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## 5 A view from Africa

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*Compared with other continents, Africa has contributed the least to climate change, while its impacts on the continent have been and will continue to be the greatest in the future. Africa generally has the least capacity to adapt. Thus, it should be the continent with the most interest in addressing the climate change problem and would benefit the most if the problem were to be addressed successfully through global cooperation. As Africa is growing fast, starting from a low base, this is also an opportunity to develop a climate-friendly infrastructure. Achieving the required mitigation and adaptation objectives will require external financial support. Given the difficulty of achieving an efficient and equitable solution to this global problem, African countries need to work towards the conclusion of a feasible, inclusive, effective and equitable climate agreement that considers Africa's situation in the identification of mitigation and adaptation options. Addressing climate fund governance issues and increasing the availability of climate funds will be key to success. Africa should also be supported in capacity building, technology development and transfer, and institutional reform. Meeting these objectives will require efforts at the global, national and local government levels.*

In this chapter, I present a view from Africa of how I see the climate change problem and the role that African countries should play in addressing it. Section 1 compares Africa with other continents in terms of contributions to climate change, of vulnerability to extreme temperature rise and of expected damages in the coming decades. Section 2 deals with the role Africa can be expected to play in mitigation and the steps to be taken for adaptation. Section 3 deals with the required financing and criteria for its allocation. Section 4 concludes.

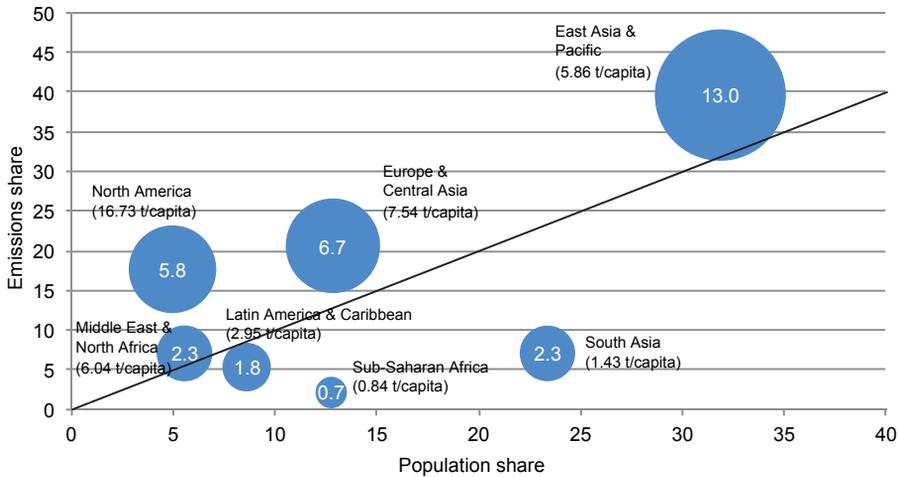
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## **1 Africa and climate change**

Evidence concurs that, compared with other continents, the impact of climate change on Africa (as a share of GDP) is generally the greatest and the continent generally has the least capacity to adapt (AfDB 2011, IPCC 2014, Mekonnen 2014). In spite of shortcomings in the estimates of impacts for various reasons including data limitations, a review of estimates suggests that “Africa stands to lose between 2-4% of its GDP due to climate change over the coming ten to fifty years” (Mekonnen 2014, citing Nordhaus and Boyer 2000, Tol 2002a and 2002b, Watkiss et al. 2010). Deeper consideration of the effects of climate change on poverty and income distribution also reveals that the poorer people in Africa would suffer even more (Hallegatte et al. 2015). For example, citing Winsemius (2015), Hallegatte et al. (2015) note that when large-scale floods hit the Shire River Basin in Malawi in January 2015, the poorest areas were the most exposed. In spite of progress over the last 15 years, with a poverty headcount (below US\$1.25 per capita per day in 2011 at 2005 prices) of 41%, Africa’s poverty rate is more than 20 percentage points higher than that of South Asia, and East Asia and the Pacific (Corneille et al. 2015).

On the other hand, relative to other continents and to the developed world in particular, Africa has contributed very little to climate change. Supposing that convergence towards equal CO<sub>2</sub> emission shares per capita is a relevant indicator, Figure 1 shows that Africa makes the lowest absolute contribution and, with 0.84t/capita, has the lowest per capita emissions. Also Africa is furthest below the 45° line, an indication of its low contribution in relative terms. The continent’s low emissions share also indicates that, even if the costs of abatement are low relative to other regions, its contribution will necessarily be marginal relative to the mitigation task especially if, as in Figure 1, emissions related to land use and livestock are not included.

**Figure 1** CO<sub>2</sub> emissions from fossil fuels and manufacture of cement by regions, 2011



Notes: Numbers in blue circles are in Gt and blue circles show position of region relative to 45° line

Source: Author's calculation from World Development Indicators 2015

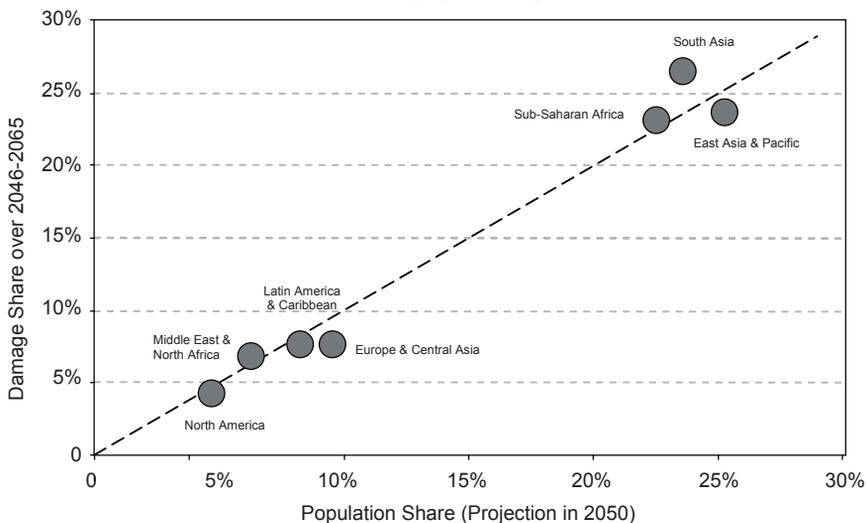
Because of its geography, Africa is also likely to be the region most strongly affected by climate change. About 43% of Africa's land area, 70% of its cropland, 80% of its livestock holdings and 50% of its population are already in drylands (including arid, semi-arid and dry-humid areas) (Cervigni and Morris 2015). African countries' projected reduction in agricultural yields due to climate change could be as high as 50% by 2020 (Boko et al. 2007, p. 435). As discussed below, the temperature is already high in most of Africa; projected above average increases in temperature for the continent due to climate change, combined with limited capacity to adjust, imply that adaptation is a huge challenge for Africa.

Using panel data over a 50-year period, Dell et al. (2012) estimate that a temperature of 1°C higher relative to trend in a given year reduces per capita income by 1.4%, but this holds only for poor countries. When the model is estimated with lags, this large effect is not reversed when the temperature shock is over, suggesting a negative effect on growth from the lower resilience in poor countries.

Predicted temperature changes can be used to estimate potential damage across continents. Drawing on Sauter et al. (2015), Figure 2 gives a very rough estimate of

the potential geographical damage from excessive heat towards mid-century using the A2 scenario from Randall et al. (2007). The estimate draws on projected extreme temperatures, viewing the planet as grid with 1° degree latitude and longitude intervals, where extreme temperatures are defined as the number of days when temperatures are above the 90th percentile of the temperature distribution, and the distribution of damage costs is simply the projected population share times the above measure of extreme temperature. While the estimate is rough because the population shares on the grid are for 2008, it is clear that damage costs are projected to be highest in Africa, South Asia, and East Asia and the Pacific, and above the respective population shares for South Asia and sub-Saharan Africa.

**Figure 2** Potential damage share and population projections in 2050, by region



Source: Author's calculation adapted from Sauter et al. (2015).

Summarising Africa's predicament, the latest report by the Africa Progress Panel (2015) states that "[n]o region has done less to contribute to the climate crisis, but no region will pay a higher price for failure to tackle it." The report also notes that "Africa is already experiencing earlier, more severe and more damaging impacts of climate change than other parts of the world".

## **2 Africa's role in adaptation and mitigation**

African countries are starting to address climate change in their domestic policies (Federal Democratic Republic of Ethiopia 2011, Republic of Rwanda 2011). The removal of subsidies on fossil fuels is a prime example of a policy with multiple gains. Though this is politically sensitive, research in developing countries has shown that such an action may not hurt the poor (Stern 2011, Mekonnen et al. 2013). Ex ante measures, such as strengthening early warning systems and weather-indexed insurance in agriculture, are also important domestic policy measures to consider (see the chapter by Hallegatte et al. in this book).

Africa's recent fast growth is an opportunity to avoid a development path relying on old, high-carbon technologies. This will contribute both to mitigation and adaptation. Starting from a low infrastructure base is also a late-comer advantage. This is particularly important for Africa, where the urban population is expected to triple by mid-century. In his chapter in this book, Bigio notes that emerging cities and small urban areas in developing countries – of which there are many in Africa – that are starting from a primitive infrastructure base have the greatest potential for avoiding lock-in to long-lived, high-carbon urban infrastructure. As Africa is expected to continue growing rapidly, the opportunity is there to invest in activities that are climate friendly.

Such a development path requires leapfrogging into modern technologies including reliance on clean renewable energy technologies such as hydropower, solar and wind, for which there is a huge potential in Africa. The costs of technologies to enable the use of renewable energy sources such as solar and wind are going down. If assisted by measures that keep a significant amount of fossil fuels unextracted, as suggested by Collier (2015) in his chapter in this book, the shift to clean renewable energy technologies would be faster, although, as noted below, this poses a problem of burden sharing. There are also opportunities for Africa in other areas – such as forestry and agriculture – where development, mitigation and adaptation could be combined.

Such a strategy will provide several climate-related benefits. First, the construction of infrastructure will be less carbon-intensive (e.g. cook stoves with higher thermal efficiency; see the chapter by Kaudia in this book). Second, the operation of that infrastructure will also be less carbon-intensive. Third, the infrastructure will be better

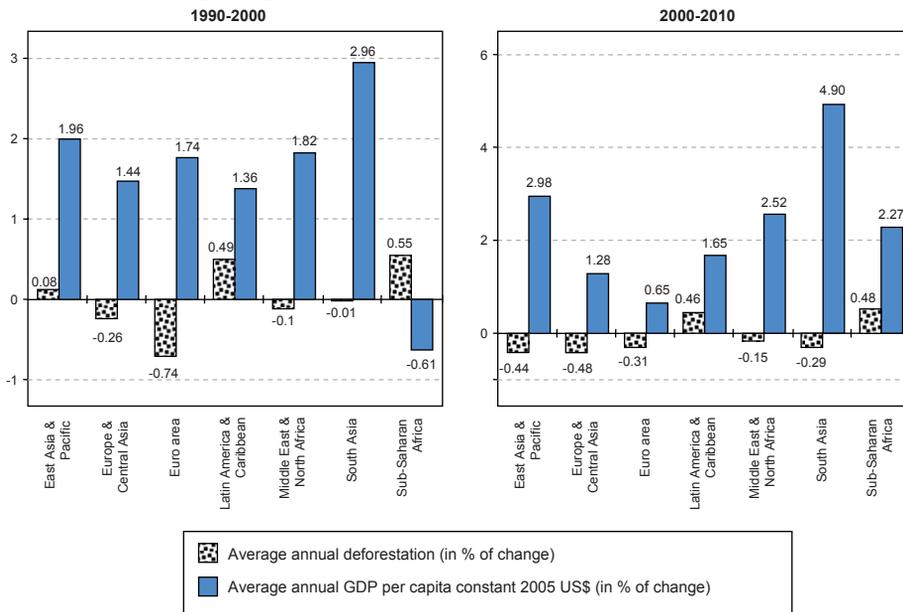
adapted for temperature rise. Fourth, there will be co-benefits in terms of improved health and livelihoods in general.

Mitigation being a global rather than national public good, it is globally beneficial if mitigation takes place where it is least costly. As discussed by McKinsey (2009), GRICCE (2009) and the World Bank (2010), Africa has negative or only small abatement costs for a number of mitigation options. The most important area for mitigation for Africa is forestry, but it has been excluded from the Kyoto Protocol and hence from the Clean Development Mechanism (CDM), the main instrument for increasing the efficiency of mitigation activities.

Africa has not participated much in mitigation activities under the Kyoto Protocol as the Clean Development Mechanism was not adapted to Africa's situation, not only because activities avoiding deforestation were not allowed, but also because the requirements for qualification were too stringent for African countries. Of the 8,592 CDM projects submitted and registered over the period 2004-2015, the bulk (6,343, or 74%) went to China, India, Mexico and Malaysia, and only 238 (2.8%) to Africa. An analysis of the determinants of qualifying projects shows that high tariffs on environmental goods imports and burdensome procedures to start a business were negatively associated with the likelihood of a technology transfer (Schmid 2012). Proposed reforms to increase participation in CDM projects by African countries would include mitigation in forestry, agriculture, and other land use projects (ACPC 2011, Haites 2011, Gebreegziabher et al. 2012).

Regarding GHGs, by 2030, Africa's comparatively low-cost mitigation potential is estimated to be close to two-thirds, or 2.8 GtCO<sub>2</sub>e, of its projected GHG emissions under a business-as-usual scenario (4.2 GtCO<sub>2</sub>e) (McKinsey 2009, exhibit 3.2.1). GRICCE also suggests that mitigation in Africa could focus on forestry (including REDD+, afforestation/reforestation and forest management), agriculture (including restoration of degraded land and reduced tillage) and energy (including hydropower, solar power, and energy efficiency programs), as well as transport. As shown in Figure 3, during the 1990s Europe reforested, and South Asia experienced an average per capita growth of 2.9% while avoiding deforestation. On the other hand, Africa experienced negative growth and the highest rate of deforestation. In the next decade, Africa's growth picked up, but deforestation continued at a similar rate to the previous decade.

**Figure 3** GDP per capita and deforestation (decadal averages)



Note: Negative values correspond to reforestation rates.

Source: Author's calculation using deforestation rates from Food and Agriculture Organization, Global Forest Resources Assessment and GDP per capita (constant 2005 US dollars) from the World Bank.

As discussed by Angelsen in his chapter in this book, there are local benefits from good management of forests, but given the multiple values of land-use conversion for local communities, financial incentives should be provided to compensate for the global benefits resulting from successful implementation of REDD+, as urged by the 'Lima Challenge' signed by 14 tropical forest countries, including the Democratic Republic of Congo, Ethiopia and Liberia.

As of August 2015, three African countries, Gabon, Kenya and Ethiopia had submitted their INDCs. Ethiopia's INDC includes reducing GHG emissions in 2030 by 64% compared with a BAU scenario, assuming sustained double digit growth in the economy up to 2030. If the assumption of growth at or above 10% for such a long period is realistic, this would be an example of very significant intended action by an African Least Developed Country (LDC), as the required investment is projected to be over US\$150 billion by 2030.

### **3 Financing requirements in response to climate change**

Of the 48 LDCs, 34 are in Africa. This category is highly vulnerable to natural and external economic shocks. As forcefully argued by Guillaumont in his chapter in this book, concessional funding should be formula-based and the allocation of funds should take into account a country's vulnerability. This implies that Africa should be receiving a sizable share of concessional financing for the Sustainable Development Goals (SDGs) recently agreed by the UN. Such a formula-based approach towards allocating funds should also be applied to climate funds, taking into account vulnerability to climate change. This would lend transparency and address the issue of equity in the allocation of funds.

Though insufficient, recent efforts to increase the relative importance of adaptation funding are to be commended. These include the Green Climate Fund's decision to allocate 50% of funds for adaptation and 50% for mitigation, which should be maintained. Unlike mitigation, the benefits of adaptation go to those who are adapting and are specific to a country, or even to a locality within a country. Using such criteria for the allocation of funds to adaptation would serve several purposes, including reducing transaction costs, supporting a results-based agenda based on measurable yardsticks, and supporting mutual accountability through transparency in allocations (Barr et al. 2010, World Bank 2010, Mekonnen 2014).

As has been learned from the aid evaluation experience, where multiple sources of financing and competition among donors hindered evaluation, facing the problems of fragmentation in climate funding will require commitment by donors and recipients alike to incorporate the key tenets of ownership, alignment, harmonisation, results orientation, and mutual accountability into their development activities (World Bank 2010). Recent developments in this regard, with the establishment of the Green Climate Fund (GCF), should be strengthened (Bird et al. 2011). For example, this could help address issues of fragmentation. At the regional and country levels, this requires strong leadership, capacity building/strengthening, good governance and institutional reforms.

In a new global deal on climate change, more attention also needs to be paid to issues of power, responsibility and accountability between recipient and traditional contributor countries (Ballesteros et al. 2010). This would involve introducing a power balance

while also ensuring that developing countries take responsibility and are accountable. A complementary source of transfer, proposed by Collier in his chapter in this book, could be to proceed with staggered closing of coal mines, starting with developed countries (i.e. the US, Germany and Australia) while not freezing new carbon discovery in low-income countries (about 80% of known coal reserves should stay stranded to reach the 20 target). Not only is controlling carbon emissions easier at the point of extraction than at the point of consumption, and developed countries would move first, but oil producers in developed countries would also have to buy rights for increasing emissions in coal mines in middle-income countries that would be scheduled to close. At the same time, low-income producers would have more time to close and capture some rents, and low-income users could exploit alternative sources of energy. Bottlenecks and power shortages are estimated to cost Africa 2-4% of GDP annually (Africa Progress Report 2015).

#### **4 Concluding remarks**

Africa is still the poorest continent, with a poverty rate double that of the next poorest regions in the world (South Asia, and East Asian and the Pacific). Since the poor are generally the most vulnerable to climate change, as they have limited capacity to adapt, Africa has the greatest need to carry out adaptation activities, which will require financing beyond that available domestically. Africa is also the continent that has contributed the least to climate change, while it is the continent that will be the most severely affected by global warming. External funding will be needed to carry out adaptation and mitigation activities. Because Africa is also characterised by a great degree of heterogeneity across geographical, economic and institutional dimensions, indicators of vulnerability to climate change should be used to allocate external funds.

Beyond these general observations, for a start, actions such as REDD+ should be supported financially by the international community. This is a clear potential 'win-win' situation because, if properly designed, these actions provide global benefits including to the countries participating if the financial compensation is adequate, as suggested by Angelsen in his chapter in this book. In this regard, while Ethiopia, Liberia and the Republic of Congo are signatories to the Lima Challenge involving 14 tropical-forest countries, greater participation by other African countries should be encouraged.

In general, African countries should work more closely towards ensuring commitment to financial and technical support for low-income countries. As indicated in other contributions to this book, together African countries need to exert pressure on the global community to commit to reducing emissions by a 'sufficient amount' (keeping global warming within the 2°C threshold) with compliance mechanisms that should be enforced (see the chapters by Flannery and Wiener in this book). Individually, African countries should work towards addressing the climate change problem by designing appropriate policies, strategies and policy instruments, and implementing them. This should include paying attention to institutional reforms, policy reform, capacity building, research and good governance. Examples of measures that could be taken in the near future and that are beneficial in addressing climate change include the removal of fossil fuel subsidies, land use policies, and increasing the share of renewable energy.

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