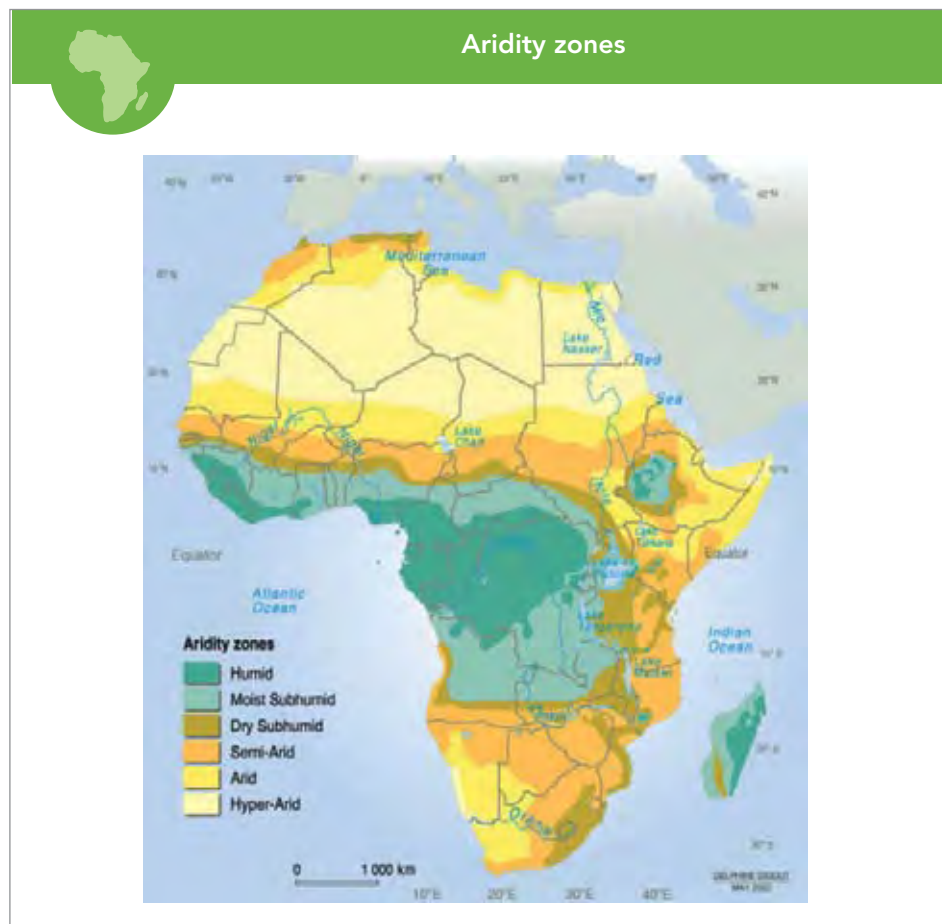


DESERTIFICATION, DROUGHT AND CLIMATE CHANGE



Source: UNEP-GRID, 2007.

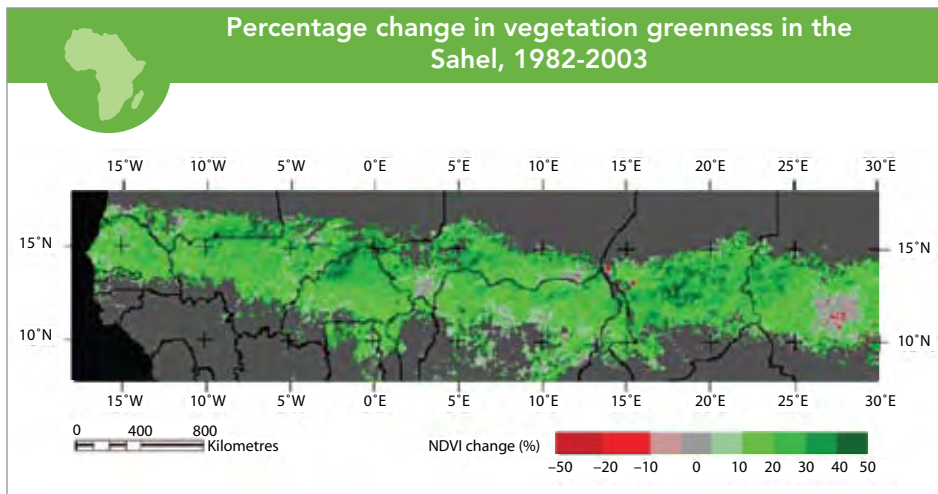
“Drought is the silent killer—the natural catastrophe that is only too easily forgotten.”

Hama Arba Diallo
Former Executive Secretary of the
United Nations Convention to Combat Desertification, 2005

More than 30 per cent of the world's drylands are found in susceptible dryland regions in North Africa, the Sahel and the southern part of Africa.⁵³ They cover almost 2 billion hectares in 25 countries, representing 65 per cent of the continental land mass. Over 400 million people live in the drylands of Africa and the majority of them are the rural poor. Moreover, the area registers an annual population growth rate of 3 per cent.⁵⁴

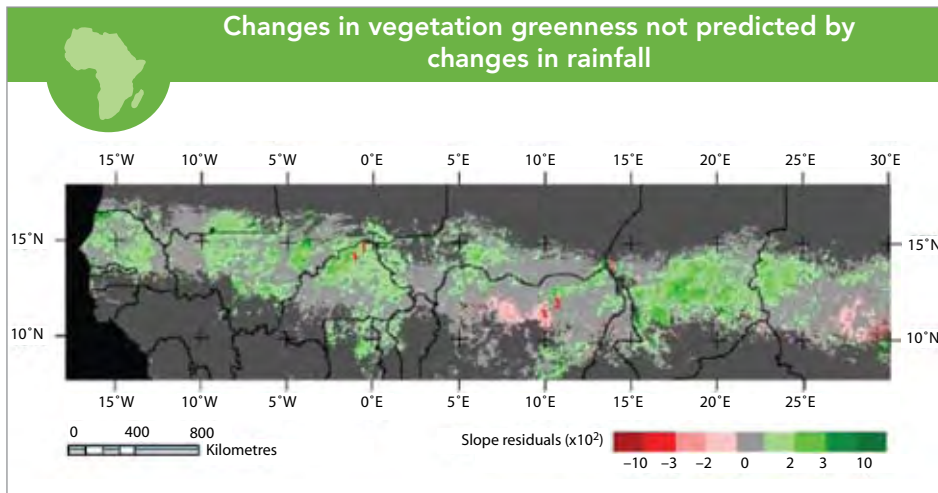
Dryland areas in Africa are under threat from deforestation, soil erosion, nutrient mining, recurrent drought and climate change, potentially resulting in land degradation and desertification, and aggravated poverty. Sustainable agricultural innovations are key to limiting adverse impacts on the environment and on the livelihoods of rural populations.





Source: Herrmann, Anyamba and Tucker (2005).

Note: Overall trends in vegetation greenness throughout the period 1982-2003 based on monthly Advanced Very High Resolution Radiometer, Normalized Difference Vegetation Index (AVHRR NDVI) time series. Percentages express changes in average NDVI between 1982 and 2003.



Source: Herrmann, Anyamba and Tucker (2005).

Note: Overall trends in the residual NDVI throughout the period 1982-2003 based on regression of vegetation greenness (AVHRR NDVI) on 3-monthly cumulative rainfall. Slopes of residual NDVI trend lines between 1982 and 2003 are expressed in units of NDVI x 104.

The Sahel has been greening in recent years.

Greening of the Sahel as observed from satellite images is now well established, confirming that trends in rainfall are the main but not the only driver of change in vegetation cover. For the period 1982-2003, the overall trend in monthly maximum Normalized Difference Vegetation Index (NDVI) is positive over a large portion of the Sahel region, reaching up to 50 per cent increase in parts of Mali, Mauritania and Chad, and confirming previous findings at a regional scale.⁵⁵

Local conditions seem to have influenced the extent of vegetation recovery.

Some areas have greened more than what would be expected from rainfall recovery alone. In some regions (e.g., Niger Delta of Mali; south-western Mauritania), increases in vegetation can be explained by an expansion of irrigation. For other regions, such as the Central Plateau of Burkina Faso, recovery of vegetation greenness beyond what would be expected from the recovery of rainfall is thought to be the result of increased investment and improvements in soil and water conservation techniques. Some areas have registered less greening than expected from rainfall patterns.



The Niger has witnessed reforestation and population increase at the same time



1984

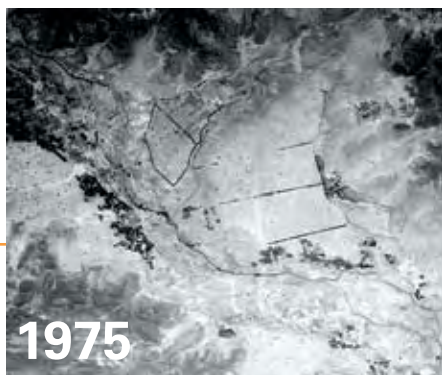
Source: CILSS and others, 2005.



2004

The Lama plateau in the Niger in 1984 (above) and 2004 (below).

Better conservation and improved rainfall have led to at least 6 million newly tree-covered acres in the Niger, achieved largely without relying on large-scale planting of trees or other expensive methods often advocated for halting desertification. Moreover, these gains have come at a time when the population of the Niger has grown rapidly, confounding the conventional wisdom that population growth leads to the loss of trees and accelerates land degradation.



1975

Source: CILSS and others, 2005.

Kware village neighbourhood in 1975 (left) before interventions and in 2003 (SPOT image). Black dots are trees. Windbreaking lines consisting of trees are clearly visible in 2003 (below).



2003



1990

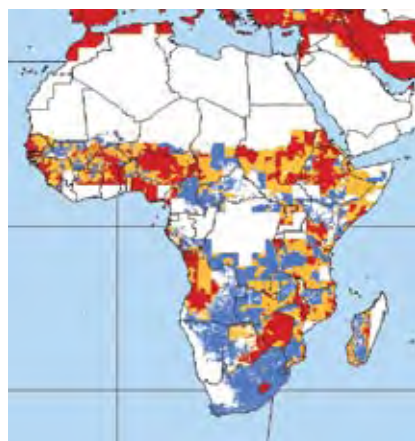
Source: CILSS and others, 2005.



2004

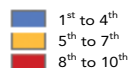


An evaluation project undertaken in three areas of the Niger in 2005 (Tahoua, Tillabéri and Maradi) points to encouraging results in the locations of projects initiated to fight desertification with support from donors, compared to areas where no such project was implemented. Degraded lands have been reclaimed and restored to crop production by local populations. Water tables have risen significantly, which has made possible the development of vegetable gardens that have become significant producers at the national level. In the three regions studied, yields have increased both for millet and sorghum. Side benefits of land regeneration have included reduced vulnerability of women and reduced emigration rates.⁵⁶



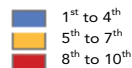
Drought total economic loss

Risk deciles



Drought mortality

Risk deciles



Source: World Bank, 2005, *Global Disaster Hotspots*.

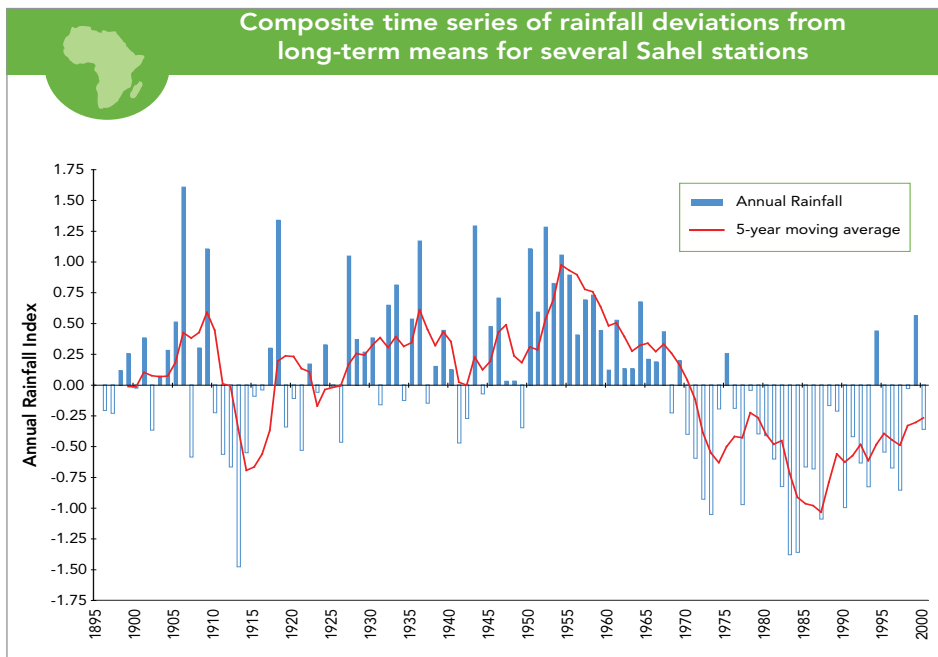
Note: Deciles are based on all regions, not only Africa.

Africa is most vulnerable to extreme weather events.

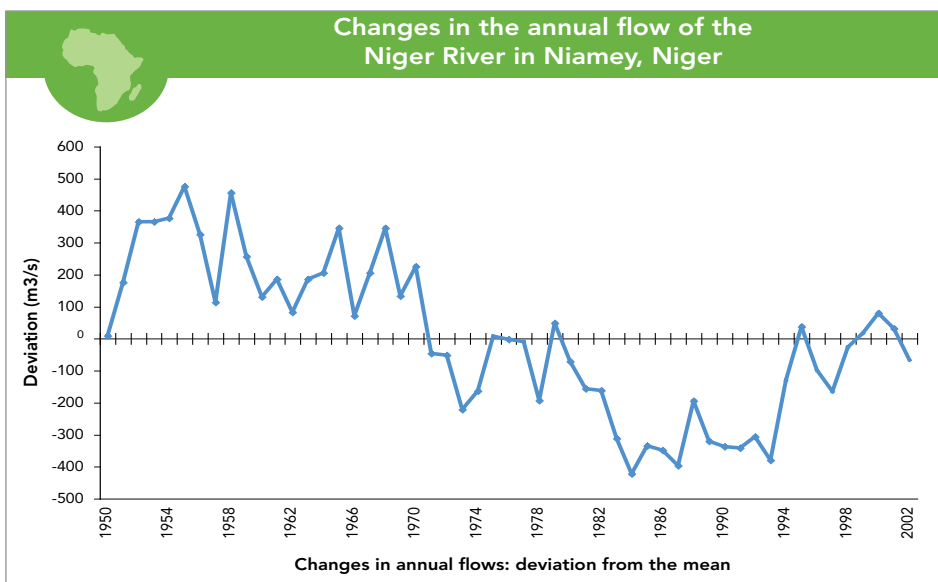
According to a global study undertaken by Columbia University and the World Bank, Africa is not stricken by more natural disasters than other continents. However, impacts of such disasters tend to be particularly high in Africa, both in terms of number of people affected and in terms of mortality from droughts and floods. A global study of losses from drought found that drought mortality hot spots are concentrated exclusively in sub-Saharan Africa.⁵⁷

While economic loss hot spots for drought tend to include more developed regions, for example in southern Europe and the Middle East, Mexico, north-east Brazil and north-east China, a sizeable portion of African territory is also located in the top deciles for economic losses due to drought.⁵⁸





Source: Agrhymet, 2005.

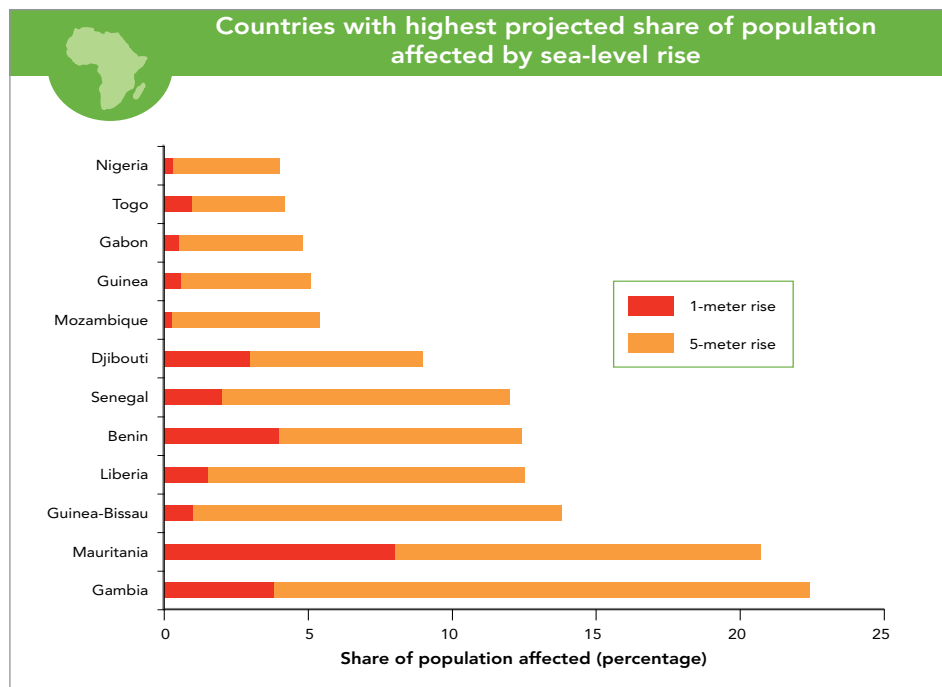


Source: CILSS, 2005.

Variations in climatic conditions have been observed for a long time in Africa.

Changes in rainfall patterns observed in the Sahel in the 1970s and 1980s have dramatically affected livelihoods in that region, which already had to cope with highly irregular and unpredictable rainfall patterns. Decreases in rainfall have had profound repercussions on the flows of the main rivers that provide an essential source of livelihood for the population of arid areas. Declines in river flows and runoff in those regions have typically been more pronounced than those in rainfall.⁵⁹ Decreased river flows have contributed to the shrinking of Lake Chad, one of the largest lakes of Africa. Recent years have registered somewhat more favorable rain conditions. However, extreme weather events have also become more common.⁶⁰



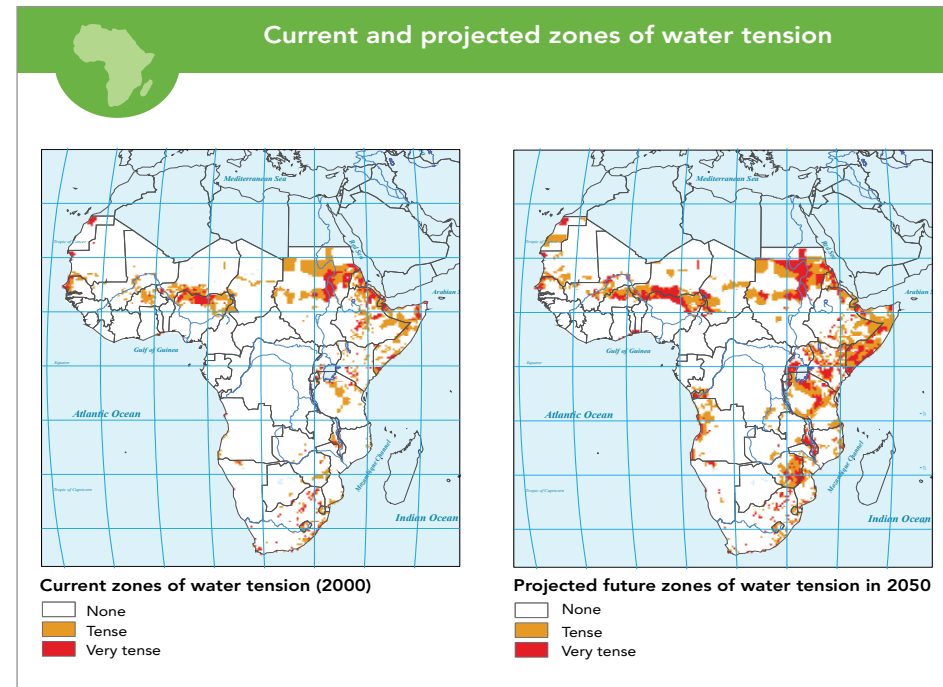


Source: World Bank, 2007.

Impacts from sea-level rise will be high for some African countries.

Climate change is expected to translate into sea-level rise during the next century. The extent of the rise is still uncertain. According to World Bank estimates, less than a quarter of 1 per cent of sub-Saharan Africa's GDP would be impacted by a 1-metre sea-level rise. Only a very small percentage of the region's area and agricultural land would be affected.⁶¹

However, some countries would be much more severely affected. The countries with greatest land area impact would be the Gambia and, to a lesser extent, Guinea-Bissau. Banjul, the capital city of the Gambia, is particularly vulnerable to sea-level rise and the entire city could be lost with a 1-metre rise in sea level.⁶² A major ecological and economic consequence of sea-level rise would be the destruction of wetlands and mangroves, which currently provide livelihoods to coastal populations. Approximately 15 per cent of Benin's wetlands would be impacted by a 1-metre sea-level rise.⁶³

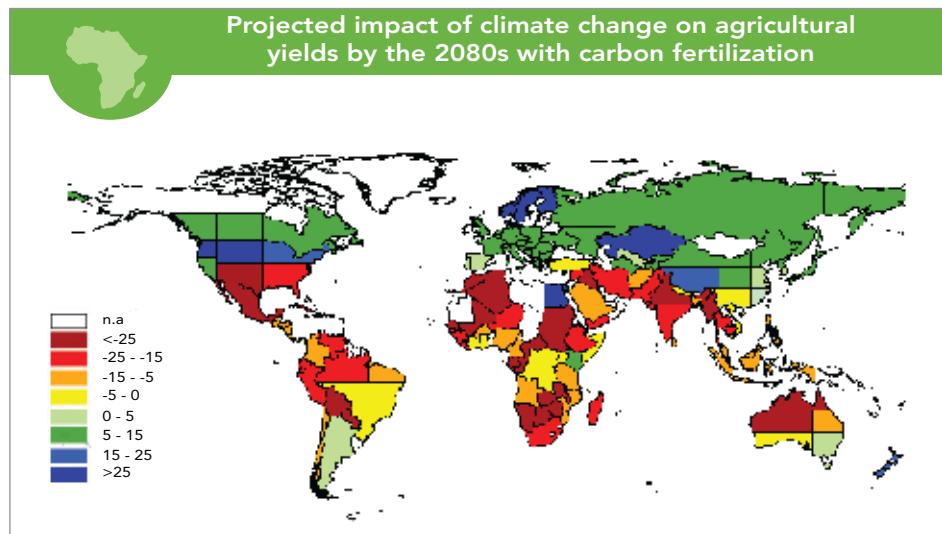


Source: Le Blanc and Perez, 2008.

Note: Tension in these maps is defined based on population densities conditional on average annual rainfall.

Climate change, by modifying rainfall patterns, could exacerbate water tensions on the continent.

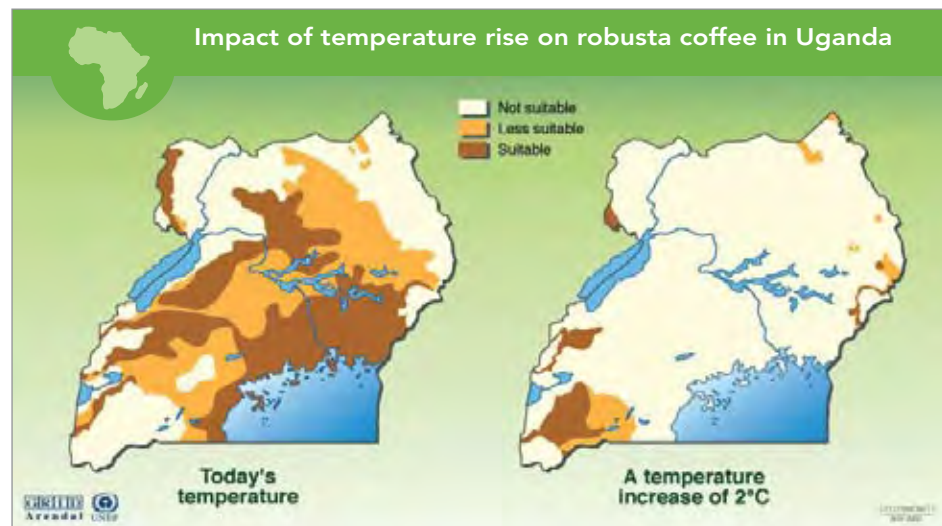
On most of the continent, population growth is going to impose additional pressure on water resources compared to the present situation, in particular in the Sahel but also in Eastern Africa. However, changes in rainfall will modulate substantially the demographic impacts, and may have very different implications in different subregions and at the country level. Many climate models project a wetter Sahel in the coming decades, as well as drier conditions for Eastern Africa. If these trends materialize, pressure on the water resources in the Sahel could be eased somewhat, although not to a sufficient extent to counterbalance the impact of population growth. Eastern Africa is likely to see its situation worsen, because demographic and climate impacts are predicted to work in the same direction towards increasing water stress.⁶⁴



Source: Cline, 2006.

Africa is the region where the impacts of climate change on agriculture are predicted to be the most severe.

Increasing temperatures and changed rainfall patterns will affect African agriculture dramatically, by changing the geographical distribution of areas suited to the different crops. Keeping current crop mixes would result in decreased yields due to suboptimal climatic conditions compared to the current situation. As a result, countries will have to adjust the mix of crops they grow. Recent research focusing on the biophysical effects of climate change (precipitation and temperature) suggests that Africa would be the continent most affected by climate change from the point of view of agricultural productivity, with almost all countries undergoing losses of productivity, even after crop adjustments and the positive effects of carbon fertilization are taken into account.⁶⁵



Source: UNEP-GRID, 2002.

At the country level, important adjustments in crop mix may be needed due to climate change.

For some countries that are currently relying on a few crops, increases in temperature such as predicted by the main climate models will probably imply radical changes in the agricultural production system, because the crops in question will not be adapted to the agroclimatic conditions of the country any more. Whereas most parts of Uganda are currently suited for coffee cultivation, one study estimates that a 2-degree Celsius temperature increase would render most of the country's area unsuitable for coffee.