



The development and climate nexus: the case of sub-Saharan Africa

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Abstract

This paper explores an alternative approach to future climate policies in developing countries. Although climate change seems marginal compared to the pressing issues of poverty alleviation and economic development, it is becoming clear that the realisation of development goals may be hampered by climate change. However, development can be shaped in such a way as to achieve its goals and at the same time reduce vulnerability to climate change, thereby facilitating sustainable development that realises economic, social, local and global environmental goals. This approach has been coined the ‘development first approach’, in which a future climate regime should focus on development strategies with ancillary climate benefits and increase the capability of developing countries to implement these. This is anticipated to offer a possible positive way out of the current deadlock between North and South in the climate negotiations. First, elements are presented for an integrated approach to development and climate; second, the approach is elaborated for food and energy security in sub-Saharan Africa; and third, possibilities are outlined for international mechanisms to support such integrated development and climate strategies.

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1. Introduction

The Millennium Development Goals form an ambitious global agenda to eradicate extreme poverty and hunger. The targets set for 2015 are to halve the proportion of people living in extreme poverty and hunger. The Millennium Development Goals have gradually come to guide international policies.

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Development should lead to a better quality of life and productive work for the 3 billion people living in poverty and provide opportunities for the 2–3 billion to be added to the world population over the next 30–50 years, an increase that will almost completely take place in developing countries (World Bank, 2003). Recognising the great challenges Africa is facing, African states have combined forces and adopted a new partnership for Africa's development (NEPAD). The main objective of NEPAD is to give impetus to the continent's development by bridging existing gaps between Africa and the developed world, especially on infrastructure and technology (NEPAD, 2001). The long-term goal is to eradicate poverty via sustainable growth and development.

Box 1. The development and climate project

This paper results from the 'Development and Climate' project that started in 2002. An international research network comprising research centres from developing countries and industrialised countries take part in the Development and Climate project to explore the possibilities for creating synergies between (sustainable) development and climate change. The goals of the project are:

- To explore national development strategies and policies that both meet development priorities of the countries and address the issue of climate change, focusing on energy and food/water security.
- To identify promising policy options within the countries for making the transition to long-term sustainable development patterns (will include addressing climate change and facilitating the formation of networks of actors that are capable of promoting such options).
- To explore what lessons can be drawn for international co-operation, specifically considering how incentives for integrated development and climate strategies can be created at the international level.

Case studies will assess in more detail policies for the energy and food/water sectors that can support a transition to alternative development pathways. The project includes studies for Bangladesh, Brazil, China, India, South Africa, and West Africa, with partners from the Development and Climate project, i.e. Enda, Senegal; Bangladesh Centre for Advanced Studies; Energy and Development Research Centre, South Africa; Centro Clima, Brazil; Energy Research Institute, China; Indian Institute of Management, India; UNEP Collaborating Center on Energy and Environment/Risø, Denmark; RIVM, The Netherlands; IIED London, UK; IISD, Canada; Potsdam Institute for Climate Impact Research, Germany; CIRED/IDDRI, France; Plant Research International, Wageningen UR, The Netherlands and Stanford University, USA.

For more information visit: <http://www.developmentfirst.org>.

Although climate change seems marginal compared to the pressing issues of poverty alleviation, hunger, health, economic development and energy needs (e.g. UNFCCC, 2001, 2002a; Beg et al., 2002; Winkler et al., 2002; African Development Bank et al., 2003; Huq et al., 2003), it is becoming increasingly clear that realisation of the development goals can be seriously hampered by climate change. This is why the linkages between development and climate change are starting to receive more and more attention in scientific and policy circles (e.g. OECD, 2001, 2002a; Halsnæs and Markandya, 2002; African Development Bank et al., 2003; Beg et al., 2002; Bruinsma, 2003; EU, 2003; IUCN, IISD, SEI, 2003; World Bank, 2003). Since the World Summit on Sustainable Development (WSSD) in Johannesburg in 2002, there has been renewed interest in putting climate change in the context of sustainable development (UN,

2002). In line with this, the new programme for the UN Commission on Sustainable Development (CSD) combines energy for sustainable development and climate change. And there is good reason to combine development and climate. Efforts undertaken within developing countries as part of sound development initiatives could also be beneficial from a climate perspective (Gupta et al., 2002; Halsnæs and Olhoff, 2002). Price reforms, agricultural soil protection, sustainable forestry, energy sector restructuring (all undertaken without any reference to climate change) can lead to lower greenhouse gas (GHG) emissions and protection of biological carbon reservoirs, increasing adaptive capacity while enhancing economic and social development.

Development can be shaped in such a way that the development goals are achieved, while at the same time, vulnerability to climate change is reduced, facilitating a sustainable development that realises economic, social, local and global environmental goals. In this approach, coined the ‘development first approach’, a future climate regime should focus on development strategies with ancillary climate benefits and enhance capabilities of developing countries to implement these. This is anticipated to be a possible positive step forward in breaking the deadlock between North and South in the climate negotiations.

Here, we will explore the ‘development first approach’ by presenting elements for an integrated approach to development and climate, showing the potential of this approach for food and energy security in sub-Saharan Africa and, finally, outlining possibilities for international mechanisms to support such integrated development and climate strategies.

2. Development and climate

Development objectives have a multidimensional character, representing various economic, social, local and global sustainability dimensions. In this paper development will be addressed in a very pragmatic way. The issues here are understood in relation to how human well-being can be achieved in a local and global context. This includes considerations on development goals, specific needs for access to energy, food, and water and climate change. Access to income and basic needs are seen as the basis for human well-being; these needs include such items as education, food, energy, medical care, which the individual can use as inputs to meeting their individual needs. The understanding of human well-being is here to a large extent inspired by recent work on development strategies and the discussions on economic growth versus development (Dasgupta, 1993), where development as a broader issue focuses on human well-being and economic growth looks at achievements such as GDP. Developing countries are undertaking a broad range of national development planning activities, including nation-wide efforts, sectoral plans, and specific efforts addressing social issues, health, education and environmental programmes. Some of these activities are primarily initiated by national authorities, and others are closely linked to regional collaboration and international frameworks (e.g. see the Millennium Development Goals activities by the UN Development Programme (UNDP) and the Poverty Reduction Strategies of the World Bank). It is typically the case that none of these planning activities have included an assessment of links between development and climate change, implying that the potential stresses and constraints that future climate change and variability will impose on the development opportunities are not taken into consideration. Nor is the possibility of achieving joint benefits through co-ordinated development and GHG emission reduction policies identified. This omission of climate change information and policy options in development planning can, for example, imply that large infrastructure projects and agricultural activities are

planned without taking changed climate conditions into consideration, thus making them unprofitable and vulnerable. Development issues related to food, water and energy are clearly connected to climate change.

- Food production needs to double to meet the needs of an additional 3 billion people in the next 30 years. Climate change is projected to decrease agricultural productivity in the tropics and sub-tropics for almost any amount of warming.
- One-third of the world's population is now susceptible to water scarcity. Populations facing water scarcity will more than double over the next 30 years. Climate change is projected to decrease water availability in many (semi-)arid regions.
- Wood fuel is the main source of fuel for one third of the world's population. Wood demand is expected to double in the next 50 years. Climate change will make forest management more difficult, due to increases in pests and fires.
- Today, 1.6 billion people are without electricity. Electricity demand in developing countries will increase three to five times over the next 30 years. Fossil fuel-based electricity production will exacerbate climate change.

The capabilities of developing countries for increasing their adaptive capacity to deal with the climate issue as a way to decrease their vulnerability will largely depend on these countries' overall capacity to develop. The capacity to develop means carrying out the basic functions of the nation state in solving problems, and setting and achieving objectives (Fuduka-Parr et al., 2002). General problems encountered in realising this capacity to develop include appropriate infrastructure, well-functioning markets and weak institutions, which seriously constrain the integration of climate concerns in national development planning (Halsnæs et al., 2003).

The links between climate change, environmental problems, social problems and mitigation and adaptation options to capture co-benefits and minimise trade-offs are extensively described by Swart et al. (2003). Integrated development and climate strategies should allow developing countries to realise their development goals in a sustainable way (i.e. following a low emission pathway, wise use of natural resources), while becoming less vulnerable to the impacts of climate change. A scan of case studies in the literature confirms the potential of a 'development first' approach.

- Environmentally sound development programmes are often developed and implemented for reasons other than climate change, but reduce vulnerability or GHG emissions as a side-effect.
- Many developing countries have indeed reduced their emission growth in the context of an energy policy dedicated to increased energy use needed for meeting basic needs.
- Many of the efforts are motivated by common drivers such as economic growth and poverty alleviation, energy security, local environmental protection and health, but not by climate concerns.
- Synergies between development policies and climate change objectives reduce the vulnerability of society and help develop towards a low emission economy.

Positive examples reflect local realities of the countries and the 'home-grown' aspect of the efforts; countries are actively involved in identifying and implementing their own solutions.

Many more possibilities for de-linking economic growth and fossil energy consumption can be implemented if national and international policies provide more support and incentives (see Goldenberg and Reid, 1999; Biagini, 2000; Beg et al., 2002; Chandler et al., 2002; Halsnæs and Olhoff, 2002; IUCN, SEI and IISD, 2003).

The remaining part of this section will discuss the role of the energy and agricultural sectors in development in relation to climate change, while also demonstrating links to the Millennium Development Goals. Some of the options and policies for integrated development and climate strategies will be highlighted. The energy sector has a key role in supporting economic growth and in delivering social services. Main social attributes include energy accessibility, affordability, adequacy, quality, reliability, safety and environmental impacts. Basic consumption needs include cooking, illumination and heating. Welfare-enhancing amenities are the reduced time spent, especially by women, reduced local air pollution impacts, and lighting and education. For agricultural and industrial development, energy forms a critical resource. In particular, access to modern energy for the poor is a basic component in ensuring development (Farinelli, 1999; UNDP, 2000; OSCAL, 2001; IEA, 2002; Halsnæs et al., 2003). The problems of hunger and poverty are directly connected to agriculture. The agricultural sector is the main source of food, work and income for rural communities. Part of the problem is the low performance of the agricultural sector (AICHA, 2002). Where agricultural research has provided technologies to enhance production levels, markets and economic incentives have lagged behind dramatically. For agriculture to provide rural dwellers a basis to improve their livelihood, these barriers need to be broken down. High variability in food supplies, especially in places where storage is poor and redistribution of food is difficult, will have an impact on the food security situation of rural populations. Both the level and stability of the food production are coupled to the climate and climate variability.

Starting from the Millennium Development Goals, Table 1 provides an overview of examples of major development themes and related indicators to be covered in integrated development and climate strategies for the energy and food sector.

Of course, there are also examples of negative links, or trade-offs between development and climate. Large hydropower plants can lower GHG emissions, but can also have an effect on the livelihoods of local communities and destroy valuable ecosystems. Where science may provide the information on trade-offs, synergies and uncertainties, the hard decisions are made in the political domain. Guidance in these decisions could be the no-regret and precautionary principles. The following options illustrate some of the potential for synergies between development and climate change response.

- Reducing fossil fuel consumption contributes to the abatement of urban and regional air pollution and the reduction of health risks, but also contributes to reducing climate risks.
- Agro-forestry projects protect soils and provide employment opportunities for local farmers, but also result in carbon sequestration.
- Coastal zone management activities cannot only protect the coast against extreme events due to the current climate variability, but also strengthen the capacity of local communities to deal with the impacts of sea level rise and provide a resource basis for local livelihoods.
- Development of drought resistant crops to reduce farmers' vulnerability to current climate variability and future changes in the climate.

However, looking at the many, apparently good, options raises the question of why they have not yet more often been implemented. To answer this question we need a better understanding of the context and policy frameworks in which development is evolving on a country level. Many developing countries are in transition, opening their markets to international investments and liberalising state enterprises, a process in which they are experiencing a decreasing role for the state. This has many implications for governments, which can influence even fewer issues in a more market-oriented context than in a state-centred situation. Climate is most likely not one of the priorities in such a situation. To be able to include climate concerns

Table 1

Development themes for energy and food in relation to the MDGs and examples of relevant indicators

MDG goals	Sectoral themes	Examples of indicators
1. To halve the proportion of the world's population whose income is below US\$ 1 a day between 1990 and 2015	<u>Energy</u> Energy for local enterprises Lighting to facilitate income generation Energy for machinery Employment related to energy provision	<u>Energy</u> Quantity of energy supplied to enterprises, lighting, machinery, etc. Energy costs and the share of these costs in household income, production costs, etc. Number of people employed
	<u>Food/water</u> Increased food production Improved water supply Employment in agriculture	<u>Food/water</u> Quantity of food supply to households in different areas and income groups Quantity of improved water supply Food costs and their share of household budgets Water costs and their share of household budgets, production costs Number of people employed
2. To halve the proportion of people who suffer from hunger between 1990 and 2015	<u>Energy</u> Energy for machinery and irrigation in agriculture	<u>Energy</u> Energy supply and costs related to food production
	<u>Food/water</u> More efficient production processes that increase production and reduce waste Distribution of land and food	<u>Food/water</u> Quantity of food produced Quantity of waste Costs of food relative to household budgets Distribution of land to low-income groups
3. To ensure that, by 2015, children everywhere will be able to complete primary schooling in full	<u>Energy</u> Reduce time spent by children on providing energy Lighting for reading Energy for educational media, including TV and computers	<u>Energy</u> School enrolment rates Time spent on education Quantity of energy supplied for lighting and electronic media for education
	<u>Food/water</u> Reduced time spent in this sector enables children to spend more time on education Improved health increases children's capacity to read	<u>Food/water</u> Additional time for education Number of days off sick with implications for educational activities
4. Ensuring that girls and boys have equal access to primary and secondary education, preferably by 2005, and to all levels of education no later than 2015	<u>Energy</u> Modern energy services free girls and young women from time spent on energy provision New electronic educational media makes it easier for girls to get information at home	<u>Energy</u> Free girls and young women from time spent on energy provision Energy supply to electronic media in homes

Table 1 (Continued)

MDG goals	Sectoral themes	Examples of indicators
	<u>Food/water</u> Modern production practices in agriculture and improved water supply free girls and young women from time spent on food/water provision	<u>Food/water</u> Free time for girls and woman from time spent on food and water provision
5. To reduce the death rate for children under the age of 5 years by two-thirds between 1990 and 2015	<u>Energy</u> Energy supply can support health clinics Reduced air pollution from traditional fuels Reduced time spent on fuel collection can increase the time spent on children's health care	<u>Energy</u> Number of new health clinics or quantity of services Mortality rates Air pollution Free time
	<u>Food/water</u> Improved health due to increased supply of high quality food and clean water Reduced time spent on food and water provision can increase the time spent on children's health care	<u>Food/water</u> Food supply Water supply Time free
6. HIV/AIDS, malaria and other major diseases	<u>Energy</u> Energy for health clinics Cooling of vaccines and medicine	<u>Energy</u> Energy supply Cooling capacity
	<u>Food/water</u> Health improvement from cleaner water supply Food production practices that reduce malaria potential	<u>Food/water</u> Water supply Water quality-related sickness Malaria incidence
7. To stop the unsustainable exploitation of natural resources	<u>Energy</u> Deforestation caused by woodfuel collection Use of exhaustible resources	<u>Energy</u> Deforested area Quantity of resources used relative to stock
	<u>Food/water</u> Land degradation	<u>Food/water</u> Land area degraded
8. To halve the proportion of people who are unable to reach and afford safe drinking water between 1990 and 2015	<u>Energy</u> Energy for pumping and distribution systems	<u>Energy</u> Energy supply and costs
	<u>Water</u> Improved water systems	<u>Water</u> Quantity of different water qualities Water costs relative to household incomes

in development planning, policy options will therefore have to be rooted in the development process, taking into account the changing contexts. Some of the suggested appropriate policy directions are the following.

- Continuing market reforms that result in climate promotion activities (making prices realistic, making prices matter and removing subsidies).
- Mobilising investments in a climate-friendly direction (enhancing technology transfer and redirecting investments).
- Enhancing resilience of the poor to make them less vulnerable.
- Building institutional capacity to develop in a stable way as a basis to improve adaptive and mitigative capacity.
- Promoting environmental improvements to capture the synergy between local environmental objectives and climate.
- Reforming international and industrial country policies to enhance developing country implementation (Chandler et al., 2002; African Development Bank et al., 2003).

In the next section the ‘development first’ approach will be applied to sub-Saharan Africa, especially with reference to food security and energy for development.

3. Priorities for development in Africa

Africa is a fragmented continent in which nearly 170 borders demarcate more than 50 different countries. Nearly half of all the African countries have populations of fewer than one million, and only a handful number over 30 million. A large and growing force of opinions maintains that regional co-operation, with a view to eventual integration, is the optimal approach to future development in Africa (e.g. see NEPAD, 2002). In a region of enormous variety in terms of physical geography and social structures, the geopolitical boundaries only rarely correspond to the cultural and ecological zones. One effect of this relative lack of cohesion is the difficulty in African countries of mobilising domestic as well foreign financial resources. The causes of environmental degradation in the region tend to be similar across the continent’s various shared ecosystems: extensive farming systems and the disappearance of fallow land, increasing demographic pressure and high rates of migration, water-management difficulties and farmer-herder conflicts. The African nation-state has not yet succeeded in bringing either stability or coherent development to the region: a failure to grasp the regional picture often obscures enormous potential in commercial expansion, infrastructural integration and resource exploitation.

The continent is rich in energy and mineral resources, as well as other natural resources, but their exploitation is minimal or irrational, and often directed outside the region. Infrastructure is weak, for example, the region has less than one telephone line per 100 persons. Institutional and administrative capacity is no better than the transport and communications infrastructure. Population on the continent is expanding at an annual rate of about 3%, and although GDP has been growing in recent years, it is unable to match the demographic increase. Standards of living in the region are currently falling as a result. Africa is largely dependent on agricultural production, both for its alimentary sustenance and export revenue. However, this sector is at risk because of desertification, on the one hand, and more competitive international producers on the other. The industrial base, which is the focus of governmental development efforts, remains weak.

Many African policy makers and financial institutions express little interest in controlling GHG emissions or adapting to changes in climate. This attitude is based on their experience that, in general, other, more local, environmental problems have more direct influence on their populations than climate change. Their priority is to guarantee the survival of these populations. In strongly degraded areas, efforts are geared towards immediate rehabilitation of the most productive and cultivable areas by focusing on the prevention of soil degradation and bush fires, and encouraging reforestation. For areas with erratic and low rainfall, where timing of soil and crop management determines success or failure of the growing season, efforts are geared towards searching for more suitable crop varieties, precision management of resources and implementation of weather-information-based support systems. The question asked by Africans is how to reconcile these immediate priorities with the more long-term objectives presented by the climate change threat. In other words, how can we be concerned about the survival of future generations when we have to eat and live today? It is easy to see why African governments assert their legitimate right to use their natural resources for development, and why they are wary of over-zealous environmental protection measures that could impede African economic development.

3.1. *Priorities*

No analysis of the social and environmental conditions of Africa can overlook the fact that the continent has been in the throes of a profound and relentless crisis for the past two decades. As financing for social programmes becomes increasingly scarce, the situation deteriorates. Most countries have had to lock themselves into programmes of economic stabilisation or structural adjustment. Climate change is not a priority. Its full effects will only be felt 30–100 years down the line—a lifetime in Africa when compared to current economic and political urgencies. However, although it might be the policy makers' perception that climate change is a problem that will only become manifest in the long-term, climate change is already being shown to have an impact (IPCC, 2001a,b). Depending on what future mitigation measures are taken, the impacts will be more or less severe, but a substantial degree of climate change is, in any case, already inevitable.

The priority areas of concern in Africa are well-known, but how to satisfy them is not. The most pertinent question is: what should be done, and how, to transform the daily lives of the poor majority and to improve both the standard of living and the environment of the most disadvantaged and marginalized people. Indeed, the persistence of poverty and the widening of social disparities are making Africa's social, economic and political situation ever more unstable. As part of the search for solutions to this disturbing situation, African countries identified their common primary concerns at the consultations in preparation for the 2002 WSSD. While not wanting to play down the importance of other concerns, this paper is restricted to two of them: food security and energy security.

3.2. *Food security*

Without a doubt, the most pressing need in Africa is to halt the decline in agricultural yields and increase food security by producing more food and taking measures to deal with irregular rainfall through improvements in storage and distribution of agricultural products (Evans, 1998; FAO, 2002). Until now, the relative increase in agricultural production has not been due to better production methods but mainly to territorial expansion. Tree-clearing for agricultural reasons, which is the primary cause of deforestation and soil erosion, has become an essential act to meet the food needs of a rapidly growing population.

Previous methods—leaving land fallow for long periods and maintaining the balance between human activity and natural regeneration—have been shattered. Fallow periods are steadily diminishing, thwarting the proper regeneration of agro-ecosystems.

Prevailing agricultural practices (extensive and/or rotation systems) constitute the main causes of soil degradation and the destruction of primary forest formations. The low purchasing power of peasants stands in the way of obtaining the production factors (fertilisers, pesticides, etc.) needed for agricultural intensification (Bremen et al., 2001), while the limited financial resources of the relevant governments often preclude re-establishing ecological balance and adopting more rational systems of agricultural production. Alternative forms of agriculture should combine environmental concerns with efficient use of inputs.

3.3. Energy security

Energy poses a major problem in Africa, more so than anywhere else in the world. In the decades to come, Africa will have to consume far more energy if it is to climb out of its underdevelopment and satisfy its societies' demands for better living conditions. The energy question is particularly serious on this continent because, although it is generally considered to be rich in resources, with a highly diverse energy potential, African populations have access to very little of this. Energy consumption in Africa is 0.3–0.6 Toe per capita per year, compared to 7.5–9.0 Toe in North America. In other words, Africans consume on average 30 times less energy than North Americans. The electricity provision level in sub-Saharan Africa is 49% (IEA, 2002). Moreover, most of Africa's energy consumption (two-thirds) consists of various forms of highly inefficient traditional biomass. In rural areas, low energy consumption is both a cause and consequence of poor development and also of the degradation of the natural environment (such as deforestation). Uncontrolled use of biomass aggravates soil erosion and flooding, and retards development actions.

4. Combining development priorities and climate objectives

In global terms, current African GHG emissions are practically negligible due to the low level of development and industrialisation. The entire continent is estimated to be responsible for less than 7% of global emissions and only about 4% of CO₂ emissions. As a result, the contribution to mitigation of global emissions by Africa can only be limited. However, although Africa is responsible for very little of the anthropogenic emissions of GHGs, it does have considerable potential to help reduce them through export of biomass or hydropower, or even to absorb them through sustainable forestry.

Ironically, the African continent encompasses the most vulnerable regions and populations for current climate variability. Africa is already showing visible climate changes and further climate change here is envisaged. The challenge is to implement policies and programmes that can confront the priorities identified above, while at the same time help to reduce vulnerability to climate change and to limit emissions or increase sinks. It is encouraging to see that in each of the key areas of African development, there are possibilities for doing just this.

Let us take the example of food production. The introduction or expansion of agro-forestry and organic agriculture, i.e. methods that intensify agricultural production using fewer inputs (at lower costs), can improve food production and at the same time reduce GHG emissions (Sokona et al., 2003). In agro-forestry

systems, trees are planted to delineate plots of land and to fix nitrogen, causing nutrients lower in the soil to rise. The trees also prevent soil erosion, supply firewood and animal fodder, and constitute a source of income. Improving soil fertility enhances soil organic matter content through the addition of organic matter with or without the addition of inorganic fertiliser (Ben Mohamed et al., 2002; Ringius, 2002). Costly inputs are not used at all or are kept to a minimum and the system is flexible. In addition these methods restore and maintain carbon levels in the soil. Hence, if practised on a large scale, they could transform African soils from carbon sources to carbon sinks.

Early warning systems providing countries and regional organisations with the means to manage the risk of food insecurity are already in place (AGRHYMET, FEWS). These systems are used to monitor desertification and, more recently, have become an instrument in monitoring climate change impacts. This is a first step in preparing for climate-related disasters. In a more pro-active approach, early warning systems are being developed that provide farmers with essential information about timing of soil and crop management activities (Jongschaap et al., 2001). Such efforts are based on the idea that, by increasing the resilience and stability of current production systems, these systems will be better equipped to deal with changes in climate.

With regard to energy security the crucial questions are: How can energy consumption be increased, especially in the disadvantaged communities, to boost economic activities, while limiting waste and pollution—in this case, GHG emissions in particular? What are sustainable energy strategies, i.e. economically effective, environmentally viable and socially equitable strategies that will contribute to a reduction in energy poverty? Introducing cleaner and more efficient technologies in energy plants is only a first step. Many examples can be taken from the field of renewable energies, which replace emission-producing technologies and can supply power to areas currently without electricity—95% of rural Africa. Small-scale off-grid application of renewable electricity has been widely demonstrated in various regions in Africa. Approximately 100,000 small-scale solar PV systems have been installed throughout the region. Small-scale hydropower plants are being introduced and small-scale wind turbines and biomass generators (e.g. gasifiers) have been introduced at the pilot level. Ethanol production from local biomass has been developed in the sugarcane industries in southern Africa. Mali and Zimbabwe are among countries experimenting with the use of multi-purpose, lower-input biomass feed stocks, such as *Jatropha* for the production of diesel substitutes. Each of these examples is the result of capital injections accompanied by sound development of capacity through human and infrastructural resources. However, the scale of these examples needs to be expanded if larger economies of scale are to be produced. Such a multiplier effect will both stimulate sustainable development and create a low emissions economy (Davidson and Sokona, 2002; Davidson et al., 2002; Karakezi, 2002; Davidson and Winkler, 2003).

An important condition for achieving an economy of scale is regional or sub-regional co-operation, for example, in West African Economic and Monetary Union (UEMOA), Southern African Development Communities (SADC) and through NEPAD (Denton et al., 2001). Currently, programmes are generally carried out at the national level, and often lead to negative competition among individual nations and to high-cost solutions rather than to co-operation that could bring benefits in terms of low-cost and improved infrastructure. A regional emphasis would provide enormous opportunities. This is the case in areas such as the transport sector (developing sizeable markets for ethanol fuels; revamping public transport systems), electricity provision (lowering costs of off-grid systems, connecting grids to share electricity resources) and even housing (achieving larger markets for low-energy or renewable energy systems). Furthermore, projects that support the region would work towards the opening up and development of African markets. The absence of stable market conditions has also contributed to the paucity of foreign direct investment

(FDI) into the continent. The idea of a ‘North–South–South triangle’ is also applicable here. Projects which have been successfully applied in one developing country could then proceed to another one.

There are numerous examples of areas that would benefit enormously from such projects. A number of railway lines, dating from colonial times, traverse sections of the continent, but have regressed in more than 30 years since independence. Their restitution and extension would provide an invaluable infrastructural resource in the region. Likewise, construction programmes based on energy-efficient housing projects can limit emissions and reap large social benefits. Such a programme has already been implemented on a small scale in certain countries. The potential benefits of widespread dissemination of similar programmes on the continent are enormous. The continent also has enormous potential in natural gas, and hydroelectric and solar power which remain virtually untapped.

Agricultural techniques are also in need of a major shift, from the traditional extensive systems (and the associated land degradation) to intensive or mechanised systems, so as to increase labour efficiency and productive capacity. A large number of existing and potential large-scale inter-regional projects (such as regional power-sharing, e.g. the delayed Manantali dam in the Senegal river in Mali) remain stalled or unimplemented due to lack of financial resources. To achieve sustainable development and avoid potential future GHG emissions, Africa’s top priority is the development of regionally based technical and organisational infrastructures.

This all goes to show that plenty of opportunities exist to ‘re-visit’ development programmes so that they will respond to global environmental problems, particularly climate change. The development of strong and well-conceived basic infrastructures, both in the technical and organisational sense, will have the greatest impact on the future emissions from the continent. By placing the climate change issue in the context of African development policy, dealing with it as a primarily regional (global) rather than national issue and using the resources it offers to build basic infrastructures, genuine sustainable development for the continent can be assured (Davidson and Sokona, 2002).

5. International policies to support integrated development and climate strategies

From a ‘development first’ perspective, international policies should help to create the conditions to implement development strategies with ancillary climate benefits. This cannot be done through the United Nations Framework Convention on Climate Change (UNFCCC) process alone. Most likely, incentives will have to come from a much broader area of international fora and processes, such as trade and finance, development assistance, other multilateral agreements and sectoral policies on energy and agriculture. This requires action by the International Monetary Fund (IMF), the World Trade Organisation (WTO), the World Bank, and other international organisations, all of which typically do not interpret their mandate as going far beyond economic development (Jones, 2002; Metz et al., 2002). There is a continued reluctance of some of the parties to international agreements to co-operate with others. As a consequence, policy directions and specific mechanisms to mainstream environmental concerns in development policies remain weak (UNEP, 2002). On a positive note, the move to mainstream climate concerns in official development assistance (ODA) is now starting to attract attention. This is now at the stage of convincing the broader donor communities of the need to include climate concerns in their planning and convincing the recipient countries to accept this integration of climate change and development (see African Development Bank et al., 2003; EU, 2003; Huq et al., 2003). That this is indeed necessary is illustrated by a review by Klein (2001) of 136 German-funded ODA projects in Africa, none of which refer to climate change. To obtain

a broader climate regime requires a more active, externally oriented strategy than one focussed solely on the UNFCCC.

It is necessary to explore alternative approaches for future climate policies to break the deadlock in the negotiations between North and South on this issue. North–South collaboration on climate change has not developed adequately over the last 10–15 years. Worse than this, the question of how to address climate change over the longer term has become further polarised. One of the reasons is the lack of meaningful progress in reducing emissions by industrialised countries. Another reason is that industrialised countries have not dealt with climate change in the broader context of (sustainable) development and have not adequately recognised the needs of developing countries. This became especially apparent during the negotiations at the eighth UNFCCC Conference of the Parties (COP-8) in 2002 in New Delhi. Ott (2002) observed: “that the wish of developing countries to marry climate policy and sustainable development collided with the EU position that insisted on climate change and its mitigation as the focus of the regime and attempted to initiate a dialogue on the further development of the Kyoto Protocol after the first commitment period” (see also Delhi Declaration, UNFCCC, 2002b). In this context, it would seem appropriate to recall UNFCCC Article 4.7 that reads “the extent to which developing country Parties will effectively implement their commitments under the Convention (. . .) will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties”. It will be crucial for developing countries not to have their development threatened by further climate change action. The previous section indicated opportunities to shape development in ways that address development priorities, but also contribute to climate change goals. The Development and Climate project will identify more of these. The question then is how to enhance the implementation of such options and policies. We will conclude by looking briefly in a few directions.

There is a case to be made for a more systematic promotion of mutually reinforcing policy actions to create policy coherence or even synergies aligning development interests and climate/environmental concerns. It is increasingly recognised that the international policies lack coherence in ends and means, resulting in inefficient and ineffective policy making processes. Improving coherence and striving for synergies between different international fora and processes may result in an important step forward, without requiring new instruments (Dodds et al., 2002). Improved policy coherence on the global level can create a stronger incentive for integrating long-term sustainability concerns into national development programmes (Jones, 2002; OECD, 2002b). Improved coherence will especially help developing countries (who have mostly limited capacities for implementation) in meeting the large number of international requirements that they will have to include in their development planning (Dalal-Clayton and Bass, 2002). This could be realised between different multilateral environmental agreements (MEAs), such as the UNFCCC, the Convention to Combat Desertification and the Convention on Biological Diversity, and also between the Rio agreements and trade and finance (WTO).

Other options that could form part of a future development and climate regime are the stimulation of regional co-operation and the re-orientation of FDI in a climate-friendly direction. As the previous section on sub-Saharan Africa illustrates, there is considerable potential for regional options, e.g. in the energy system. In Africa, this could be organised through SADC, UEOMA and NEPAD, similar to the current operation in the Southern African Power Pool. This is also happening in South Asia (Shukla, 2003). With FDI playing an increasing role as a major contributor to overall North–South financial flows (most of which do not, in fact, go to Africa), opportunities for influencing new investments in energy infrastructure, for example, need to be further explored. It is highly relevant for the future climate change

regime to provide incentives and means to support countries in identifying and pursuing alternative (energy) development paths. These options need to be explored further.

The climate change regime already opens up a number of new avenues that could further be tailored to development needs. The Clean Development Mechanism (CDM), primarily a private sector, project-based channel, is likely to suffer the fate of most FDI, that is, most of it will go to only a handful of larger developing countries, such as China, India and Brazil, with the vast majority of the poorer developing countries being left out (unless special steps are taken to make sure that they get CDM projects). African countries might have to collaborate to set up an African CDM Fund if they want to use CDM as a contribution to integrating climate change policies with development programmes. [Samiengo and Figueres \(2002\)](#) have explored the possibilities for a so-called ‘sectoral CDM’, which could be sectoral (transport, electricity), territorial (entire cities or regions), or combined sectoral–regional (e.g. transport in a region). Such an approach might be especially useful in up-scaling the current project-based approach to direct sectors or regions onto a more sustainable path. Sector-transition strategies, land-use policies and technology development and transfer programmes could be made part of, or stimulated by, the UNFCCC. A proposal for sustainable development policies and measures (SD-PAMs) has been developed by [Winkler et al. \(2002\)](#). This is a pledge-based, bottom-up approach that builds on the right to sustainable development as stated by the UNFCCC. The authors suggest this as possibly the easiest way for many developing countries to take the first step to long-term action on climate change. The commitment of countries would be to implement and accelerate national sustainable development plans and specific measures that are beneficial to climate as well.

6. Conclusions

If we want to incorporate the long-term dimensions of climate change into (short-term) development policies, development and climate will have to be studied in an integrated way. First, the case of Africa shows the potential and added value of the ‘development first’ approach: integrated development and climate policies can connect climate change and development. This is important because climate change will be undermining the achievement of development goals. Further research will have to provide more insight into how to design robust strategies at the local and national level to achieve development and climate goals at the same time. Furthermore, how the policies to implement such strategies might look like in a national context will also have to be examined. Secondly, the ‘development first’ approach could open the prospect for a constructive role of developing countries in addressing climate change and working towards new international agreements to tackle the problem. Implementing policies that address development priorities in a climate-safe and climate-friendly way could take away the fear that further climate change action will threaten development. Thirdly, international policies should provide incentives for countries to move in this direction. This will require a strategy, not only from the UNFCCC, but also other fora to broaden its instruments so that climate policies can enhance development policies and shift them in a more sustainable fashion, and align international development and climate policies. As a first step, further country-based research could clarify the policies concerning international issues (beyond the directly climate policy related ones) that are crucial for the successful implementation of any ‘next generation’ climate agreements or, in other words, which issues need to be dealt with in other regimes to make international climate policies more inclusive and effective. Fourthly, from the climate perspective, time is a crucial element. If the world wants to keep open the option of avoiding unacceptable climate

change, global emissions will have to peak within the next few decades. However, even if this is achieved, climate impacts will be experienced in most developing countries. An open question not yet answered is if a development first approach can create enough ‘critical mass’ to make the transition to sustainable development patterns that will keep climate change within tolerable thresholds, and that leaves the option of low stabilisation levels open. At the same time, and keeping in mind that a safe stabilisation level for GHG concentrations is more easily achieved in a more sustainable world, integrated development and climate strategies comprise, very much, a doable first step, consistent with long-term goals for development and climate.

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