Addressing Mitigation of and Adaptation to Climate Change in Sub-Saharan Africa While Meeting Development Goals

Romy Chevallier[1]

The impact of climate change will fall disproportionately on the world's poorest countries, many of them in Africa. Poor people already live on the front lines of pollution, disaster and the degradation of resources and land. For them, adaptation is a matter of sheer survival.

Former UN Secretary-General Kofi Annan,
addressing the 12th Conference of Parties, UNFCCC,[2] Nairobi,
15 November 2006

Africa's vulnerability to climate change

Africa is among the regions of the world that are most vulnerable to the adverse impacts of climate change,[3] as two-thirds of the continent is dependent on rain-fed agriculture. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) has predicted that by 2020, between 75 and 250 million Africans will experience climate-induced water stress and a consequent insecurity of supply.[4] As a result, agricultural production will fall significantly, and in some countries the length of growing seasons and the yield potential of rain-fed agriculture will be reduced by up to 50%. Other negative consequences of climate change for sub-Saharan Africa will include a decrease in overall fishing stocks (for example in Lakes Malawi and Tanganyika); rising sea levels that will affect low-lying areas (such as the Maldives, the Seychelles and the delta region of Egypt); and the spread of diseases such as malaria into areas that had previously been exempt (like the highlands of Ethiopia, Tanzania and Rwanda).[5]

Table 1: Sectors vulnerable to climate change	
Agricultural productivity and food security	By 2050 African countries could see their agricultural yields decrease by up to 50%. By 2100 they could also see net crop revenues fall by as much as 90%.
Water stress and insecurity	By 2020 an additional 75–250 million people in Africa could be exposed to increased water stress.
Rising sea levels and exposure to catastrophic climate disasters	By 2080, 70 million people and 30% of Africa's coastal infrastructure could face risk of coastal flooding. In Kenya, for example, a one-metre sea level rise would cause the loss of/damage to mango, cashew nut and coconut crops worth nearly $500 million. An estimated 6 million people in lower Egypt could also be affected by flooding.
Human health	By 2050 Ethiopia, Rwanda and Burundi could experience incursions of malaria. In total, an additional 260–320 million people could be living in malaria-infested areas by 2080.
Ecosystems and biodiversity	Studies predict that 25–40% of mammal species could become endangered or extinct by 2080.

Source: United Nations Development Programme (UNDP), 'Fighting climate change: Human solidarity in a divided world', *Human Development Report 2007/08*. New York: Palgrave Macmillan, 2007, pp. 18–19; and <http://www.data.org/issues/climate_change_and_africa_012408.html>, 2007, accessed on 24 January 2008.

Experts emphasise that the risk of climate change is particularly high in Africa, because of its meteorological character (which makes extreme forms of weather activity more likely) and the underdevelopment of many of its countries. Many African states have insufficient financial and institutional capacity to cope with the negative impacts associated with climate change, let alone to adapt to rapidly altering conditions. According to the IPCC, '[n]on-climate stresses can increase vulnerability to climate change by reducing resilience, and can also reduce adaptative capacity because of resource deployment to competing needs'.[6]

Climate variability therefore threatens to destroy the foundations of African economies and the livelihoods of millions of people. For this reason, it is necessary, first, to consider climate change in the context of socio-economic development, and further to point out the interconnectedness between climate change and development in sub-Saharan Africa. Investment in improving socio-economic conditions by adopting measures to boost health, education and social welfare makes vulnerable communities more resilient and thus more able to adapt to the altered conditions brought about by climate change. It can

also bring about a rise in income levels, which in turn can create the fiscal space needed by a government to meet additional demands on public spending, both on climate-related public goods (such as weather forecasting and sea defences) and on programmes to protect those aspects of the country's existing services that are affected by climate change (including healthcare, infrastructure and water supply systems).

Responding to climate change in Africa: Global mitigation initiatives

The international community has presented a programme to reduce the negative impacts of climate change in Africa that requires simultaneous action on two fronts: mitigation and adaptation.

1) The emission of greenhouse gases (GHG) by industrialised and emerging economies must be *mitigated*.[7] The atmospheric concentration of carbon dioxide is higher at present than it has been for 800 000 years. These levels will continue to rise if countries continue to practise 'business as usual' behaviour. On the other hand, the extent of their commitment to mitigation will determine whether dangerous climate change can be avoided in the future.

   There are numerous ways to reduce carbon dioxide emissions. These include an increased use of renewable sources of energy and clean technologies, and concerted action to prevent deforestation and land degradation.

2) Mitigation efforts must be complemented by *adaptation*[8] measures. These refer to various means to address the vulnerability of developing countries to climatic changes and the associated effects, both in the present and the future. It must be noted, particularly within the African context, that a country's vulnerability depends not only on climate variability itself, but also on its government's ability to increase efficiency in the usage of natural resources and energy supplies. Financial, technical and institutional support and capacity building are often needed to assist poor nations to switch to more sustainable development pathways.

   Discourse on climate change mitigation and adaptation has yet to reach maturity in Africa. Currently, discussions focus mainly on the mitigation efforts of the industrial North, and pay scant attention to the adaptation policies all players across the world will have to implement. There are a number of reasons for this short-sighted approach, but all hamper the gathering of political momentum necessary to support the actual realisation of mitigation and adaptation programmes in Africa.

Before a proactive and comprehensive climate change agenda can become a priority to the continent's leaders, it is important to counter the perception

that climate change obligations are in tension with development objectives. Electricity produced from fossil fuels (such as coal, which is found in relative abundance in many African countries) produces high GHG emissions, but provides power at a comparatively low cost.[9] South Africa's most profitable sectors are, for example, highly carbon-intensive,[10] and the country uses coal for about 50% of its electricity production. Changing South Africa's development path to one that is more carbon-efficient would be extremely costly.

This apparent conflict between the needs of addressing climate change and fostering development objectives therefore presents a dilemma for democratic governance in Africa, as the body politic in each country will have to agree to pay hefty initial costs for mitigation and adaptation programmes, with a view to reaping long-term gains. This will require that African leaders look beyond electoral cycles.

Barriers to Africa's support of mitigation

The contribution of Africa's current and historical GHG emission levels to the global total is negligible. While representing 11% of the world's population, the continent is responsible for less than 3% of the sum of fossil fuel emissions. The majority of Africa's emissions derive from the energy and transport sectors, both of which are essential to sustaining the continent's economic development. The G8 countries, on the other hand, are home to 13% of the earth's population, but account for over 40% of GHG emissions.[11]

> The US state of Texas, with only 23 million inhabitants, emits more carbon dioxide than all of sub-Saharan Africa's countries combined. The annual per capita emission of carbon dioxide in sub-Saharan Africa is approximately one million tonnes (2004 figure).[12] In comparison, the equivalent in Germany alone is 10 times as high.

Bearing in mind the disproportion in these statistics and the 'polluter pays' principle, African governments are increasingly reluctant to adhere to stringent mitigation requirements. Critics of the mitigation regime point out that historically it was the uncontrolled use of fossil fuels that placed the industries of the North on the high road to development, and that Africa has not enjoyed similar opportunities to bring about cost-effective industrialisation and economic growth. According to Table 2, the only African country to feature in the ranking of the top 12 global GHG producers (as a share of the world's total) is South Africa. In a list of the 30 countries that produce the highest level of carbon dioxide emissions globally, there are only three African countries: South Africa (12th), Algeria (25th) and Egypt (28th).

Table 2: Top 12 carbon dioxide emitters, 2004			
Rank	**Country**	**Total emissions (million tonnes of CO_2)**	**Share of world total (%)**
1	United States	6 046	20.9
2	China	5 007	17.3
3	Russian Federation	1 524	5.3
4	India	1 342	4.6
5	Japan	1 257	4.3
6	Germany	808	2.8
7	Canada	639	2.2
8	United Kingdom	587	2.0
9	South Korea	465	1.6
10	Italy	450	1.6
11	Mexico	438	1.5
12	South Africa	437	1.5

Source: UNDP, *op. cit.*, Appendix, table, p. 31.

However, despite the argument given above, climate change poses a global challenge that requires a collective and long-term response, not only from all conspicuously polluting nations but others as well. It is particularly important that emerging (developing) economies accept and pursue common but differentiated mitigation responsibilities. Global carbon dioxide levels have risen rapidly in recent years, and emerging countries are now producing more than 50% of global carbon dioxide emissions (2007 figure).[13] According to the Netherlands Environmental Assessment Agency, China is currently responsible for nearly a fifth of global emissions, and by 2010 will become the world's largest contributor to GHG emissions.[14]

The unequal distribution of high carbon dioxide emitters across the world is also applicable to the African continent. Of the 53 countries in the African Union (AU), 95% of carbon dioxide emissions emanate from only 15 member states. These include Nigeria and Angola, which are members of the Organisation of Petroleum Exporting Countries (in the Niger Delta, 100 million tonnes of carbon dioxide are emitted from gas flaring every year), and agrarian economies such as Ethiopia and Ghana. South Africa is responsible for 39% of emissions on the continent,[15] and on a per capita basis[16] is one of the greatest sources of pollution in the developing world. South Africa's power generation from coal is responsible for approximately 350 million tonnes of carbon dioxide emissions per year.[17]

Table 3: Carbon dioxide emissions in Africa, 1990–2004

		CO_2 emissions, total (millions of tonnes)		CO_2 emissions per capita (tonnes)	
	Country	**1990**	**2004**	**1990**	**2004**
1	South Africa	331.8	436.8	9.1	9.8
2	Algeria	77.0	193.9	3.0	5.5
3	Egypt	75.4	158.1	1.5	2.3
4	Nigeria	45.3	114.0	0.5	0.9
5	Libyan Arab Jamahiriya	37.8	59.9	9.1	9.3
6	Morocco	23.5	41.1	1.0	1.4
7	Yemen	10.1	21.1	0.9	1.0
8	Zimbabwe	16.6	10.6	1.6	0.8
9	Kenya	5.8	10.6	0.3	0.3
10	Sudan	5.4	10.4	0.2	0.3
11	Ethiopia	3.0	8.0	0.1	0.1
12	Angola	4.6	7.9	0.5	0.7
13	Ghana	3.8	7.2	0.3	0.3
14	Equatorial Guinea	0.1	5.4	0.3	10.5
15	Senegal	3.1	5.0	0.4	0.4
16	Tanzania	2.3	4.3	0.1	0.1
17	Botswana	2.2	4.3	1.7	2.4
18	Seychelles	0.1	0.5	1.6	6.7

Source: UNDP, *op. cit.*, 'Indicators: CO_2 emissions, total (Mt CO_2)', <http://hdrstats.undp.org/indicators/232.html>; and 'Indicators: CO_2 emissions per capita', <http://hdrstats.undp.org/indicators/237.html>.

Barriers to Africa's support for adaptation

Climate change adaptation is not seen as a priority by African governments, which are preoccupied with more immediate economic challenges and more pressing development needs on their domestic (and regional) fronts. Effective adaptation of the kind required is costly and involves not only significant investment in research, awareness-raising and capacity building, but practical measures such as 'climate-proofing' infrastructure projects. According to a 'guesstimate' by the *Human Development Report* of the United Nations Development Programme (UNDP), poor countries may need as much as $86 billion a year in additional financing by 2015 to help them adapt to the consequences of climate change.[18] The report also states that in the same

period 'at least $44 billion will be required annually for the climate-proofing of development investments'.[19] This adds to the financial and human burden on the already strained resources of sub-Saharan Africa's economies. With the spreading of the financial crisis to Africa since late 2008, the constraints on African economies are even more severe.

There is an inverse relationship between responsibility for climate change and vulnerability to its effects. According to the executive director of the UN Environment Programme,[20]

> the most difficult policy challenges will relate to distribution. Where there is potential catastrophic risk for everyone, the short and medium-term distribution of the costs and benefit will be far from uniform. The distributional challenge is made particularly difficult because those who have largely caused the problem are not going to be those who suffer the most in the short-term.

Nevertheless, few African countries realise the direct and indirect cost of their failing to take adaptation measures, because information that quantifies the economic implications for sub-Saharan Africa is severely lacking. While cost estimates are rudimentary and subject to uncertainty in the cases of individual countries, even the most conservative figures estimate a loss of 0–3% of global gross domestic product (GDP) annually by the time the temperature has risen 2–3 degrees Celsius.[21] According to the *The Stern Review on the Economics of Climate Change*, inaction — that is, not taking any steps towards adaptation — could cost up to $5 trillion globally. Stern further predicts that the losses incurred if high-emission countries continue with a 'business as usual' approach could reach 5–20% of world GDP annually.[22]

Possible solutions to Africa's mitigation and adaptation challenges

As mentioned above, one of the greatest constraints on compliance with the global carbon mitigation regime in sub-Saharan Africa is a lack of awareness of climate change issues. This is directly responsible for the lack of interest in and commitment to mitigation and adaptation at the highest political levels.

It is thus imperative that efforts to mitigate and adapt to climate variability should be presented as complementary to the broader economic agendas of African countries, and that they should not be seen as impeding wider development objectives. As the Institute of Development Studies reasons, 'if climate change adaptation policies are to have any chance of achieving the political support from African leaders necessary for implementation, climate policies will have to be "development-led"'.[23]

Certain innovative approaches have been used to meet this criterion. The European Union (EU), for example, has come up with a practical and

cost-effective 'no-regrets' approach that has benefits for both environmental sustainability and (more importantly) for non-climatic stresses and development needs. An example is a project in northern Madagascar. Mad'Etole has established a new grid-connected wind energy plant to address the current shortage in power supply. This is a co-benefit approach. It meets domestic socio-economic needs (reducing the cost of electricity; creating jobs for locals, as the turbines are in part built locally; ensuring technology transfer; and assisting local economic development). At the same time it follows a broader agenda in addressing challenges such as deforestation and introducing renewable and carbon-neutral electricity production to the area.

Another way to promote the participation of various stakeholders is to emphasise the economic opportunities offered by mitigation and adaptation projects, for example by emphasising the profitability of the environmental goods and services industry (which includes renewable[24] resources and energy-efficient technology). African leaders and business people are largely unaware that this industry is worth approximately $600 billion globally, and is growing at a rapid rate. Also, its strong potential for job creation generally outperforms that of traditional energy and carbon-intensive industries.

The International Energy Agency estimates that about $45 trillion will be needed to develop and deploy new, clean technologies between now and 2050. Although the number of cleaner and more energy-efficient coal-fired generation plants and the retirement of fuel sources using older technologies has accelerated over the past few years, especially in the developed world, much more needs to be done to promote the rapid diffusion of technology. This would make existing sources of renewable energy economically viable, and a more feasible option for Africa.[25]

A further example is provided by the clean development mechanism (CDM), which was established by the UNFCCC to channel finances to renewable energy initiatives in developing countries. CDM projects are designed to earn carbon credits for investors who reduce carbon emissions in developing countries.[26] This credit scheme stimulates sustainable development and emission reductions while simultaneously giving industrialised countries some flexibility in how they meet their emission reduction or limitation targets (as stipulated in the Kyoto Protocol). It also offers developing countries that host CDMs the opportunity to seek private and public sector investment, build capacity and capability, and gain experience in areas such as the transfer of technology.

CDM projects in Africa

In August 2008 there were 71 CDM projects in the pipeline in Africa. South Africa currently hosts 25 of these. Although these figures for Africa are not placed in an international comparative context, the number of projects in sub-Saharan Africa has more than doubled since 2006. Thirty-nine percent of African CDMs are in the renewable sources of energy sector, and the number of opportunities for further expansion are growing rapidly.

Another project that has potential economic benefits for developing countries is the World Bank's new carbon finance facility — the Forest Carbon Partnership Facility (FCPF). This was set up in October 2007 as part of the World Bank's Investment Framework for Clean Energy and Development, and benefits developing countries that are actively 'reducing emissions from deforestation and degradation (REDD)'.[27] Its proponents aim to create economic value from tropical forests — making cuts in emissions from forest areas eligible for global carbon trading. At the end of July 2008 the first 14 countries to participate in this initiative, which included six countries from Africa, were selected.[28]

The Forest Carbon Partnership Facility

The FCPF is a financing mechanism that has dual objectives. One is building capacity on the technical, regulatory and sustainable forestry fronts for REDD. The other is testing a programme of performance-based incentive payments in certain pilot countries to set the stage for a much larger system of positive incentives and financing flows in the future.

Two facilities have been created to carry out these objectives.

1) ***The $100 million Readiness Fund***. This mechanism will enable the FCPF to establish systems to monitor and govern the forests of 20 developing countries, and to arrive at a credible estimate of their national forest carbon stocks and sources of forest emissions. It will also assist the countries to draw up a reference scenario, based on past emission rates, to estimate emissions in the future. The Fund will provide these countries with technical assistance to calculate the opportunity costs of possible REDD interventions, and subsequently to design an adapted REDD strategy that takes into account that country's priorities and constraints.

2) ***A Carbon Finance Mechanism***. Several countries will be selected to participate in this initiative, in terms of which the FCPF will implement pilot incentive programmes for REDD and evaluate them according to a system of compensated reductions. The selected countries, having a) demonstrated both commitment to REDD and adequate monitoring capacity, and b) presented a credible reference scenario and viable options for reducing emissions, will receive payments for reducing emissions to levels below those in the reference scenario.

The structure of these incentive payments is intended to build on the options for REDD that are currently being discussed as part of the UNFCCC process, to help countries address the causes of deforestation and degradation. Within the Carbon Finance Mechanism, payments will be made only to countries that achieve measurable and verifiable emission reductions. They will also be able to sell these carbon credits both to a special $200 million Carbon Fund supported by wealthy countries and to other bodies, such as businesses and organisations. Currently, developing countries cannot offer carbon credits from deforestation and forest degradation on the $30 billion carbon market that has evolved under the Kyoto Protocol agreement, in terms of which industrialised countries can offset some of their carbon emissions by buying credits from developing nations hosting eco-friendly projects. Critics advocate that these forest carbon credits be included in a new agreement when the first commitment period for the Kyoto Protocol ends in 2012.

Source: World Bank Carbon Finance Unit, 'Catalyzing markets for climate protection and sustainable development', <http://www.carbonfinance.org>; also see World Bank Carbon Finance, Forest Carbon Partnership Facility, <http://wbcarbonfinance.org/Router.cfm?Page=FCPF&ItemID=34267&FID=34267>.

Important facts about deforestation

According to the UN Food and Agriculture Organisation (FAO),[29] it is important to consider net rises in emissions that result from deforestation in sub-Saharan Africa, which now account for an estimated 18–25% of all global emissions.[30] This is particularly true of the 12 densely wooded countries of Equatorial Africa, whose annual emissions are estimated at approximately 1.1 billion tonnes — much higher than those from technical sources such as the energy and transport sectors, which amount to approximately 650 million tonnes per year.[31]

Adaptation in sub-Saharan Africa: National actions, and regional and international co-operation

Actions to address climate change in Africa require a mixed portfolio of strategies that should include mitigation, adaptation, technological development and research. The resultant policies should be combined with incentive-based approaches and concrete applications at all levels, as mentioned above. Assistance from international sources could take various forms and includes a broad spectrum of measures, among them cash transfers, cash-for-work programmes, longer-term weather forecasting, crop-switching and water management, early warning systems, adequate training in effecting lifestyle changes that respond to climate alteration, and infrastructure planning.

Given the number of natural catastrophes that have occurred during the past few years, a growing number of governments have recognised the need to build their capacity to prepare for and manage disasters. Mozambique, which is particularly vulnerable to floods, is setting up an early warning agency to deal with natural disasters, and to warn its population of the related risks. The adaptation measures used in this case include better analysis and use of data for climate forecasting; the creation of physical barriers to protect areas that are most exposed to climate-related risks (such as better flood defences); financial buffers (such as cash transfers and weather-related insurance); and systems to support a more proactive international relief and response efforts in the aftermath of extreme events.

Adequate responses to climate change require substantial resources. Meteorological information, for example, is imperative for successful adaptation, but sub-Saharan Africa still has the lowest density of meteorological stations in the world. The meteorological budget of France amounts to $388 million annually, as compared with Ethiopia's $2 million.[32]

The heavy costs of addressing climate change and its repercussions make it imperative that African countries acquire development partners in the North to assist their mitigation and adaptation policies. International partners are most likely to be found in those members of the bilateral and multilateral development community that are already involved in the continent. The assistance called for is likely to vary according to country-specific vulnerability assessments, but in general, what is needed is financial and planning support. The first includes funding for awareness-raising and capacity building, improved systematic observation of climate variability and climate change; and impact and vulnerability assessments on different scales. The second covers adaptation planning and implementation in different vulnerable sectors, and cross-sector approaches.

Integrating climate change into development policies: Political levels of adaptation

In African countries, climate change responses should be systematically integrated into socio-economic development policy-making and planning at all levels of government and throughout all sectors. The ideal would be a cross-cutting approach that incorporates all government ministries and every level of society, and extends from the local to the national, regional and continental spheres.

In practical terms, national policies need to combine planning for climate change adaptation with existing national poverty reduction strategies and policies. Regional and continental institutions, such as the AU and the Southern African Development Community, need to adopt a similar approach. Unmüßig and Cramer suggest that a climate-based African Peer Review Mechanism could be instrumental to creating an effective and consistent policy on climate protection for the continent.[33]

All international development programmes should be 'climate aware' or 'climate-proofed' and provide additional support (financial and other) for adaptation to climate change. Assistance from development partners that does not take climate alteration and the threat to environmental sustainability into account will be rendered less effective or even futile in the near future, and more than likely lead to a waste of resources. The EU and the Organisation for Economic Co-operation and Development have recognised the new parameters, and made headway in incorporating them into their policies.

At the local level, adaptation programmes should involve (and give ownership to) communities at the grassroots level, and move steadily towards evolving a people-based adaptation approach. It is imperative that indigenous knowledge be incorporated into adaptation policies, and that analysis takes into account models of best practice and adaptation approaches already developed in grassroots communities. National authorities and international partners need to assist the local inhabitants by supplying the necessary resources, knowledge and technology, while consulting them so that their contributions are assimilated into policy planning. This will lead to the development of effective adaptation strategies/pilot projects that are cost-effective, participatory and sustainable.

At the national level, the public bodies responsible for managing climate change and development need to make a greater effort to include adaptation as an integral element of national plans, policies and strategies. Progress has already been made on incorporating national adaptation programmes of action into poverty reduction strategies, but much more needs to be done. Ideally, a cross-sectoral/cross-ministerial approach should be followed if mitigation and adaptation are to be incorporated across the range of policies.

For example, South Africa needs a centralised and well-resourced decision-making system that involves all the departments that deal with climate, water, agriculture, energy and other related issues. In most of Southern Africa, there is minimal inter-ministerial and inter-departmental communication and co-ordination, and this presents additional difficulties to adopting overarching strategies.[34] There is also a lack of communication between the different levels of society. For example, little information filters downwards from the national ministerial structures to minor government officials; and even less reaches non-governmental organisations, businesses and parastatals, let alone private individuals.

Organisations at the *sub-regional and pan-African levels* have a crucial role to play owing to the transboundary nature of the adaptation strategies needed to counter climate change. The AU, the New Partnership for Africa's Development (Nepad) and regional economic communities need to ensure the integration of climate change adaptation into their sectoral programmes. According to a former director of the AU's Rural Economy and Agriculture Commission (which is responsible for addressing climate change), Ahmadu Babagana, the AU Commission is supporting the Nepad Environment Initiative and its related Action Plan. Like Nepad's Agricultural Development Programme and water management projects, the Action Plan recognises the economic importance of climate variability and alteration, and has therefore created a section dedicated to combating climate change in Africa. In addition, the Nepad Africa Regional Strategy for Disaster Risk Reduction, which is supported by the AU Commission, is fully aware of the need for co-ordination between agencies in designing proactive disaster prevention and response strategies. The AU Commission, in co-operation with the UN Economic Commission for Africa and the African Development Bank, is also supporting a new initiative — GCOS-Africa Climate for Development — that is part of the Global Climate Observation System (GCOS). The programme, which was launched in 2007, is designed to integrate climate information and services into socio-economic development planning, to support Africa's attempt to meet the Millennium Development Goals. A major objective is to make climate information a central element in national and regional development programmes, with a special focus in the initial stages on sectors that are climate-sensitive. The AU has also adopted the Addis Ababa Declaration on Climate Change and Development in Africa.

In terms of awareness-raising and information-sharing, the AU has also started to publish a series called *Climate and Society*, in which case studies are examined and best practice models offered for ongoing climate risk management. These focus on the areas of risk reduction and threats to health, agriculture and food security in the event of climate-related disasters.

Adaptation as a feature of international development partnerships

Adaptation to climate change in Africa has increasingly gained prominence in the development co-operation strategies of bilateral and multilateral donors. As mentioned previously, it is imperative that donor interventions in Africa are responsive to climate change.[35] The UNDP estimates that around one-third of current development assistance is concentrated in regions facing varying degrees of risk relating to climate change:[36]

> Insulating aid budgets from that risk will require additional investment of around $4.5 billion. At the same time, climate change is contributing to a diversion of aid into disaster relief. This has been one of the fastest growing areas for aid flows, accounting for 14% of total commitments in 2005.

To integrate adaptation into development co-operation effectively requires appropriate entry points, which vary according to the development partner. They can take the form of country strategies, sectoral policy frameworks, poverty reduction strategies, long-term investment plans, technical consultations and sector reviews, and strategic and project-level environmental impact assessments. For example the EU, which is Africa's most significant development partner, has dovetailed its development approaches with adaptation strategies. In 2004 the European Commission adopted a framework on Climate Change in the Context of Development Co-operation. The purposes of the Strategy and Action Plan are to give climate change a major role in the EU's programme of development co-operation, and to assist developing countries to integrate their overall planning with measures to address altered climatic conditions.[37] The EU has also established a joint venture with vulnerable countries in the G–77 which is called the Global Climate Change Alliance, to which the European Commission has dedicated €50 million. Its aim is twofold: to provide support for countries suffering capacity constraints; and to help integrate climate change policies into poverty reduction strategies.

However, few of these policies have resulted in concrete progress. So far the improvements made have generally manifested themselves in high-level policy declarations by international organisations, donor agencies and global financial institutions. Little has been done as far as implementation of promises or the introduction of pilot projects at the grassroots level is concerned. It is therefore particularly urgent that these issues are discussed in Africa, and that every effort is made to raise public and political awareness of the importance of climate change mitigation and adaptation to Africa's future.

International donors should also be aware that development assistance to the continent faces many constraints apart from the difficulties of integrating climate change adaptation into their development policies. Other important considerations include the need for policy coherence and complementarity

of projects between the European Commission, EU member states and other donors; recognition of the primacy of national ownership of development strategies; and the importance of participation by a broad range of stakeholders in the implementation process. The latter is particularly challenging in a field such as environmental sustainability and climate change, as there is a dearth of knowledge and experience and severe institutional shortcomings in most African countries. On the development partners' side, the European Commission finds the lack of operational guidelines and human resources in its member states and continental agencies a serious impediment to its efforts.

Funding dedicated to adaptation in sub-Saharan Africa

Bearing in mind the fiscal implications of climate change for Africa given in the forecasts detailed above, the funding allocated to adaptation in the past has been insufficient. Yet Africa has been promised little in the way of new or additional funding for the purpose by the international community.[38]

According to the UNDP, if donors wish to counter the global food shortages and increasing frequency of natural disasters that will be caused by climate change,[39] they should increase their contributions to humanitarian and development programmes by an additional $85 million by 2015. A similar World Bank study estimates the costs of protecting existing investments from the consequences of climate change in developing countries at $10–40 billion per year, with the burden of perhaps a third of these costs falling into the public accounts category.[40]

The international response to climate change adaptation has fallen short on all fronts. Several dedicated multilateral financing mechanisms have been created, including the Least Developed Country Fund and the Special Climate Change Fund. However, only limited amounts have been paid out by these mechanisms. The total to date has amounted to approximately $26 million — less than a tenth of the $279 million initially pledged for disbursement in the next few years.[41]

Following the UNFCCC conference in Bali in December 2007, a new Adaptation Fund has also been set up to finance projects and programmes in developing countries that are signatories of the Kyoto Protocol.[42] The Adaptation Fund is to be financed through a 2% levy on revenues generated by the CDM. A $500 million grant for developing countries, which can be drawn on from 2012 onwards, was approved in Bali. Analysts hope that this concrete commitment will move the debate beyond rhetoric, and instead set out specific obligations on the donor community and stringent time frames for implementation in recipient countries. Much depends on what is decided at the UN annual climate change summit to be held in Copenhagen in December 2009.

However, other innovative ways to raise funds on the scale required have been initiated. These include imposing carbon and aviation taxes, and higher levies on carbon trading. Other market-based ideas for protecting countries, communities and individuals against climate and disaster risk range from catastrophe bonds to micro-insurance and disaster derivatives.

The participation and accountability of recipients is important to the success of adaptation measures. An increase in net funding for climate change adaptation should be accompanied by added pressure on the governments of developing countries to manage these resources transparently and effectively. This brings us back to the challenges inherent in providing funding to African states: a scarcity of resources and of the capacity to distribute new funds; insufficiently transparent accounting and budgetary systems; and inadequate provision of checks and balances.

Concluding remarks and policy recommendations for African governments

Despite Africa's relatively small contribution to global emission levels, both in the past and at present, it is still the continent most vulnerable to climate variability. At the same time it is the continent least able to cope with the drastic economic and development implications. For this reason alone, it is essential that Africans become aware of the politics surrounding the global threat of climate change, and that they take their mitigation and adaptation responsibilities seriously. Keeping climate change on the agenda is critical for Africa's future.

Climate change action in Africa requires a mixed portfolio of strategies and responses that include mitigation, adaptation, technological development and research. Mitigation efforts by industrialised and emerging economies should be carried out simultaneously with adaptation measures at all levels. To ensure the committed participation of high-level politicians and representatives of other important constituencies, such portfolios should include policies that are incentive-based and offer 'no-regrets' approaches. All development projects should take adaptation measures into account. Yet they should not compete with or detract from the continent's broader development agendas, but rather complement them. Co-benefit models that address environmental sustainability and economic development simultaneously are particularly good options for Africa.

Because of the interface between environmental sustainability and socio-economic development, climate change should be systematically integrated into policy-making and planning at all levels and throughout all sectors domestically. This also holds true for a national and regional planning, and

that of Africa's development partners. To prepare for the effective merging of sustainability and growth, African governments should conduct an audit of existing environmental policies and protocols, and call for an overview of the existing envelopes of funding. There is no need to reinvent the wheel. Instead, the new policies should build on synergies and practical areas of existing collaboration in implementation. In those areas where schemes are outdated, they can be drastically improved to fall into line with adaptation requirements. The international community can play a key role in assisting this reframing of policy for Africa.

Endnotes

[1] ROMY CHEVALLIER is the EU–Africa researcher at the South African Institute for International Affairs.

[2] United Nations Framework Convention on Climate Change (UNFCCC).

[3] The vulnerability of sub-Saharan Africa to climate variability has been discussed extensively by the following publications and institutions: Sir Nicolas Stern's Review (*The Stern Review on the Economics of Climate Change*. London: New Economics Foundation, 2006), the Intergovernmental Panel on Climate Change (IPCC), the United Nations Development Programme (UNDP), World Bank country and environment assessments, and country studies by the Organisation for Economic Co-operation and Development (OECD). The IPCC reiterates that the geographical areas most vulnerable to climate change are Africa, Asia's mega-deltas and small island states like Tuvalu in the south Pacific.

[4] IPCC, *Climate Change 2007*. Fourth Assessment Report (AR4) of the UN IPCC. Cambridge: Cambridge University Press, 2007.

[5] A report written by Christian Aid in May 2006, *Poverty and Climate Change* (London, 2006), states that 182 million people in sub-Saharan Africa could die of diseases attributable to climate change by the end of the century.

[6] IPCC, 'Summary for policymakers', in Parry ML *et al.* (eds), *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press, p. 19.

[7] *Mitigation* in this specific sense entails limiting greenhouse gas emissions and finding ways to curb the impact of global warming. According to UNDP (*op. cit.*), 'climate change mitigation is about transforming the way we produce and use energy. And it's about living within the bounds of ecological sustainability.'

[8] *Adaptation* measures entail assessing the vulnerability of societies and natural systems to the consequences of climate change and aiming to help communities cope with associated threats to their way of life by adopting appropriate behaviour.

[9] See <http://uku.allAfrica.com>, accessed on 19 September 2008. The current level of proven coal reserves worldwide stands at roughly 850 billion tonnes, about 50 billion of which occur in Africa. Coal is much more widely distributed geographically than any other fossil fuel.

[10] The mining and industrial sectors consume half the national primary energy demand, while the residential sector uses only a sixth.

[11] Pachauri RK (chairperson, IPCC), 'Development assistance: Climate change and Africa', presentation to the 8th meeting of the Africa Partnership Forum in Berlin, Germany, 22–23 May 2007, <http://www.data.org/issues/climate_change_and_africa_012408.html>, accessed on 24 January 2008.

[12] UNDP, *op. cit.*, Appendix, table, p. 31.

[13] According to *International Energy Outlook 2008*, in 1990 China and India together accounted for 13% of world carbon dioxide emissions; but in 2005 their combined share had risen to 23%, largely because of strong economic growth and increasing use of coal to provide energy to support it. In 2030 carbon dioxide emissions from China and India combined are projected to account for 34% of total world emissions, with China alone responsible for 28% of the world total. Energy Information Administration of the US Department of Energy, International Energy Outlook 2008. Washington DC, June 2008, <http://www.eia.doe.gov/oiaf/ieo/pdf/0484(2008).pdf>.

[14] Although both China and India have ratified the Kyoto Protocol, neither are at present subject to its legal emissions limits, as these apply only to signatories from the developed world.

[15] UN Economic Commission for Africa (UNECA), *Harnessing Technologies for Sustainable Development*. Addis Ababa: UNECA, p. 33, <http://www.uneca.org/harnessing>.

[16] According to the UNDP (*op. cit.*), carbon dioxide emissions per capita in South Africa in 2004 equalled 9.8 tonnes. In per capita terms, this is equivalent to Germany's emissions statistics.

[17] Unmüßig B & S Cramer, 'Climate change in Africa', *GIGA Focus*, 2, 2008.

[18] UNDP, *op. cit.*, p. 194.

[19] *Ibid.*, 'Summary', p. 25. These are 2005 figures.

[20] *Ibid.*

[21] Llewellyn J, *The Business of Climate Change: Challenges and Opportunities*. Lehman Brothers, February 2007, <http://www.lehman.com/press/pdf_2007/TheBusinessOfClimateChange.pdf>.

[22] Stern, *op. cit.*

[23] Institute for Development Studies (IDS), 'Climate change adaptation', *IDS In-Focus*, 2, November 2007.

[24] Renewable energy is energy generated from natural processes that are replenished constantly. In its various forms, it derives directly from the sun, or from heat

generated deep within the earth. Included in the definition is electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources

[25] South Africa, for example, has identified abundant renewable energy sources (particularly solar), and has started to invest in technology and capital to 'harvest' these resources. The state-owned power utility Eskom has completed a feasibility study preparatory to building the largest solar plant in the world, which will be able to provide continuous power for at least 60% of the country's day-by-day needs, using a molten salt energy-storage system. Eskom has also called for a universal carbon price that would ensure that the cost of carbon emissions is paid by polluters rather than being transferred to the ordinary domestic user. This represents significant progress, but does not offer a feasible option for other, less-developed African states.

[26] Such projects earn saleable certified emission reduction (CER) credits, each equivalent to one tonne of carbon dioxide, which can be counted towards a country's record in meeting Kyoto targets.

[27] UN Food and Agriculture Organisation (FAO), UNDP & United Nations Environment Programme (UNEP), *UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD)*. Framework document. New York: FAO, UNDP & UNEP, 20 June 2008.

[28] The African countries are the Democratic Republic of Congo, Gabon, Ghana, Kenya, Liberia and Madagascar.

[29] FAO, *State of the World's Forests*, 2007. Rome: FAO, 2007.

[30] FAO, *Global Forest Resources Assessment 2005: Progress towards Sustainable Forest Management*. Rome: FAO, 2005.

[31] Unmüßig B & S Cramer, *op. cit.*

[32] In 2005 the G–8 pledged support to strengthen Africa's meteorological monitoring capacity.

[33] Unmüßig B & S Cramer, *op. cit.*

[34] In South Africa, for example, the Department of Environmental Affairs and Tourism and the Department of Minerals and Energy deal with separate issues both relating to climate change. There is little communication between the two, as they have not successfully defined their respective roles and responsibilities. There is also no documentation that integrates development issues, environmental sustainability and climate change.

[35] According to Tony Blair's Commission for Africa, climate change should be 'mainstreamed' within development policies, planning and activities by 2008. However, the international community must acknowledge the overarching objective of poverty reduction.

[36] UNDP, *op. cit.*, p. 25.

[37] In particular the objective is to help these countries to implement the UNFCCC and Kyoto Protocol.

[38] To make matters worse, nearly all of the financial assistance to date has been directed towards mitigation, and not towards socio-economic development and poverty reduction.

[39] UNDP, *op. cit.*

[40] World Bank Development Committee, *Clean Energy and Development: Towards an Investment Framework*, 2006, <http://siteresources.worldbank.org/DEVCOMMINT/Documentation/20890696/DC2006-0002(E)-CleanEnergy.pdf>.

[41] House of Commons, 'Environmental Audit Committee, Reaching an International Agreement on Climate Change', Sixth Report of Session 2007–08, London, 8 July 2008.

[42] The Adaptation Fund is the first significant agreement to emerge from the talks, which aim to establish a 'road map' to lay the groundwork for an expected two years of talks to draft a replacement for the Kyoto Protocol, which expires in 2012.