very serious problem for Africa. Sea levels are projected to increase by at least 40 cm above those in 2000 in a below-2°C scenario, and up to 1 meter by the end of the century in a 4°C warming scenario. Globally, the highest rate of population growth and urbanization is in Africa's coastal zones. The low-lying coastal-zone population of Africa could increase to over 100 million people in 2030, and over 200 million by 2060, relative to 50 million in 2000. Much of this increase will be in informal settlements that are

5. This section relies on the analysis and data in IPCC (2022) and IPCC (2014).

particularly exposed to sea-level rise and storm surges. In addition to the human cost, a high-warming scenario would imply high material costs. The most affected African cities would be Alexandria ($79.4 billion in losses), Abidjan ($32.6 billion in losses), Lomé ($10.7 billion in losses), and Lagos ($6.8 billion in losses).

The risk of flooding will increase, and cyclones will be more intense. Across large African river basins, global warming will lead to an increase in the frequency of flood events with a current return period of 100 years, to one in 21 years at 4°C of warming. Egypt, Nigeria, Sudan, and the Democratic Republic of Congo are in the top 20 countries globally for projected flood damages. While the frequency of cyclones is projected to decrease, their intensity is expected to increase because of the change in sea surface temperatures. The exposure of East Africa's urban population to cyclone hazards will therefore increase, especially for Mozambique.

Climate change will also impact energy and transport infrastructure in Africa. Climate change poses an increased risk to energy security in countries that depend primarily on hydropower, because of the greater variability of rainfall and a drier climate and greater risk of droughts. Higher temperatures, increased flooding, and more intense cyclones will have a major impact on Africa's road infrastructure. The potential cumulative cost to repair and maintain existing roads damaged by climate change has been estimated by the IPCC to be close $250 billion.

Climate change will further worsen Africa's food-security situation by leading to lower crop yields, and a reduction in livestock and fisheries. Global warming will have an overall negative effect on yields of major crops across Africa. Estimated yield losses for sub-Saharan Africa are about 22%, with large variations across crops, from a loss of 2% for sorghum to 35% for wheat by 2050. Loss of livestock under prolonged drought conditions, caused by climate change, is a critical risk given the extensive rangeland that is prone to droughts. This is of particular concern for Northern and Southern Africa, because these two regions are expected to get drier. Fish production, which contributes to about 30% of Africa's animal protein consumption, will also be impacted. The annual landed value of fisheries in the coastal countries in West Africa is projected to fall by some 21%.

Climate change will have an impact on Africa's health outcomes. Hunger and malnutrition could increase because of the decline in food production. Health outcomes will also be affected by changes in temperature and precipitation. Food and waterborne diseases, such as cholera, would increase because of higher temperatures and greater precipitation. Climate change would also impact vector-borne diseases including malaria, rift valley fever, and meningitis.

All of these impacts are projected to add up to an annual loss of 2% to 4% of Africa's GDP by 2040. As usual, the brunt of the loss will be felt by the poor, the most vulnerable, and marginalized communities. About 40% of Africans already live in extreme poverty, and some 20% suffer from undernourishment. Africa cannot afford more GDP losses, more poverty, and more hunger. It needs to adapt fast.

# 6. AFRICA'S ADAPTATION NEEDS

To adapt to climate change, Africa must invest more in data and early warnings, agriculture and water and food security, dryland protection, urban infrastructure, transport and energy infrastructure, and health and social protection. The cost of adaptation will be high, and

could amount to over $100 billion per year. Currently Africa receives only a small fraction of the external finance it needs, most in the form of loans at a time when many African countries face debt distress. The continent's debt service obligations in 2024 amounted to $163 billion.

Reducing human and material losses from severe weather events including floods, droughts, and cyclones requires quality weather data and forecasts, and systems to inform target populations. A 24-hour advance notice of a coming event could reduce damages by as much as 30%. Accurate weather forecasts would ensure that people go to shelters before the arrival of a storm. They would also help farmers decide what and when to plant to increase output, and would inform herders of where to move their livestock to avoid losses. Developing effective ways of reaching communities with the necessary information in a timely manner is at least as important as accessing good data and producing reliable forecasts. Countries have been using messages sent via mobile telephones and radio broadcasts to disseminate information. This also requires investment to increase access to cell and radio services.

Agriculture and food and water security under climate change are major challenges for Africa. Providing farmers and herders with better information will help make African agriculture more resilient, but it is not enough. Africa needs to invest more in climate-smart agriculture. Agricultural research and extension services must be strengthened. There is a need to improve soil management, to develop more drought-resistant crops, and to increase access to fertilizers. More than 80% of Africa's food production comes from rainfed agriculture, which makes the continent's food systems extremely vulnerable to climate shocks. Investments in irrigation and in integrated water-management systems would help reduce this vulnerability.

In addition to increasing agricultural production, food security can be improved by reducing post-harvest losses, and increasing trade in food products. More than one-third of the food produced in Africa is lost because of food spoilage. This could be greatly reduced through investments in better grain silos and in cold storage facilities for fresh produce. Cross-border trade can help increase food availability, while cushioning local markets from the impact of climate shocks. The African Continental Free Trade Agreement (AfCFTA), which supports free trade between African countries, offers an opportunity to open up markets, boost productivity, and improve resilience.

Dryland protection is an important part of any adaptation strategy in Africa. Drylands cover two-thirds of the continent's land area. About 40% of Africa's population, and 60% of its farmlands, are in arid and semi-arid areas. Those drylands are warming at a rate that is double the world average, and they have suffered from decades of land degradation. Hence, there is an urgent need to restore degraded drylands to enhance resilience. The Great Green Wall is an example of the kind of initiative that can be used to restore Africa's drylands. It is an ambitious project, implemented in 22 countries, with the aim of restoring 100 million hectares of degraded land by 2030.

Preparing African cities to deal with climate change and, especially, protecting coastal cities against increases in sea levels, should be high among policymakers' priorities. Providing safe and affordable housing to vulnerable populations living in informal settlements is essential to protect them from the impact of climate change. Meanwhile, cities need to invest in better drainage systems that can deal with severe flooding, and in dependable power grids, while ensuring that all citizens have access to stable electricity.

Protecting coastal cities against rising sea levels requires investment in natural and man-made systems. Coastal wetlands, coral reefs, and mangroves provide nature-based defenses against coastal flooding and storm surges. Africa can learn from the experience of Vietnam in this area. It has planted 160 square kilometers of mangrove forests around the low-lying Ho Chi Minh City to protect it from rising sea levels. In addition to natural defenses, cities can use physical structures such as sea walls, dikes, levies, and flood barriers to protect against rising sea levels. Buildings and infrastructure need to be designed in ways that reduce the impact of coastal flooding. This means retrofitting current buildings, and ensuring that new ones are designed to withstand coastal flooding. This includes measures such as elevation, improved foundation design, and moisture entrapment. Finally, cities need to be prepared to retreat in a planned fashion from high-risk areas—moving people and assets from areas being inundated—as sea levels continue to rise.

Africa will need to adapt its infrastructure to climate change. For roads, this would imply four types of action. First, better spatial planning would position roads where they are less likely to be harmed by the changing climate. Second, engineering solutions should be employed, meaning building roads that are more adapted to higher temperatures, and/or heavier precipitation, depending on the location of the road. Third, better traffic control would, for example, not allow trucks to use the roads at certain times or during weather events. Fourth, better road maintenance systems are needed. For the energy sector, Africa needs to make greater use of its solar resources to produce cost effective and reliable energy.

To reduce the health effects of climate change, Africa needs to improve its health facilities to ensure universal access to healthcare. At the same time, there is a need to improve surveillance and information dissemination, so that people can take precautionary measures in a timely fashion. For example, malaria epidemics are associated with increased rainfall; early warning systems can provide lead time to put appropriate interventions in place to reduce mortality and morbidity before the onslaught of such epidemics. Poor people are more vulnerable to the health impacts of climate change because of their greater exposure and reduced adaptive capacity. Therefore, social protection programs, such as targeted cash transfers, would contribute to adaptation and better health outcomes.

## 7. MOBILIZING MORE FINANCING FOR ADAPTATION IN AFRICA

How much will those investments cost? Using data from African NDCs, the Global Center for Adaptation (GCA) has calculated that Africa needs $70 billion per year in adaptation financing. GCA argues that this figure may underestimate actual needs by as much as 100%, because only 28 out of 54 African countries provided costed estimates for adaptation in their NDCs. Africa only received $14.8 billion of adaptation financing in 2023. Moreover, 53% of adaptation financing came in the form of loans that must be repaid at a time when the continent faces a massive debt problem.

Rich countries need to live up to their promises on climate finance. The big shortfall in adaptation financing for Africa is part of a global trend. According to UNEP, total financing needed for adaptation in developing countries is more than $300 billion per year. However, international public finance flows for adaptation in developing countries amounted to only $26 billion in 2023, down from $28 billion in 2022. Unfortunately, the prospect for increasing ODA is not good. Hence, it is necessary to consider more imaginative solutions.

A possible approach would be to focus on attracting private investment into adaptation projects in developing countries in general, and Africa in particular, and use public funds to provide guarantees and blended finance. Another approach would be to put in place a system of debt for climate swaps, under which African debt would be forgiven on condition that the savings in debt service are used to finance climate adaptation.

Rich countries, which developed their economies by emitting great quantities of GHGs and causing climate change, have a moral duty to help Africa adapt. However, the main responsibility for protecting Africans from the impact of climate change lies with African governments. They need to act in at least four areas. First, all African countries need to include the cost of adaptation in their NDCs. Second, Africans need to develop and cost detailed project plans that are prioritized and can be presented to prospective financiers. Third, Africans need to enhance domestic resource mobilization, and expand their own domestically financed public investment programs. Fourth, reforms of the business environment are needed to attract more private investment into adaptation projects in Africa.

What if President Trump is right and climate change is just a hoax; will all that money and effort be wasted? No. Nearly all the investments needed for adaptation are 'no-regret' investments. They are also needed for development and poverty reduction. Africa needs to improve agricultural productivity and water management, and to strengthen its food systems to deal with hunger and malnutrition. There is also a need to provide safe housing to people living in informal settlements and improve drainage in African cities. Similarly, early warning systems, improving health services, fighting diseases including malaria and cholera, and expanding access to social protection, are necessary under all scenarios.

Adaptation investments are economically viable even if the worst-case scenario of climate change never materializes. On the other hand, if climate scientists are right and Africa is heading into a future of excessively hot temperatures, droughts, flooding, rising sea levels, more intense cyclones, and more vector-borne diseases, failure to invest in adaptation now could be catastrophic.

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Hafez Ghanem – who holds a PhD in Economics from the University of California, Davis – is Senior Fellow at the Policy Center for the New South, a development expert with a large number of academic publications; and more than forty-year experience in policy analysis, project formulation and supervision, and management of multinational institutions. He has worked in over 40 countries in Africa, Europe and Central Asia, Middle East and North Africa, and South East Asia.

Between 2015 and 2022 he was Vice President of the World Bank, initially responsible for the Middle East and North Africa, then for Sub-Saharan Africa and then East and Southern Africa. In this latter capacity he was responsible for developing and implementing the World Bank's strategy in the region, including a nearly $20 billion annual lending program and a large volume of analytical work and policy papers.

During 2012-15 he was a senior fellow in the Global Economy and Development program of the Brookings Institution. His research focused on the Arab countries in transition: Egypt, Jordan, Libya, Morocco, Tunisia and Yemen. He continues his connection with Brookings as a Nonresident Senior Fellow.

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