Rural Development and Environment

120

October 1998

Findings reports on ongoing operational, economic, and sector work carried out by the World Bank and its member governments in the Africa Region. It is published periodically by the Knowledge Management and Learning Center on behalf of the Region. The views expressed in Findings are those of the author/s and should not be attributed to the World Bank Group.

Climate change and Sub-Saharan Africa: Issues and opportunities

Findings

The climate change issue

The possibility of long-term climate change is linked to an increase in global carbon dioxide, (CO_2) concentration in the atmosphere, together with a few other greenhouse gases (GHG). This increase is at least partly the result of the influences of human activities on nature such as exhaust gas emissions from vehicles, coal burning for energy, and deforestation. An increase in the amount of CO2 will lead to increased trapping of solar heat in the atmosphere, giving rise to the expectation that the climate will be warmer although mitigating influences exist.

A warmer global climate may lead to long-term weather changes causing impacts not yet fully understood; the impacts will also vary according to region. The anticipated temperature increase resulting from climate change is of not so much direct concern as the possible indirect influences it may have on our daily lives. In general, a warmer climate will lead to increased evaporation from the oceans and more precipitation. Of more concern are the indications that even a very small increase in global temperature may lead to an increase in extreme weather events such as stronger storms and hurricanes, worse droughts and floods, changes or shifts in seasons, milder winters and wetter summers. Higher precipitation and warmer winters are expected to lead to the spread of disease vectors into new areas. Even a small increase in global temperature will lead to thermal expansion of the oceans which will cause rises in sea levels that may threaten low-lying coastal areas and river deltas. Some impacts of global warming may be quite the opposite of what people may expect. For example, snowfall may increase in some of the colder regions because warmer ocean air may bring a higher amount of moisture into cold areas and drop more snow on land which is already so cold that an increase in temperature of a degree or two still is well below freezing point.

The now well-known El Niño effect is a natural climate variability event that has been occurring more or less frequently long before any change in climate was predicted. However, questions have arisen as to the possibility that global warming may lead to stronger and more frequent El Niños.

Largely due to these potential threats to development and human lives, the World Bank is getting involved in a range of activities under the heading of climate change, which is slightly misleading since most of these activities refers to climate variability. Climate change science is

not meteorology and weather forecasting, although meteorological data is a necessary basis for climate change prediction. Climate change consists of short- and medium-term climate variability together with long-term gradual climate change (changes in annual average temperature). Real climate change is a very slow process and is mostly defined through large global simulation models (GCM). Climate variability deals only with the variations in weather as we know it over short periods of time. Fig. 1. shows the relationship between climate variability and climate change.

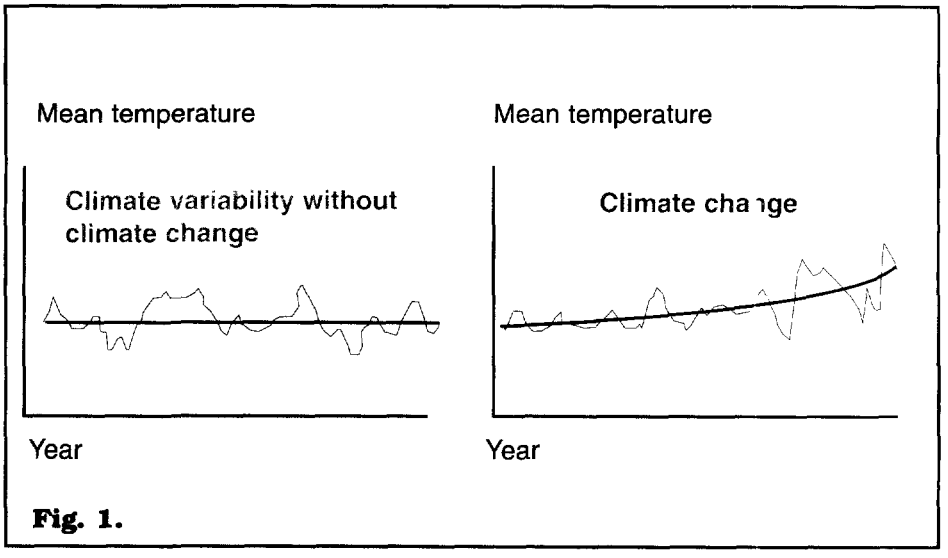

Fig. 1.

It is important to note that global circulation model results are not weather predictions, but are scenarios describing a possible future climate situation under a set of variables with given values. Model results can nevertheless provide insights regarding the important factors and their interdependencies and sensitivities. Most of these scenarios are still presented on a global scale because of the high degree of uncertainty relating to climate consequences at regional levels. However, rapid scientific advances are being made to improve regional climate modeling.

Climate change and Africa

Climate change is likely to impact seriously on Africa. Increased intensity of droughts, floods and changes to growing seasons may have significant implications for soil productivity, water supply, food security, and in turn human welfare and poverty, as well as deleterious and, in many cases, irreversible impacts on biological diversity.

Current GHG emissions from Africa are of little importance on a global scale, and have contributed only a negligible share to the build-up of GHGs in the atmosphere so far. Still, Africa's share of global emissions may increase considerably in the future. In a "worst case" scenario, African emissions could become comparable to those of other regions towards the end of next century. Variables that produce the scenario variations include (i) population growth, (ii) economic growth; (iii) energy intensity, i.e. the amount of energy consumed per unit output; (iv) use of fossil fuels; (v) deforestation rates; and (vi) burning of vegetation.

It is commonly argued that GHG emissions from development projects in Africa should be paid only minor attention for three main reasons: (i) Present GHG emissions from Africa are negligible on a global scale; (ii) climate change is a problem that is largely caused by GHG emissions from industrial countries, and hence, these countries should bear the main responsibility and the major costs of reducing emissions; and (iii) the cause-effect relationship is complex and our knowledge about climate change and its potential impacts is relatively tentative. However, these factors do not necessarily mean that emissions are irrelevant in an African context. First, as indicated earlier, it is clear that continued high rates of population growth would lead to considerable increases in African GHG emissions into the next century, even if per capita emissions are kept at a low level. Second, African countries will make a number of strategic decisions through the development process that will significantly affect emissions. One example is the choice of energy source (non-renewables versus renewables, or coal versus gas in Southern Africa). Third, land use change, largely deforestation, is the dominant source of GHG emissions in Africa. Fourth, by actively participating in global climate change negotiations, Africa could attract significant financial and technological transfers through joint implementation mechanisms and carbon investment opportunities. There are thus strong arguments for internalizing the global consequences of development actions in Africa.

Impacts of climate change on development

Climate change may affect development directly through changes in precipitation, evaporation and hydrology, sea-level rise, and changes in the occurrence of extreme weather events (floods, droughts, storms) that would impact on primary production, ecological systems, public health and poverty.

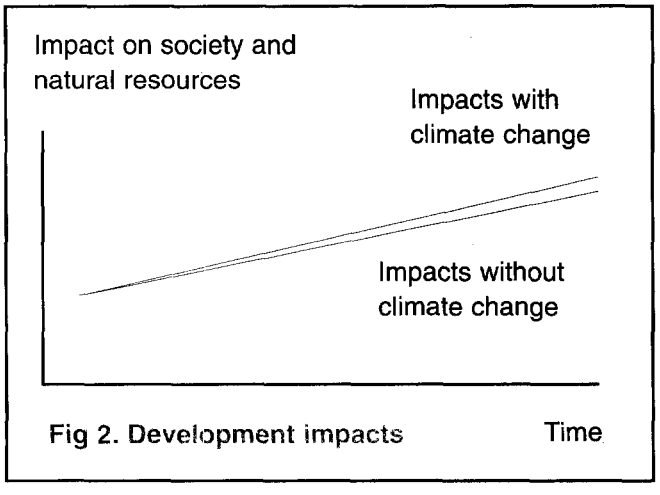

Fig 2. Development impacts

It is anticipated that a given change in climate will result in more adverse socio-economic impacts in Africa than in other parts of the world. This relates to several factors related to the vulnerability of society and the sensitivity of the environment. Important factors here are high dependency on bio-fuels, high dependency on the agriculture and forest sectors, restricted population mobility, poor health facilities, high population growth rates and low material standards. Furthermore, countries in Africa tend to have a much higher share of their economy dependent on climate-sensitive sectors such as agriculture than is the case on other continents. Developing countries in general have a low institutional and financial capacity to adapt to changes. Thus, it seems obvious that improved adaptation capability will be of higher priority than GHG emission reductions among African countries.

The inclusion of climate change concerns in development projects falls to some degree under the responsibility of environmental assessments (EA). However, the inclusion of climate change in EAs poses a challenge to the World Bank and other donors because of a number of factors that have to be added to the already acknowledged problems mentioned previously. These are:

- Climate change is a transboundary and global problem, whereas EAs only rarely include impacts at the international level.
- Climate change is the cumulative effect of a huge number of individually insignificant GHG emissions. EAs normally focus on the local and regional effects of individual projects. Thus, even if GHG emissions were accounted for, they would be negligible at this level.
- The complex cause-effect relationship makes it difficult to assess the magnitude and direction of climate change impacts, particularly at the regional level.
- Response strategies to climate change will require international efforts that at the national level may challenge existing sector policies and institutional frameworks.
- Due to time lags, the climate change impacts of present emissions may not be evident for many decades to come, whereas irreversible impacts can only be avoided by anticipatory measures. Traditional project-level EAs, however, tend to be reactive and more concerned with the mitigation of impacts than selection and design of alternative projects or strategies.
- It is expected that climate change may have significant impacts on the social and economic environment, while EAs traditionally have concentrated on impacts on the natural bio-physical environment.

Adapting to climate change

Adjustment to climate change has been the standard climate policy issue for African countries. Adaptation options are of two main types: *reactive*, which are measures taken in response to climate change, and *preventive* measures taken in advance of climate change to minimize or offset adverse impacts. Suggested adaptation strategies for Africa concentrate on the reduction of vulnerability to current climatic events, as well as the inclusion of adaptation policies in planning for long-term sustainable development. Adaptation measures are relevant for a variety of natural resources and socio-economic sectors in Africa such as natural ecosystems, agriculture, managed forests, water resources, coastal zones, energy, and infrastructure.

Preventive adaptation options are considered on the basis of two basic criteria, namely flexibility and the potential for net benefits. Adaptation options should be

implemented now if they yield net benefits independent of climate change ("no-regrets"). High priority should be given to the preventive adaptation options that would not be effective if implemented as reactive policies. Examples of situations where preventive policies are needed relate to irreversible or catastrophic impacts, when decisions affect long-term investments, and when trends are unfavorable.

Reduction of vulnerability to climate change is probably a more realistic adaptation policy for Africa than efforts to reduce GHG emissions. This vulnerability relates to several key sectors. A more comprehensive illustration of adaptation to climate change vulnerability would need a separate article, but a couple of examples can be mentioned here : the dependency on bio-fuels constitutes a serious energy management issue in Africa, often leading to local deforestation. Thus, increasing the range of substitution possibilities for household energy consumption also represents an adaptation measure. In agriculture, relatively small climatic changes may have profound effects on the farming capacity. Agricultural research promoting drought-resistant seeds or climate-adapted species, or developing new sources of income for farmers can reduce vulnerability to climate change. Improved education for farming communities will increase mobility, income, and increase material standards and thus reduce vulnerability to climate change. Likewise, improvements in public health will increase the population's resistance to climate change and the impacts of disease vectors spreading into new areas.

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