

## CHAPTER 2

# Africa's Renewable Natural Resources

In line with the classification of natural resources presented in Chapter One, this chapter focuses on Africa's *renewable* natural resources, chiefly, water, forestry and land resources. A majority of Africans will remain heavily dependent on these resources for their livelihoods in the foreseeable future. The chapter provides an overview of the stock, production patterns, current status of each resource. This initial presentation is followed by a deeper analysis of the management of the resources and a discussion on adaptation to climate change in Africa. Each resource is presented separately to enhance clarity, but it is worth noting that there are very close linkages between these resources, since poor management and exploitation of one resource is highly likely to affect the others.

### Water Resources

Water constitutes a key component of Africa's natural resource endowments, but it is becoming increasingly scarce in the continent. Indeed, one of the current challenges facing Africa is how to comprehensively take stock of its water resources and use them optimally to sustain an acceptable standard of living in the continent. Available statistics reveal that nine African countries already face "water scarcity" on a national scale (less than 1,000 m<sup>3</sup> of water per person annually), eight countries face "water stress" (less than 1,700 m<sup>3</sup>), while at least another six countries are likely to join this list in the coming decades. More than 300 million people in Africa still

lack access to safe water and adequate sanitation. The majority of these people are in sub-Saharan Africa, where only 51 percent of the population has access to safe water and 45 percent to sanitation.<sup>1</sup>

By 2025, almost 50 percent of Africans will be living in an area of water scarcity or water stress. Five African countries — Kenya, Morocco, Rwanda, Somalia and South Africa — are expected to face water scarcity within the next 10 years.<sup>2</sup> In South Africa, the demand for water is expected to increase by 50 percent in the next 30 years. This projected demand for water resources is unlikely to be met without considerable investments in the water sector. Because of low rainfall, North Africa is most affected by water scarcity. However, sub-Saharan Africa will also become increasingly affected. There is already considerable national competition for water for agriculture and power generation in Africa's major river basins, particularly in the Nile River Basin.<sup>3</sup>

Water plays a vital role in improving the socioeconomic circumstances of many African countries. Although several economic instruments are being deployed to address the water crisis, the success of these efforts will depend heavily on the availability of sustainable water resources. Meanwhile, successful economic develop-

<sup>1</sup> WMO & UNESCO (1988); Bzioui (2005); OECD & AFDB (2007)

<sup>2</sup> WRI (2005)

<sup>3</sup> WRI (2005); Bzioui (2005); DFID (2003)

ment efforts are needed to ensure the sustainable flow of funds for water resources development. This interdependence between water availability and development is exemplified by the link between water and poverty. Because of poverty, access to adequate water and sanitation is low in Africa; in turn, this inadequate access to safe water and sanitation has led to a high incidence of communicable diseases that reduces vitality and economic productivity in the continent. This in turn exacerbates poverty.<sup>4</sup>

Inadequate access to water and sanitation is thus both a cause and a consequence of poverty. Similarly, inadequate water resources can become a constraint to improved agricultural development and food security. It is noteworthy that, even with its current poor performance, agriculture is the largest user of water in Africa, accounting for almost 90 percent of total water use on the continent. However, only 27 percent of cultivable land on the continent is currently cultivated. This ranges from 40 percent of suitable land cultivated in North Africa, the Gulf of Guinea, and the Indian Ocean Islands, to only 19 percent in the Sudano-Sahelian Region. This is believed to be attributable to the relatively low investment in water resource development in Africa. Thus, there is considerable scope for improved agricultural production and food security through investment in agricultural water use.<sup>5</sup>

From this premise, it is clear that water and socioeconomic development are mutually dependent on each other. They can be

nodes in a vicious cycle that puts societies in a downward spiral of poor economic development and poor access to safe and adequate water supply and sanitation. Alternatively, they can be nodes in a virtuous cycle, reinforcing each other in an auto-catalytic way, and leading to an upward spiral in which improved socioeconomic development produces resources needed for improved development of water resources, which in turn buttress and stimulate further socioeconomic development. The cycle that prevails will depend on policy options and political choices, which facilitate or impede the level of investments in domestic water supply and agricultural water use.

### ***Stock of Water Resources in Africa***

At first glance, Africa seems to be endowed with abundant water resources given its big rivers, large lakes, vast wetlands, and widespread groundwater. The continent has 17 major rivers with catchment areas that are greater than 100,000 km<sup>2</sup>; and more than 160 lakes with surface areas exceeding 27 km<sup>2</sup>. Most of the lakes are located around the equatorial region and the sub-humid East African Highlands within the Rift Valley. The water resource potential of the continent is shown in Table 2.1. Box 2.1 illustrates the potential for water transfer.

Irrespective of spatial and temporal climate variability, the overall image at the continental level is that Africa has abundant rainfall and relatively low levels of water withdrawal for the three key sectors, namely agriculture, domestic, and industry. Water resource availability in Africa at the regional level is shown in Table 2.2. Regions are defined as follows:

<sup>4</sup> WMO & UNESCO (1988); OECD & AFDB (2007)

<sup>5</sup> FAO AQUASTAT (2005)

## 14 African Development Report 2007

**Table 2.1: Stock of Water Resources by Country**

Country	Average Annual Groundwater Recharge	Groundwater Available per Capita	Surface Water	Overlap *
	(km <sup>3</sup> )	(m <sup>3</sup> /yr)	(km <sup>3</sup> )	(km <sup>3</sup> )
Algeria	1.7	54	13	1
Angola	72.0	5,591	182	70
Benin	1.8	295	10	2
Botswana	1.7	1,048	2	1
Burkina Faso	9.5	796	8	5
Burundi	2.1	314	4	2
Cameroon	100.0	6,629	268	95
Central African Republic	56.0	15,490	141	56
Chad	11.5	1,503	14	10
Congo	198.0	67,268	222	198
Congo, DRC	421.0	8,150	899	420
Côte d'Ivoire	37.7	2,550	74	35
Egypt	1.3	19	1	0
Equatorial Guinea	10.0	22,092	25	9
Eritrea	No data	No data	No data	No data
Ethiopia	44.0	703	110	40
Gabon	62.0	50,566	162	60
Gambia	0.5	383	3	1
Ghana	26.3	1,301	29	25
Guinea	38.0	5,114	226	38
Guinea-Bissau	14.0	11,541	12	10
Kenya	3.0	100	17	0
Lesotho	0.5	232	5	1
Liberia	60.0	19,023	200	60
Madagascar	55.0	3,450	332	50
Malawi	1.4	128	16	1
Mali	20.0	1,780	50	10
Mauritania	0.3	112	0	0
Morocco	9.0	317	22	3
Mozambique	17.0	864	97	15
Namibia	2.1	1,217	4	0
Niger	2.5	233	1	0
Nigeria	87.0	780	214	80
Rwanda	3.6	466	5	4
Senegal	7.6	802	24	5
Sierra Leone	50.0	10,300	150	40
Somalia	3.3	327	6	3
South Africa	4.8	119	43	3

Table 2.1: (continued)

Country	Average Annual Groundwater Recharge	Groundwater available per Capita	Surface Water	Overlap *
	(km <sup>3</sup> )	(m <sup>3</sup> /yr)	(km <sup>3</sup> )	(km <sup>3</sup> )
Sudan	7.0	237	28	5
Tanzania	30.0	895	80	28
Togo	5.7	1,231	11	5
Tunisia	4.2	433	3	0
Uganda	29.0	1,332	39	29
Zambia	47.1	5,137	80	47
Zimbabwe	5.0	428	13	4

\* The part common for both groundwater and surface water resources.

Source: World Resource Institute (2005), Earth Trends: The Environmental Information Portal

### Box 2.1: Water Transfer in Africa

Although irrigation schemes are quite common in Africa and have been practiced for a long period, water transfers as such (from one location to another) are still very rare. Moreover, this practice is mostly done on an intra-country scale, as is the case in Morocco (about 2.7 km<sup>3</sup> / year between river basins) and in Libya, where fossil groundwater resources are transferred from south to north through the Great Manmade River Project. The only real example involving countries is the transfer of 2.2 km<sup>3</sup> / year from the Malibamatso River in Lesotho to the Vall River in South Africa, within the framework of the Lesotho Highlands Water Project. In return, Lesotho receives assistance, including electricity, for its own consumption.

However, many potential large-scale projects to develop such transfers have been discussed and studied, including in Algeria (from south to north); Kenya (resources from Lake Victoria to the drier zones); Botswana (between the Shashe and Notwane rivers); and, Lake Chad (securing water flows towards the lake from the Niger Basin in Nigeria, or from the Congo Basin).

Source: FAO (2005): AQUASTAT Information System on Water and Agriculture

**North Africa** — Algeria, Egypt, Libya, Morocco and Tunisia;

**Sudano-Sahelian** — Burkina Faso, Cape Verde, Chad, Gambia, Djibouti, Eritrea, Mali, Mauritania, Niger, Senegal, Somalia, and Sudan;

**Gulf of Guinea** — Benin, Cote d'Ivoire, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Sierra Leone, and Togo;

**Central Africa** — Angola, Cameroon, Central African Republic, Congo,

## 16 African Development Report 2007

Equatorial Guinea, Gabon, Sao Tome and Democratic Republic of Congo;

**Eastern Africa** — Burundi, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda;

**Islands** — Comoros, Madagascar, Mauritius and Seychelles; and

**Southern Africa** — Botswana, Lesotho, Malawi, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe.

This overview shows that approximately 86 percent of water resources withdrawal is used for agriculture, 10 percent for domestic purposes (municipalities and community water supply), and about 4 percent for

industrial use. Average annual rainfall in Africa is about 678 mm per year, albeit with high spatial and temporal variability. First, temporal variability of rainfall is typically 40 percent around the mean — much higher than in temperate zones. Second, the spatial distribution of rainfall is highly varied among humid, sub-humid, semi-arid, and arid zones. The highest rainfall occurs in the Island countries, the central African countries, and the Gulf of Guinea, with an annual average of approximately 1300–1700 mm/year. In contrast, the lowest rainfall occurs in the northern African countries, where the average annual rainfall is only

**Table 2.2: Stock of Water Resources by Region**

Sub-Region	Regional Rainfall			Internal Renewable Resources (IRR) (2004)			Annual Withdrawals (2004) *			
	1000x km <sup>2</sup>	km <sup>3</sup> /yr	mm/yr	km <sup>3</sup> /yr	% of Africa	Per inhab. m <sup>3</sup>	km <sup>3</sup> /yr	% of Africa	m <sup>3</sup> /inhab.	% of IRR
North Africa	5753	550	96	49	1	325	93.9	43.7	616	189
Sudano-Sahelian	8591	2671	311	160	4	1418	54.9	25.7	486	35
Gulf of Guinea	2106	2874	1356	952	24	4853	12.4	5.8	63	1.3
Central Africa	5329	7593	1425	1876	48	19845	2	0.9	21	0.1
Eastern Africa	2916	2666	920	281	7	1521	14.2	6.6	77	5
Southern Africa	4739	3110	659	270	7	2518	21.7	10.0	202	8
Islands	591	895	1510	341	9	17042	15.7	7.3	786	4.6
<b>Africa</b>	<b>30,025</b>	<b>20,359</b>	<b>678</b>	<b>3,930</b>	<b>100</b>	<b>4527</b>	<b>214.8</b>	<b>100</b>	<b>247</b>	<b>5.5</b>

\* Main sectors: Agriculture (86% of Annual Withdrawals); Domestic (10%) and Industry (4%).

Source: FAO, AQUASTAT (2005)

96 mm. More importantly, the rainfall amounts for each of the countries of the continent — also *within* the countries — are as varied as the vegetation and the landscape, giving rise to humid, sub-humid, semi-arid, and arid zones.<sup>6</sup>

The amount of surface and ground water flows generated from rainfall within the sub-regions is low. Annual renewable water resources (ARWR) refers to the sum of all run-off generated within a country, plus any inflows into the country, minus outflows committed to neighbouring countries. Only a certain proportion of the ARWR is actually available for utilization in the country, depending on the practical situation and the economic storage facilities, including reservoirs and aquifers. The low values of the internal renewable resources show that there is considerable room for improvement in the capture and utilization of rainwater. More importantly, this situation is partly responsible for the recurrent droughts in large parts of the continent.

Furthermore, a marked difference has been observed in annual withdrawals between sub-regions and countries (Table 2.3), but in general the withdrawals are low in relation to both the rainfall and the internal renewable resources. A distinct feature is that the annual withdrawals account for 189 percent of internal renewable resources in North Africa (reflecting the use of water originating from outside this sub-region — primarily from the Nile Basin). This is strongly influenced by Egypt, which accounts for 73 percent of withdrawals in North Africa, while Nigeria accounts for 65 percent

in the Gulf of Guinea. For Africa as a whole, the amount of water withdrawn for the three major uses amounts to only 5.5 percent of internal renewable resources. This is less than 6 percent of world withdrawals, reflecting the low level of development and use of water resources on the continent.<sup>7</sup>

Dependence on ground water has also been acknowledged on the continent. This is especially important in the northern African countries — Libya, Tunisia, Algeria and Morocco — and also in southern African countries like Botswana, Namibia, and Zimbabwe. Thus, although groundwater only accounts for about 15 percent of the continent's total renewable water resources and for only 9 percent in southern Africa, its use is relatively significant. As a rule, groundwater resources tend to occur in small sedimentary aquifers along major rivers and in coastal deltas and plains. Limited groundwater resources, generally sufficient for local water supply, can also be found in the widely occurring crystalline (basement) rocks.<sup>8</sup>

While some areas have abundant water supply, others suffer from water scarcity. For example, northern Africa and southern Africa receive (only) about 9 percent and 12 percent, respectively, of the continent's rainfall. In contrast, the Congo River watershed in the central humid zone, home to 10 percent of Africa's population, receives over 35 percent of the annual total. In southern Africa, the Lake Malawi basin, southern Tanzania, and northern Madagascar have become wetter in the last 30 years. This is in

<sup>6</sup> FAO AQUASTAT (2005); FAO (1995)

<sup>7</sup> Ibid.

<sup>8</sup> Bzioui (2005); DFID (2003)

## 18 African Development Report 2007

Table 2.3: Water Withdrawal by Country

Country	Actual Resources per capita	Total Water Withdrawal	Water Withdrawal per Capita	Sectoral Withdrawals (%)		
	(m <sup>3</sup> per person)	(million m <sup>3</sup> )	(m <sup>3</sup> per person)	Agriculture	Industry	Domestic
Algeria	443	6,074	201	65	13	22
Angola	13,070	343	28	61	16	22
Benin	3,585	250	40	74	11	15
Botswana	8,022	140	81	43	19	38
Burkina Faso	933	780	66	88	0	11
Burundi	509	234	37	82	1	17
Cameroon	17,520	985	65	74	8	18
Central African Republic	36,912	22	6	4	19	77
Chad	4,857	234	30	80	1	19
Congo	217,915	39	11	10	30	59
Congo, Democratic Republic	No data	356	7	31	16	52
Côte d'Ivoire	4,794	931	59	65	12	23
Egypt	794	68,653	1,013	78	14	8
Equatorial Guinea	51,282	106	232	1	16	83
Eritrea	1,466	304	82	95	1	4
Ethiopia	1,519	2,648	40	93	6	1
Gabon	121,392	128	102	40	11	48
Gambia	5,472	32	24	67	11	22
Ghana	2,489	520	27	48	15	37
Guinea	26,218	1,517	187	90	2	8
Guinea-Bissau	20,156	110	81	91	1	9
Kenya	932	1,576	52	64	6	30
Lesotho	1,678	54	30	19	41	40
Liberia	66,533	107	36	56	15	28
Libya	106	4,800	919	89	3	8
Madagascar	18,862	14,970	937	96	2	3
Malawi	1,401	1,005	88	81	5	15
Mali	7,458	6,930	582	99	0	1
Mauritania	3,826	1,698	642	88	3	9
Morocco	934	12,758	438	90	2	8
Mozambique	11,266	635	36	87	2	11
Namibia	8,921	268	142	63	5	33
Niger	2,710	2,187	204	95	1	4
Nigeria	2,252	8,004	70	69	10	21
Rwanda	613	76	10	39	14	48
Senegal	3,811	1,591	169	90	4	6

Table 2.3: (continued)

Sierra Leone	30,960	380	86	93	2	5
Somalia	1,309	3,298	378	100	0	0
South Africa	1,106	15,306	348	73	10	17
Sudan	1,879	37,314	1,187	97	1	3
Tanzania, United Republic	2,416	1,996	57	93	1	6
Togo	2,930	166	36	47	8	45
Tunisia	459	2,726	285	82	2	16
Uganda	2,472	295	13	39	15	45
Zambia	9,630	1,737	167	76	8	16
Zimbabwe	1,547	2,612	207	86	5	10

Source: World Resource Institute (2005), Earth Trends: The Environmental Information Portal

contrast with the situation in Mozambique, southeast Angola, and western Zambia, which have become significantly drier over the same period. The extremes in variability have been greater in Tunisia, Algeria, the Nile Basin, and in the extreme south of the continent. Finally, variability of rainfall is also experienced in the Sahel as testified by recurrent floods and droughts.<sup>9</sup>

It is evident in many ways that the African continent has an exceptional disadvantage with regard to water resources. A comparison of annual average precipitation in Africa with the rest of the world shows that Africa's level is comparable with that of Europe and North America. However, the higher evaporation losses in the African continent result in a substantially lower percentage of precipitation contributing to renewable water resources, thus setting Africa apart from other continents. Africa's

total runoff, reflected in its useable and renewable water resources, is thus very low. In addition to the limiting nature of water resources, the temporal and spatial variability of precipitation — owing to the strong influence of the Inter-Tropical Convergence Zone (ITCZ) on the climate in Africa — has strong implications for management strategies (discussed later in the chapter). This variability is exacerbated by unpredictability and considerable yearly variations. The unavoidable expression of this is endemic drought and occasional severe floods.

In terms of overall water availability per capita of renewable water resources, the countries with the least available freshwater per person (see Table 2.3) are Burundi (538.3 m<sup>3</sup>) and Kenya (947 m<sup>3</sup>). Conversely, the most water-abundant areas per capita are, not unexpectedly, the equatorial high rainfall areas of the Democratic Republic of Congo (259,547 m<sup>3</sup>), Gabon (126,789 m<sup>3</sup>) and

<sup>9</sup> DFID (2003)

## 20 African Development Report 2007

Liberia (70,348 m<sup>3</sup>). These trends indicate that only a few African countries — mainly in Northern Africa — are currently *physically water scarce*, that is, countries that have developed all their water reserves. The majority of the countries experience *economic water scarcity*, which means that they have abundant or at least sufficient water resources, but lack the resources and means to develop them.<sup>10</sup> By 2025 it is projected that more than 25 countries in Africa will experience water scarcity or water stress. Thus, the need for more investments in water resource development remains as critical as ever. This involves investing in reservoirs and storage structures to capture more runoff, building diversion structures, improving water quality and strengthening dialogue to increase cooperation in water resource management, both at the local and international levels.

### Forestry

Forest ecosystems play multiple roles at global as well as local levels, and provide a range of important economic, social, and environmental goods and services. This in turn affects the wellbeing of poor rural communities, local and national economies, as well as global environmental health.<sup>11</sup> The literature is replete with overwhelming evidence of the significance of forests for human existence. In fact, forests (Box 2.2) can be regarded as nature's bountiful and versatile renewable resource. They are an integral part of the environment in which we live, and have been direct providers of

#### Box 2.2: Definition of the Forestry Sector

There is no commonly agreed definition of the forestry sector. Ideally, the definition of the sector should encompass all economic activities relating to the production of goods and services from forests. These include commercial activities that are dependent on the production of wood fibre (that is, production of industrial roundwood, wood fuel and charcoal; sawnwood and wood based panels; pulp and paper; and wooden furniture). They also include activities such as the commercial production and processing of non-wood forest products and the subsistence use of forest products.

Source: FAO (2007), Forest Finance

shelter and food for people and their livestock, and of water, medicinal plants, building materials and fuel. Forests can help reduce food insecurity, alleviate poverty, improve the sustainability of agricultural production and enhance the environment in which many impoverished rural people in the developing world live.

Forests and woodlands also regulate the environment indirectly by slowing soil erosion, fertilizing soils, controlling and storing run-off water, and regulating its release into rivers and lakes. Globally and locally, forests help regulate the climate and protect coastlines. Furthermore, forests and woodlands sustain many cultural, spiritual and religious values and also play an important role in the socio-economic development of industrial countries.

Expectations of benefits from the world's forest resources are high, but forests are affected by human activities, in particular by processes such as slash-and-burn cultiva-

<sup>10</sup> Kamara & Hilmy (2004)

<sup>11</sup> Sengupta and Maginnis (2005)

tion, air pollution, pests and agricultural and urban expansion. With the recent emphasis on sustainable development, the use of forests and woodlands has come under greater scrutiny with a view to preserving a healthy resource base and sustaining social and economic benefits. The acknowledgment of competing interests in reaping the benefits of forest and woodland resources has, among other aspects, led to more holistic thinking and approaches towards achieving sustainable forest management.

### **Forestry Production and Stock in Africa**

Forests cover about 30 percent of the world's surface (approximately 3.87 billion hectares), of which 95 percent is natural forest and 5 percent, planted forests. Tropical and subtropical forests (and woodlands) comprise about 56 percent, while the remaining 44 percent is temperate and boreal forest. Over time, global forest cover is estimated to have been reduced by at least 20 percent, and perhaps by as much as 50 percent.<sup>12</sup>

Total forest cover in Africa in 2000 was estimated to be close to 650 million hectares, representing 17 percent of global forest cover, and about 22 percent of Africa's land area. At the same time, about 43 percent of Africa's land mass was estimated to be extreme desert and only 21 percent estimated to be suitable for cultivation. African forests can be broadly classified into the following nine categories: (i) tropical rain forests; (ii) moist forests; (iii) tropical dry forests; (iv) tropical shrubs (including mangroves); (v) tropical mountain forests;

(vi) subtropical humid forests; (vii) subtropical dry forests; (viii) subtropical mountain forests; and (ix) plantations.<sup>13</sup>

It is difficult to provide accurate estimates of these different forest covers, as country data is either fragmented or unreliable.<sup>14</sup> The special category, mangroves, is particularly important because mangroves provide coastal stabilization in deltas and along coastlines. It is estimated that mangrove forests (black, white, and red) alone cover 3,390,107 ha in Africa.<sup>15</sup> The following sub-sections present a more detailed analysis of the forest cover in various sub-regions.

In *North Africa*, because of the prevailing arid and semi arid conditions, forests and woodlands are not a regular occurrence, except along the western Mediterranean coast. Some mangrove forest patches can also be found along the Red Sea coastline. The total forest and woodland area in this sub-region is estimated at 68 million hectares, and constitutes 8 percent of the total land area and about 10 percent of Africa's forests. In addition, wood patches are commonly found in mountain range areas, and trees are also cultivated as windbreaks or hedgerows around farms, and along roads and canals, constituting additional forest-like resources in the region. All wooded areas, although not included in the forest area figures, are important for forest products, grazing, and control of desertification through soil stabilization and regulation of hydrological systems. With respect to revenue generation,

<sup>12</sup> World Bank (2000)

<sup>13</sup> FAO (2001a); UNEP (1999)

<sup>14</sup> UNEP (2007)

<sup>15</sup> Ibid.

## 22 African Development Report 2007

there is no significant commercial timber production — practiced or planned — in the sub-region, although small forest plantations do exist. According to existing studies, local people use over two-thirds of forest plants for food, medicinal purposes, construction, energy, and livestock rearing, while about 35 percent of plants are known to have multipurpose uses.<sup>16</sup>

The climatic conditions in the *East Africa* sub-region, contrary to the North Africa sub-region, support a wide variety of forests and woodlands. These range from dense tropical forests in the humid and mountainous regions of Uganda, Burundi, and Rwanda, to the dry savannas of the horn of Africa. This sub-region is also home to abundant mangrove and coastal forests that are of particular importance to the livelihood of people. Because of the isolated locations and the high density, the mangroves and the Mountain Forest of East Africa harbour large numbers of animals and plants and have been identified as one of the 25 internationally recognized hotspots of biodiversity. The Mountain Forests in Tanzania, for instance, harbour at least 30 percent to 40 percent of Tanzania's plant species. Approximately 13 percent of the total land area of eastern Africa is covered by forests and woodlands, which constitute about 5 percent of the total African forest cover. However, the percentage of forests and woodlands ranges from 30 percent in Kenya to less than 1 percent in Djibouti. Fuelwood and charcoal supply the majority of the sub-region's energy — meeting 96

percent of energy needs in Uganda and 75 percent in Kenya.<sup>17</sup>

Non-wood forest products are also used extensively in eastern Africa. The potential of medicinal plants in eastern Africa has been widely acknowledged, and the plants grown in forests are used by the Maasai, Kipsigis, Turkana, and many other tribes. The Maasai, for example, have a well-established pharmacopoeia for treating livestock diseases. The use of more than 60 species or subspecies of plants for ethno-veterinary purposes has also been documented among the Olkonerei Maasai.<sup>18</sup> Despite the fact that commercial timber exploitation is limited in the sub-region, the forests and woodlands are important because of the natural resources they provide to local communities.

The total forest and woodland area in *southern Africa* amounts to about 32.7 percent of the sub-regions total area and constitutes 34 percent of all of Africa's forests.<sup>19</sup> Angola has the highest forest cover with 56 percent of the land area under forests, whereas Lesotho has the lowest with less than 1 percent. Forest products provide a ready source of revenue throughout the sub-region, and the communities living in forest or woodland areas depend heavily on forest products to meet their everyday food and energy needs. Forests and woodlands are important to local communities, mainly as a source of domestic fuel — either wood or charcoal. For example, about 80 percent of Mozambique's population live in rural areas and depend on wood for cooking,

<sup>16</sup> AOAD (1998); Hegazy (1999); FAO (1999)

<sup>17</sup> FAO (2001b); Wass (1995)

<sup>18</sup> FAO (2001b)

<sup>19</sup> FAO (2001b)

space heating, heating water for domestic use, and drying foodstuffs.<sup>20</sup>

The charcoal industry generates about USD30 million annually and is the sole source of income for about 60,000 people.<sup>21</sup> Important non-wood forest products include honey, beeswax, bamboo, reeds, mushrooms, caterpillars, fodder, wild edible plants and fruits, leaves and bark for weaving, and resins. The medicinal plant trade is extensive and profitable in southern Africa, with about 3,000 species (10 percent) of southern African plants used medicinally and around 350 species commonly and widely used. Other species harvested from the wild contribute as much as 40 percent to household incomes or typically between USD 200 to USD 1000 per household year.<sup>22</sup>

*Central Africa's* high and reliable rainfall supports extensive forest cover throughout the sub-region, with the exception of the northern parts of Cameroon, Chad, and the Central African Republic. Forests and woodlands cover about 45 percent of the land area of this sub-region and constitute 37 percent of Africa's total forest cover. Most countries in this sub-region are therefore well endowed with forests. Gabon has the greatest cover (85 percent) and Cameroon, the Democratic Republic of Congo (DRC), and Equatorial Guinea all have over 50 percent. The only exception is Chad, which, because of its northerly location and arid environment, has only 10 percent forest cover. This total forest network is the second

largest contiguous area of tropical forest in the world and thus plays a very important role in atmospheric carbon sequestration and mitigation of potential climate change. In fact, DRC alone accounts for 134 million ha of forest area, and qualifies as the country in the world with the 7th largest forest area; behind only the Russian Federation, Brazil, Canada, United States, China and Australia; and ahead of such countries as Indonesia and India.<sup>23</sup>

Other benefits of the forests include extremely high levels of biodiversity, which have enormous untapped potential for agricultural, pharmaceutical, and nutritional applications. Commercial logging is important to the economy of most of the countries in this region because it secures substantial amounts of foreign exchange. Cameroon, for example, is among Africa's leading producers and exporters of sawn timber and tropical logs, and ranks fifth in the world. In 2001, Equatorial Guinea exported USD 62 million of wood-based panels, representing 14 percent of its GDP. The forest ecosystems in this sub-region furthermore provide habitat to several communities that depend on the forest for their livelihoods and offer great opportunities for tourism.<sup>24</sup>

The *West Africa* sub-region is characterized by a marked gradation of climate, reflected in the zones of vegetation cover. There are about 72 million hectares of forests, representing 12 percent of the sub-region's land area and 11 percent of Africa's total forest cover. Commercial timber production is an extensive and lucrative

<sup>20</sup> UNEP (2007)

<sup>21</sup> Kalumiana (1998)

<sup>22</sup> Cavendish (1999); Shackleton, Shackleton and Cousins (2000)

<sup>23</sup> FAO (2006); FAO (2001b)

<sup>24</sup> FAO (2001b); World Bank (2001)

## 24 African Development Report 2007

occupation, which contributes significant proportions of income and foreign exchange to the economies in the sub-region. Forest and woodland products are also extremely important to local communities, which depend on forest and savannah resources for their energy needs, most of which are met by wood. In 2000, over 175 million m<sup>3</sup> of wood were used in West Africa for fuelwood and charcoal production. Other forest resources heavily used by local communities include wildlife (bushmeat), medicinal plants, wood and rattan for construction, furniture and crafts, honey, nuts and fruits, and animal fodder, gums, dyes, teas, spices, and aromatics.<sup>25</sup>

Overall, 21 percent to 22 percent of the African continent is covered with forests, ranging from open savannahs to closed tropical rainforests. Forests provide many goods and services that benefit local communities and national economies; and they also provide international biological and environmental benefits. Commercial forest products include timber for the construction and paper industries, but more importantly, forest resources provide local communities with food, construction materials, grazing areas for livestock, cultural and medicinal products, sites for religious practices and leisure activities, and fuel for cooking, heating, and lighting. Forests also protect and stabilize the soil, recycle nutrients to maintain soil quality and regulate water quality and flow. They are vast sinks for atmospheric carbon dioxide and thus play a critical role in mitigating global climate change, the impacts of which are

predicted to be most severe for African countries and other developing nations. By protecting soils and regulating temperatures, rainfall, and hydrological systems, forests provide basic support systems for agriculture and industry, and, consequently, for the economies of African nations.

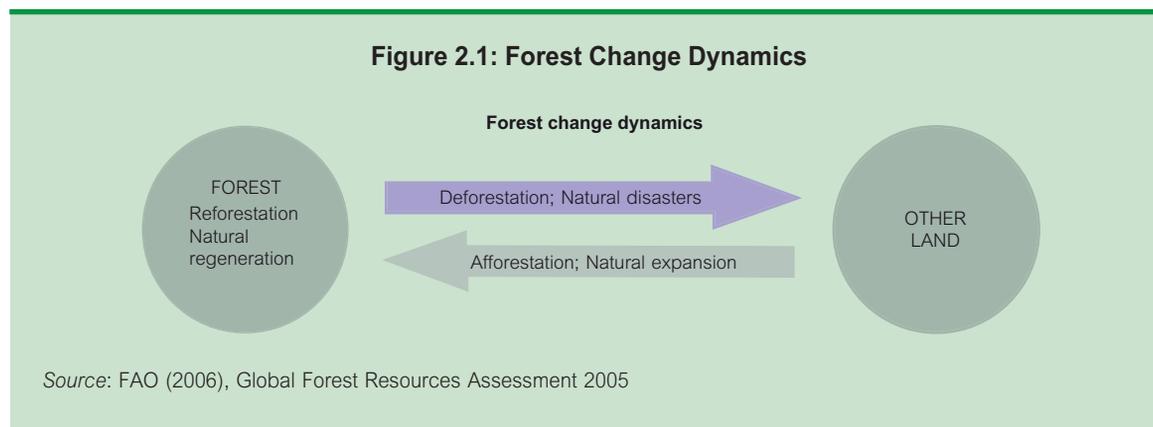
### **Long-Term Trends in Forestry Pattern in Africa**

Tracking long-term trends in forest cover involves compiling and analyzing large quantities of data that are not always consistent or comparable. The task is further complicated by different definitions of what constitutes “forest” (see Box 2.1). Forests may be defined in terms of administrative categories, land use, or land cover. The nature, extent (dimension), and bio-ecological characteristics of forest areas also change, because of both human and natural causes.<sup>26</sup> A simplified overview of key forest change dynamics is presented below in Figure 2.1.

The model has only two classes: forests and all other land. A *reduction* in forest area may occur through one of two processes: Deforestation, by far the most important, implies that forests are cleared by people — who convert the land to other uses such as agriculture or infrastructure — or is destroyed by natural disasters. Forest resources degenerate when they are not capable of regenerating naturally and no efforts are made to replant trees. In contrast, an *increase* in forest area may occur through afforestation (planting of trees on degraded forest land), or through natural expansion of forests through bush fallow.

<sup>25</sup> FAO (2001a); FAO (2001b)

<sup>26</sup> FAO (2007)



The Food and Agriculture Organization of the United Nations (FAO), in collaboration with the United Nations Environment Programme (UNEP) and the United Nations Economic Commission for Europe (UNECE), produces an assessment of the world's forests every 5–10 years. Table 2.4 presents the results of such an assessment. The data is broadly categorized into northern Africa, eastern and southern Africa, and western and central Africa based on recent assessments.

Based on the figures and assessments, the FAO (2006) concludes that the situation at the global level has remained relatively stable over the last 10–15 years. However, as outlined in Table 2.4, the trend in Africa is of particular concern, as there appears to have been very limited progress towards sustainable forest management, as measured (indirectly) through the selected key parameters. There are some indications that the net loss of forest areas has slowed down and that areas designated for conservation of biological diversity have increased slightly. Nevertheless, the continued rapid loss of total forest

area (4 million ha annually) is disconcerting.

Deforestation, forest degradation, and the associated loss of forest products and environmental services are serious challenges facing African countries. The size of natural forests and woodlands in Africa has been drastically reduced over the last century, especially since independence, as countries have struggled to improve their economies through the exploitation of natural resources. The most intensive pressures stem from deforestation for commercial timber sales; clearance for agricultural and urban developments; and overharvesting of wood for fuel, medicinal products, and construction materials. Large patches in the remaining forests have also been degraded as a result of clear felling, fires, selective harvesting and encroachment — factors that are not always evident when estimating total forest areas as a round number.

A study of forest cover and quality in Ethiopia showed that, between 1971 and 1997, up to 70 percent of forest cover was cleared or severely degraded by human

## 26 African Development Report 2007

Table 2.4: Forest Areas, Key Parameters and Trends in Forest Resources in Africa

Key Parameter / Trend	Northern Africa	Eastern and Southern Africa	Western and Central Africa	African Continent	Trends for Africa 1990–2005 (annual)
Total forest area, by sub-region	131,048 ha (3.3% of global)	226,534 ha (5.7% of global)	277,829 ha (7.0% of global)	635,412 ha (16 % of global)	– 4,263,000 ha
Forest cover in % of land area	8.6% of land area in region	27.8% of land area in region	44.1% of land area in region	21.4 % of land area in Africa	n.a.
Primary forest area 2005 (native species dominant)	13,919 ha (11.9 % of total forest)	12,241 ha (5.7%)	11,510 ha (11.6 %)	37,669 ha (8.7% of global forest area)	– 270,000 ha
Area reserved for conservation	13,036 ha (9.5% of region's forest)	20,158 ha (10.4%)	41,390 ha (35%)	74,585 ha (16.4 % of forest area)	182,000 ha (+)
Threatened tree species	5 in average per country in region	21 in average per country	34 in average per country	21 in aver. per country in Africa	n.a.
Annual average area of forest affected by fire	6176 ha (29.3% of forest area in region)	483 ha (0.8% of forest area in region)	519 ha (1.1% of forest area in region)	7177 ha (5.5% of forest area in Africa)	n.a.
Area reserved for production	44,185 ha (35% of region forest)	44,051 ha (19%)	52,796 ha (45%)	138,032 ha (30% of forest area)	– 911,000 ha
Productive plantations (area)	6,033 ha (5.1% of region's forest)	2,792 ha (1.3%)	1,939 ha (1.9%)	10,764 ha (2.5% of forest area)	42,000 ha (+)
Wood removals	Ind. roundwood 8 km <sup>3</sup> ; fuelwood 173 km <sup>3</sup> (96%)	Ind. roundwood 34km <sup>3</sup> ;fuelwood 151 km <sup>3</sup> (82%)	Ind. roundwood 36km <sup>3</sup> ;fuelwood 267 km <sup>3</sup> (88%)	Total remov.: 670 km <sup>3</sup> (22% of global)*	10,767,000 m <sup>3</sup>
Value of wood				4594 m. US \$	n.a.
Value of non wood forest products				897 million USD	n.a.
Number of people employed (2000)				870,000 (+25% since 1990)	12,000 (+)
Public ownership to forest area	98.2%	95.1%	99.7%	97.6% (global aver. is 84.4%)	n.a.

\* For industrial roundwood, 4% of global removals, but for fuelwood 49%

Source: FAO (2006), Global Forest Resources Assessment 2005

activity.<sup>27</sup> The impact of degradation also includes loss of biodiversity, radically increased rates of soil erosion, reduction in water quality, increased risk of flooding in surrounding areas, and loss of livelihoods for local communities. Other analyses also describe similar situations of forest degradation in Nigeria, where the country lost about 55.7 percent of its primary forest between 2000 and 2005. Logging, subsistence agriculture, and collection of fuelwood are cited as leading causes of forest clearing in this West African country.<sup>28</sup>

The major forestry issue in East Africa is the conversion of natural forest to alternative land-use, predominantly cultivation and grazing, although urban encroachment is also a contributing factor.<sup>29</sup> Between 1990 and 2000, East Africa lost 9 percent of its total forest and woodland cover. The highest rates of deforestation observed were in Burundi (9 percent per year), Rwanda (4 percent per year), and Uganda (2 percent per year).<sup>30</sup> Clearance of forest and woodlands for agricultural use — to feed the growing population — is perhaps the single most important cause of deforestation in this area.

Southern Africa has one of the fastest growing populations in the world and faces the challenge of having to increase its food supply by about 3 percent per year. This has invariably led to increased agricultural intensity in the sub-region. Fuelwood harvesting and tree cutting for charcoal production are other main sources of pressure

that have led to significant deforestation in this sub region.<sup>31</sup>

The main problem in Central Africa is large-scale deforestation. Indeed, the greatest threat to forests in the sub-region is commercial logging and the unsustainable harvesting practices of many companies. The highest annual rates of deforestation recorded are in Cameroon (0.9 percent), Chad and Equatorial Guinea (0.6 percent each), while insignificant rates are recorded in Gabon and Sao Tome & Principe.<sup>32</sup>

With the ever-increasing population of most African countries, there is rising demand for forest resource products, especially firewood, charcoal, and roundwood. This has led to a drastic reduction in forest cover in the continent. For example, firewood and charcoal production and consumption rose from 250 to 502 million m<sup>3</sup> (annually) during the 1970–1994 period.<sup>33</sup>

## Land

Land is one of the most critical resources in Africa and the basis of survival for a majority of its population. Land resources are generally referred to as terrestrial features that exist above mean sea level. They include landforms such as plains, valleys, plateaus, mountains, deltas and peninsulas, islands and basins; soils; and plants and animals. In terms of value, land resources also include mineral and fossil fuel deposits, natural and farmed timber, crops, animals and fish.<sup>34</sup> Land cover is the physical,

<sup>27</sup> EIS News (1999)

<sup>28</sup> FAO (2001b)

<sup>29</sup> According to the FAO (2001b)

<sup>30</sup> Ibid.

<sup>31</sup> Chenje (2000)

<sup>32</sup> FAO (2001b)

<sup>33</sup> FAO (1997)

<sup>34</sup> Hamblin (1998)

## 28 African Development Report 2007

chemical, ecological or biological categorization of the terrestrial surface, for example, grassland, forest, or concrete. Land use pertains to the arrangements, activities and inputs people undertake in a certain land cover type to produce, change, or maintain it, for example, raising cattle, recreation, or urban living. Land use concerns the products and/or benefits obtained from the use of land as well as the land management actions (activities) carried out by humans to produce these products and benefits.<sup>35</sup> It is important to note that a specific land use often corresponds to a single land cover, for example, pastoralism to unimproved grassland. However, a given land cover class may support several distinct land uses for example, a forest may be used simultaneously for hunting, timbering, shifting cultivation, fuelwood collection, recreation, wildlife preservation, and watershed and soil protection. In contrast, various land uses (for example, as carried out within a given farm system) may involve the maintenance of several distinct covers, such as cultivated land (fields), woodlots, grassland, and built-up areas. A significant change in land use (such as a land use “conversion”) is likely to cause a change in land cover, but land cover may change even if the land use remains unaltered.<sup>36</sup>

With a total land area of more than 3,025.8 million hectares (ha), Africa is the second largest continent in the world, after Asia, and its landmass is more than three times that of the United States of America. Sudan is the largest of Africa’s 53 countries,

covering 250.39 million hectares. Seychelles is the smallest, covering only 45,600 hectares. The African continent stretches nearly 8,100 km from north to south and about 7,600 km from east to west. The African landscape is a rich and dynamic mosaic of resources, which include forests and woodlands, arable land, mountains, deserts, coastal lands, and freshwater systems.<sup>37</sup> Figure 2.2 shows Africa’s eco-regions while Figure 2.3 presents the continent’s climatic zones.

Wetlands cover about one percent of the continent’s total surface area and are found in virtually all countries. Some of the more prominent wetlands include the Congo Swamps, the Chad Basin, the Okavango Delta, the Bangweulu swamps, the floodplains and deltas of the Niger and Zambezi Rivers, and the Greater St. Lucia Park wetlands in South Africa. Wetlands are critical in terms of biodiversity, but they also support many communities, providing a diversity of livelihood activities. For example, in Tanzania’s Rufiji Delta, a study covering 720,000 ha found that crop production has a gross market value of USD 3.8 million per year, and natural resources have an economic direct use value of USD10.3 million per year.<sup>38</sup>

A significant amount of the precipitation in Africa originates from the mountain ranges that thus function as the headwaters of most of the large African rivers and also deliver the resources for drinking water, hydroelectricity and irrigation of crops for the population.

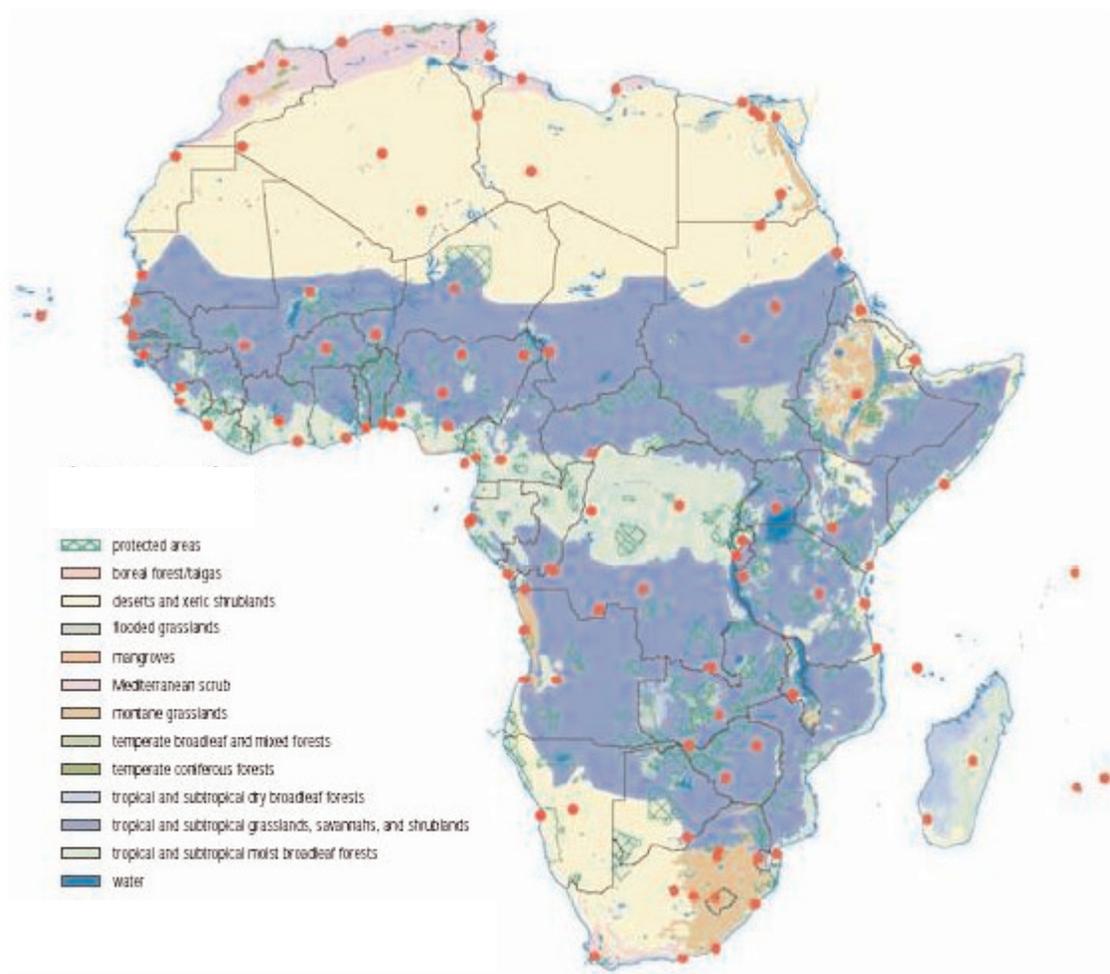
<sup>35</sup> WRI (2002–2004); FAO (2000); UNEP (2006)

<sup>36</sup> Ibid.

<sup>37</sup> UNEP (2006)

<sup>38</sup> Ibid.

Figure 2.2: Africa's Eco-Regions



Source: UNEP (2006), Forests and woodlands in Africa (Encyclopedia of Earth)

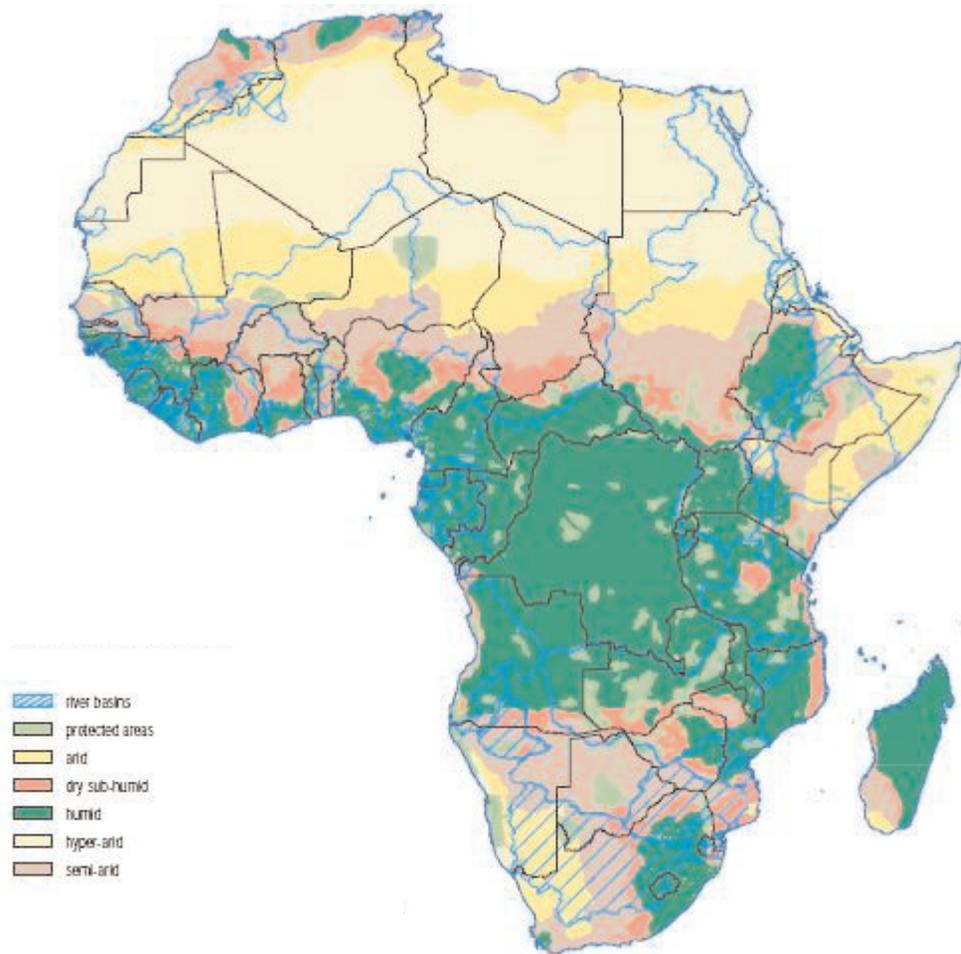
A total of 1,274 million hectares in Africa are extreme deserts, the Sahara Desert in northern Africa — the largest desert in the world — covers 906.5 million hectares. The Kgalagadi Desert in southern Africa, which covers about 26 million hectares, is about the size of France, and together with Namibia's Skeleton Coast, is the world's largest body of

sand. These desert ecosystems support distinctive plants and animals that have adapted to the harsh environment.<sup>39</sup>

Africa has priceless land resources, which provide environmental goods and services from local to global levels. Land is a

<sup>39</sup> Ibid.

Figure 2.3: Africa's Climatic Zones



Source: UNEP (2006), Forests and woodlands in Africa (Encyclopedia of Earth)

critical factor in natural and human-managed production systems, and influences the level of natural capital, and social and economic development. Access to land and to the resources it offers is at the core of enhancing opportunities and choices, particularly for people whose livelihood depends directly on it. In Uganda, for

example, land constitutes about 50 to 60 percent of the asset endowment of the poorest households.<sup>40</sup> Land and its value are closely related to the environment, with the sustainability of one being a product of the other. However, the value of land resources

<sup>40</sup> World Bank (2003)

cannot only be measured in monetary or eco-biological terms; it also includes values related to culture, aesthetics, heritage and bequest.

In summary, land in Africa is used for many activities, including agriculture and forestry; mining and oil extraction; tourism and recreation; urban expansion and infrastructure development (such as transportation). It also acts as a sink for domestic and industrial waste. It is critical in the cradle-to-grave cycle of both living and non-living things, providing habitats and other ecological goods and services, and sustaining investment and human livelihoods. There are many aspects to consider and challenges to be overcome, but Africa's significant land resources are crucial for sustainable development, and hence for the achievement of all the targets under the eight MDGs. For example, increasing agricultural production — the dominant economic activity in most parts of the continent — is the key to addressing extreme poverty and hunger.

### ***Sub-Regional Characteristics***

There are three main land use categories in northern Africa: cultivated land, forests, and rangelands. Agricultural land constitutes about 28.8 percent (or 233,590 hectares) of total land. It is estimated that about 18.7 percent of arable land is currently cultivated, although the extent of cultivated areas ranges from 2.6 percent in Egypt to 77.4 percent in Morocco. Rangelands currently occupy about 13.5 percent of total land area (mostly in Algeria and Sudan) although, over the past 50 years, half of these have been reclaimed for cultivation. However, more

than 57 percent of the total northern African land is threatened by desertification.<sup>41</sup>

Eastern Africa is characterized by intensive farming practices and a large rural population practicing subsistence-oriented agriculture, more than 70 percent by some estimates.<sup>42</sup> The total area of eastern Africa is 2,665,000 square kilometres, with 78.090 million hectares (or 29.3 percent of total area) of potential arable land. However, actual arable land is 26.221 million hectares (or 33.6 percent of potential arable land). Uganda has the highest proportion of potentially arable land (14.169 million hectares), whereas in Rwanda, all arable land is in use and the increasing population and need for food crops is pushing farmers to cultivate marginal areas — to such an extent that actual arable land stands at 156.8 percent of potential arable land. More than 30 percent of the East African land area is covered by permanent pasture, hence the dominant land use is livestock grazing. As well, about 73 percent of the total area is characterized by desert and dryland conditions, significant proportions of which are in Somalia, Djibouti, and Eritrea.<sup>43</sup>

The total land area in southern Africa is 693,000 million hectares, of which about 20 percent is arable land. Arable land and domesticated land is used for agriculture, forestry, wetlands and wildlife conservation, and human settlements. Crop production is the dominant land use, contributing to about 34 percent of GDP. Livestock farming is

<sup>41</sup> FAO AQUASTAT (2005); UNEP (2006); AOAD (1998)

<sup>42</sup> WHO/UNICEF (2000)

<sup>43</sup> UNEP (2006)

## 32 African Development Report 2007

another common form of land use, but it has been constrained in periods due to drought and diseases such as foot-and-mouth disease, cattle-lung disease, and anthrax. The proportion of the population of southern Africa employed in agriculture was estimated at 71 percent in 1970, 64 percent in 1980, and 60 percent in 1990. Proportions by country varied from 87 percent in Malawi to 14 percent in South Africa. Agriculture in southern Africa is also characterized by the employment of a migrant labour force, which engages in seasonal subsistence farming. Major threats to land use in the sub-region relate to land tenure arrangements (weak individual property rights) and associated equity issues. In addition, soil erosion (about 15 percent of land is considered degraded) is a significant threat to agricultural productivity.<sup>44</sup>

In Central Africa, land resources and land use is sensitive to climatic and vegetation characteristics, with forestry and plantation agriculture largely found in the humid zones. The region's total area stands at 536.6 million hectares. DRC has the largest total land cover at 234.5 million hectares, while Sao Tome and Principe has the smallest land area at 96,000 hectares. Large-scale agricultural development has been limited by national market failures and international trade barriers. Shifting cultivation has been the traditional means of coping with variability, but this practice has been on the downtrend and is no longer sustainable in large areas because there are much larger populations that now require land. Land degradation (including erosion

and soil compaction) is a major threat to the sustainable use of land resources in the sub-region. Armed conflict is also a threat to the sustainable management and use of land resources in Central Africa.<sup>45</sup>

The total land area in western Africa is 605.54 million hectares, of which 72.789 million hectares is arable land and 183.46 million, permanent pasture. However, about 70 percent of the sub-region (covering mainly the Sahel zone) is semi-arid to desert. Land cover and land use in the sub-region are largely determined by climate and a dramatic gradation is seen from south to north in rainfall and vegetation cover. Cultivation is thus limited and the dominant agricultural activity is livestock rearing. For example, cultivation accounts for just 4 percent of the land area in Mali and Niger, and for less than 1 percent in Mauritania. In contrast, permanent pasture accounts for 25 percent of the land area in Mali and nearly 40 percent in Mauritania. Togo and Nigeria have the largest percentage of land under cultivation (42 percent and 33 percent, respectively), followed by Côte D'Ivoire and Ghana (23 percent each). Climate variability is greatest in the Sahel (Mali, Mauritania, Niger, and northern Senegal) where drought is common and often severe.<sup>46</sup>

The four island countries of the western Indian Ocean, with a coastline of 11,646 kilometres, have a total land area of 59.2 million hectares, 99 percent of which is Madagascar, the fourth largest island country in the world. The percentage of land used

<sup>44</sup> UNEP (2006); Chenje (2000)

<sup>45</sup> UNEP (2006)

<sup>46</sup> Ibid.

for agriculture in these island countries is 53 percent, with Madagascar and the Seychelles dominating.<sup>47</sup>

### ***Characteristics of African Agricultural Land Use***

The economies of most African countries largely depend on land-based activities such as agriculture, mining, and tourism. Agriculture is perhaps one of the most challenging factors that influence the pattern of land use dynamics in Africa. It contributes about 40 percent of regional GDP and employs more than 60 percent of the labour force. In many countries, these percentages are considerably higher, generally in eastern, western and central Africa. The official estimates of the contribution of agriculture to the formal economy and to employment in many African countries, although substantial, does not even fully take into account the significant contribution of small-scale cultivation and livestock production to livelihoods. This is especially relevant for areas where pastoralism is practiced (most commonly in the more arid areas of northern, eastern and southern Africa).<sup>48</sup>

Agriculture in Africa can be classified as bimodal — divided into smallholder and large-scale/estate agriculture. The underdeveloped nature of smallholder agriculture has largely been shaped by economic policies (economies of scale factor), which are disadvantageous to smallholders but promote larger farmers, who stand a better chance of securing credit

facilities to support their agricultural practices. Agriculture in Africa is predominantly rain-fed (except in northern African countries and the western Indian Ocean Island states, where irrigation potential has been well developed). Furthermore, most of the countries experience large inter-annual and intra-annual variations in rainfall, with frequent extremes of flooding or drought. This translates into vulnerability for crop failure and economic insecurity.<sup>49</sup>

### ***Ownership and Land Access in Africa***

Over the last decade, land reform policies around the world have, with a few exceptions, such as in Zimbabwe, revolved around variations of market based land reform. This trend fits with broader shifts in global economic policies, following the end of the Cold War, that have seen a reduced role for the state, liberalization of markets, and privatization of state enterprises and assets.<sup>50</sup>

Access to land, the ability to exchange it with others and to use it effectively is very important for poverty reduction, economic growth, and private sector investment. Such access also empowers the poor and ensures good governance. Access to land varies widely across different parts of the African continent, owing to differences in colonial ties, customary laws, rule of law, and countries' historical antecedents. Typically in Africa, land can either be purchased or inherited, and this, to a great extent, determines patterns of land accessibility and ownership. Land tenure is profoundly

<sup>47</sup> Ibid.

<sup>48</sup> UNEP (2006); ECA (2004)

<sup>49</sup> ECA (2004); UNEP (2002); UNEP (2006)

<sup>50</sup> ILRI (2007); Moyo (2000); ECA (2004)

**34 African Development Report 2007**

political, and it continues to be a critical factor in the development of African politics and economies. Land tenure, in particular ownership and access rights, has been widely recognized to have important bearings on effective, efficient, and sustainable management and production regimes.<sup>51</sup> The typology of land tenure thus varies from country to country, but, overall, includes freehold tenure, state leasehold, and community-based tenure (legally recognized indigenous tenure and community-based), often in combination, as seen in Kenya, Uganda, and Rwanda. Regardless of the type of tenure that is prevalent, there are a number of challenges: In countries such as Uganda, Somalia, Kenya, and Rwanda, compulsory and systematic tenure conversion to individual ownership has not brought significant benefits to smallholder farmers. In Ethiopia, tenure insecurity is described as one of the major problems associated with the existing land system (see Box 2.3). In Kenya, where formal titles to land are held by many farmers, the lack of any significant relationship between land title and crop yield is perhaps explained by the limited use of land titles in obtaining formal credits.<sup>52</sup>

One of the key issues related to land tenure in Africa is the degree to which the tenure arrangement encourages or discourages sustainable farm practices and investment in land. It is generally believed that a more secure tenure system provides the necessary incentives for farmers to better manage their land and invest in land improvement. Analysis of data on farmers'

opinions on the current land tenure system and perceptions of tenure security shows some relationship with engagement in long-term land improvement practices. Various informal methods employed by farmers in land transfers include mortgage, renting, sharecropping, sales, gift, contracts, exchange of plots, and inheritance. The dominant practices are sharecropping of land (44 percent), sale of land (31 percent), and renting of land (16 percent).<sup>53</sup> From these assessments, one can conclude that although the existing rural land policy in much of Africa has limited the development of formal rural land markets, farmers continue to be involved in informal land transactions mainly for economic reasons.

The major features of the existing land tenure system, such as declining farm size, tenure insecurity, and subsistence farming practices, have been identified as some of the causes of the often poor performance of the agricultural sector. The land tenure system is also cited by many as the major impediment to the adoption of sustainable and long-term land improvement and management practices. As a result, the land tenure issue has attracted widespread attention and debate among policymakers, government and non-government actors, the private sector, the donor community, researchers, and the public at large. The land tenure problem remains a challenge that needs to be addressed through comprehensive and thorough research and analysis.<sup>54</sup>

High population densities and grazing rights have led to frequent conflicts over

<sup>51</sup> ILRI (2007)

<sup>52</sup> ECA (2004); ILRI (2007)

<sup>53</sup> Ibid.

<sup>54</sup> EEA/EEPRI (2002)

**Box 2.3: Land Issues in Ethiopia**

In Ethiopia, lack of adequate access to, and control over, land by peasants is said to be among the principal factors exacerbating rural poverty and food insecurity and conflicts. The history of forced land redistributions over the last thirty years remains a major cause of perceived tenure insecurity in the Ethiopian highlands. Various land policies in the country have also marginalized pastoralists in the semi-arid lowland areas. However, there is an increasing clamour for reduction in state control over land use and for transferring more land rights to land users in the regional states. There have been modest policy and legal reforms at both regional and federal levels. Efforts have been made to increase farmers' confidence that they will reap the fruit of their labour and investment (IRLI, 2007).

Furthermore, Howard and Smith (2006) noted that women are disadvantaged by unequal gender relations in land allocation in Ethiopia. Their work indicate that in rural Ethiopia, as elsewhere, in addition to the formal, *de jure*, land access mechanisms prescribed by the state, informal means of access to land abound. These include intra-family transfers and land transactions, land access through community membership, and resettlement and squatter settlement.

land and land-based resources in most Africa countries. Examples of outright land and land resource-related wars include the conflicts in Rwanda and the Democratic Republic of Congo. International organizations such as the United Nations Commission on Human Rights (UNCHR) continue to support local civil society efforts to mediate in land disputes. Several local and international organizations have also

published case studies on land problems. Despite these activities, civil society groups have seldom formed formal networks on land issues, and hence the impact on government thinking, including development of land laws, has not been maximized.<sup>55</sup>

Good political, economic, and corporate governance is of primary importance to ensure that Africa's land resource wealth serves as an engine for sustainable socio-economic development rather than a source of inter and intra-state conflict and underdevelopment.

**Management of Renewable Natural Resources**

The preceding chapters presented water, forestry and land as some of Africa's basic natural resources. Each of these resources is fundamental to Africa's commercial and subsistence related activities. Yet, the analysis clearly reveals that the resources are fragile and susceptible to degradation. Consequently, proper management of the resources and of the wealth they generate is crucial for the future development of Africa. Basic natural resource management concepts (Chapter 1) stipulate that an integrated effort is required to ensure efficient resource use and prevent adverse environmental impacts. In other words, a holistic approach is needed because of the multiple inter-linkages between natural resources. A multidisciplinary integrated approach is also called for, as recognized by the AfDB and by other stakeholders (Box. 2.4).

<sup>55</sup> IRLI (2007)

### Box 2.4: AfDB Sector Policies and Guidelines for Renewable Natural Resources

Since its inception, the AfDB has developed a number of sector policies and guidelines, which have guided its investments in natural resource sub-sectors. The mainstreaming of sustainable natural resource management has been closely linked to the Bank's environmental and social sustainability concerns, which date as far back as the late 1980s. The Bank's natural resource management concerns are largely reflected in its environmental policies and operations guidelines, and there is no single policy that encompasses all natural resources, but the guidelines on fisheries, forestry, and land management are nevertheless closely linked to the Bank's agricultural sector strategy, under which operations related to these sub-sectors are undertaken.

The Bank's NRM activities — especially those related to water resources, extractive industries, and environmental management — have increased significantly in recent years. As a result, the Bank has revised and updated its policies and strategies to accommodate emerging initiatives and partnerships; and increased activity levels, investments, new initiatives, and engagements in partnerships with other donors and stakeholders. Bank Group operations in the renewable resources area currently face three key challenges: (i) how to sustain the productivity of the natural resource base; (ii) how to halt practices that "mine" the resource base beyond its regenerative capacity; and (iii) how to support interventions that increase productivity per unit of resource used. Concerns about sustaining the productivity of the natural resource base have led the Bank to focus on land use and land management issues and on the use of common pool resources. In this context, the Bank promotes rigorous analyses at all stages of the project cycle to detect potential and actual ecological effects of investments and determine how best to avoid or minimize degradation or depletion.

Sources: AfDB Annual Report (2005); (2006)

### **Management of Africa's Water Resources**

As mentioned in previous sections, a considerable number of countries in Africa experience water scarcity or water stress. This is attributable to a number of factors, ranging from basic natural and climatic conditions to absence of proper water resources utilization and administration (at the local, national, and regional levels). The demand for water, which, in many cases, exceeds supply, has already led to unsustainable practices and increasing competition for water resources between sectors, communities, and nations. Africa's progress towards sustainable development and the achievement of the MDGs

crucially depends on amending unsustainable practices and prioritizing the management of water resources for industrial, domestic, and agricultural uses. Some of the Initiatives implemented to date are presented below.

**Basin Level Initiatives:** In conformity with the global approach to water resources management, Africa manages its scarce water resources through various partnership arrangements among riparian countries in the continent's major river basins, and among local communities within the basins and catchments. Eight of the continent's nine largest international basins have basin authorities that have been ratified by the

states sharing the river basin. The Congo River basin, which is also the largest, occupying about 12.5 percent of the continent's area, is the only basin that does not have a basin organization.<sup>56</sup> The continent's major river basin organizations and the areas of the continent they occupy are:

- The Nile Basin Initiative (10.3 percent), created in 1999 (Box 2.5);
- the Lake Chad Basin Commission (7.8 percent), created in 1964;
- the Niger Basin Authority (7.5 percent), created in 1980;
- the Zambezi Watercourse Commission (4.5 percent), created in 2004;
- the Orange Commission — Sengu River (3.0 percent), created in 2000;
- the Organization for the Development of Senegal River (1.6 percent), created in 1972;
- Limpopo Basin Commission (1.3 percent), created in 2002; and
- the Volta River Basin (1.3 percent), created in 2004.

In spite of the formal steps taken to create these organizations, most of them have been beset by bureaucratic inefficiencies and financial and capacity constraints. As such, the majority of them have not been able to operate as envisaged and results have fallen short of expectations. In addition, the organizations have not been able to keep up with emerging science-based water management innovations and thus lack key techniques for water allocation, development, and distribution. According to the Fourth World

Water Forum<sup>57</sup>, the various initiatives aimed at establishing and strengthening water basin organizations (WBOs) face a considerable shortage of human and financial resources with respect to the various initiatives aimed at establishing and strengthening water basin organizations (WBOs). In essence, only the South African and the Senegal River Development Organizations (OMVS) have a resource base that will allow them to perform their duties. This notwithstanding, the collective approach to water resources management could, if further supported and developed, reduce waste and ensure efficiency in water resources allocation and utilization in Africa. Furthermore, despite the fact that numerous water resources in Africa are shared among countries, issues relating to water rights and to ownership of international waters remain largely unresolved, resulting in national interests prevailing over shared interests.<sup>58</sup>

**Integrated Water Resource Management (IWRM):** The IWRM framework for planning and managing water resources has also been embraced in Africa and in various management initiatives for river basins. IWRM promotes the coordinated development and management of water, land, and related resources, in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. It is generally agreed that IWRM principles are prerequisites for enhanced water resource development in Africa. In principle, all African countries have

<sup>56</sup> FAO (2005); WWC/CONAGUA (2006)

<sup>57</sup> WWC/CONAGUA (2006)

<sup>58</sup> Ibid.

**Box 2.5: The Nile River Basin Initiative**

*The Nile Basin Initiative*, created in 1999 at the initiative of the African Council of Ministers on Water (AMCOW) for the countries riparian to the Nile Basin (Nile COM), furthers a first agreement in 1959 between Egypt and Sudan on Nile River water usage, and also on commitments for the environmental protection of the Nile Basin. Ten countries located in the Nile Basin (Burundi, DRC, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Uganda, Tanzania and Eritrea as a 'prospective member') are participants. The initiative aims to achieve sustainable socio-economic development through the use of, and equitable sharing of benefits from, water resources in the Nile Basin. Its main objectives are to: (i) develop the Nile River water resources in an equitable and sustainable manner in order to ensure prosperity, security, and peace for the inhabitants; (ii) guarantee effective water management and optimal resource use; (iii) promote cooperation and combined action between member countries; and, (iv) combat poverty and promote economic integration.

Source: FAO, AQUASTAT (2005)

agreed to engage in watershed management and in IWRM — in other words, manage water resources at the basin level rather than at the politically defined boundary level (see Boxes 2.5 and 2.6 as well as examples below). Thus, the planning and management of water-related activities is seen as an all-encompassing activity involving relevant actors and stakeholders.<sup>59</sup>

Ethiopia and Kenya provide good examples of IWRM. In 2001, Ethiopia engaged stakeholders to provide input for the development of a sectoral strategic action plan aimed at achieving its national water policy objectives. The resulting General Water Resource Development Program (2002–2016) was established to address water quality management as part of an IWRM plan for key river basins. Under this program, institutional bodies and facilities would be strengthened and new ones established for effective management and monitoring of water quality. These include laboratories at

national and regional levels, river basin commissions, authorities and a national water resource council.<sup>60</sup> Similarly, in the East Africa sub-region, Kenya has made considerable progress in reforming the water sector, especially in relation to water supply and sanitation. As stated in its 2002 Water Act, the objectives include enhancing the provision, conservation, control, apportionment, and use of water. As a result of these reforms, Kenya established a Water Resource Management Authority, and drafted its first National Water Resource Management Strategy in 2004 to provide a clear road map for managing and developing water resources in a sustainable manner through community participation, capacity-building, and a demand-driven approach.<sup>61</sup>

Water resource management at the true IWRM (visionary) level is still in its infancy in Africa. A national-level assessment of 34 countries on the continent, conducted by the

<sup>59</sup> WWC/CONAGUA (2006); UNEP (2006)

<sup>60</sup> UNEP (2006); Bzioui (2005)

<sup>61</sup> UNEP (2006)

### Box 2.6: The African Water Facility (AWF)

The AWF, an instrument of the African Ministers Council on Water (AMCOW), is hosted by the AfDB Bank Group at the request of the AMCOW. Its mission is to improve the enabling policy and institutional environment and to strengthen water resource management in Africa in order to attract the significant investments needed to achieve national and regional water objectives. Specifically, the AMCOW mobilizes resources to finance water infrastructure and water investment facilitating activities in Africa. Interventions under the AWF focus on achieving the following three main outcomes:

1. *Improved Integrated Water Resources Management*: RMCs have strengthened their capacities to manage their water resources effectively, based on IWRM principles that create an environment that is conducive to coherent and sustainable investments;
2. *Improved Transboundary Water Resources Management (TWRM)*: Regional organizations manage transboundary water resources under a cooperative framework that fosters investments with shared benefits; and
3. *Increased Water Sector Investments*: RMCs and regional organizations benefit from projects and programs through increased investments resulting from a sound investment climate, better preparation, and available funding.

By facilitating the very considerable water investments that are needed to provide water security and improve water resources management in Africa, the AWF offers African countries a great opportunity to address the critical problems that they face in water supply. The AWF also identifies information, knowledge management, and monitoring and evaluation as key crosscutting components designed to provide broad support for IWRM and TWRM activities. During the 2005–2009 period, the AWF plans to mobilize EUR 500 million from bilateral and multilateral donors for these activities. Resources committed to date amount to approximately EUR 60 million from seven donors: the European Union (EU), Canada, Norway, Sweden, Denmark, Austria, and France.

*Source*: African Development Bank, Water and Sanitation Department

AfDB in 2005, revealed that only 14 countries had water resources management policies and strategies, and that only 16 countries prioritized water in their Poverty Reduction Strategy Policies (PRSPs).<sup>62</sup>

**Public Private Partnerships** in water resources management and water supply programs have been gaining popularity in

some African countries. These partnerships are being used to ensure sustained development of infrastructure and water supply. Several of such partnerships have recorded successes in providing services to large urban centres, districts, as well as rural communities.<sup>63</sup> At the national level, responses to increased competition over freshwater resources include revision of water resource development policies and greater involvement of stakeholders —

<sup>62</sup> Assessment conducted by AfDB; presented at Fourth World Water Forum, Mexico (WWC/CONAGUA, 2006).

<sup>63</sup> UNEP (2002)

**Box 2.7: Meeting the MDG Drinking Water and Sanitation Targets (Goal 7, Target 11)**

Water is an essential resource for human beings. Safe drinking water, sanitation and good hygiene are fundamental to health, survival, growth and development. The Millennium Development Goals (MDGs) have set a common course aimed at pushing back poverty, inequality, hunger, and illness. All eight MDGs are, in one way or another, related to water resources. Indeed, the world has pledged, to reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation before 2015. This is reinforced with goals and initiatives for the “International decade for Action, Water for Life, 2005–2015”.

Although the world has achieved considerable results, sub-Saharan Africa (SSA) remains an area of great concern: Even though the percentage of people with access to clean water rose from 49 percent to 56 percent over the 1990–2004 period, the absolute number of people without access to drinking water actually increased by 23 percent (taking into account the population growth factor). With slow progress, low coverage, and a huge disparity between urban and rural coverage, SSA is unlikely to attain the MDG target (for this specific region: 75 percent coverage by 2015).

Source: WHO/UNICEF (2006), Meeting the MDG Drinking Water and Sanitation Target.

especially local communities and the private sector — in water resource management and in water supply. However, many countries face implementation challenges. For example, Ethiopia’s Water Resource Policy (1999) focuses on providing a clean and safe water supply, but there are no appropriate directives and regulatory instruments to enforce the legislation.<sup>64</sup>

Some of the areas where vigorous emphasis is being placed in order to achieve the MDG targets (see Box 2.7) include water resources management, watershed management, adequate water accessibility and quantity, water quality, adequate institutional capacity, and international water rights. Measures implemented so far include, the *Rural Water Supply and Sanitation Initiative* (RWSSI), a major water initiative launched by

the AfDB in collaboration with its RMCs and other donors in 2003. The objective of the RWSSI is to mobilize African governments and the international donor community to accelerate Africans’ access to sustainable drinking water and basic sanitation, so as to meet critical MDGs (Box 2.8).

Major international programs for water resource management include the Lake Victoria Environmental Management Program (LVEMP) and the Nile Equatorial Lakes Subsidiary Action Program (NELSAP). The LVEMP was established in 1995 by Kenya, Uganda, and Tanzania to improve sustainable use of the basin’s natural resources. It focused primarily on fisheries management, pollution control, invasive alien species control, and land use management.<sup>65</sup> The international community

<sup>64</sup> UNEP (2006); Bzioui (2005)

<sup>65</sup> UNEP (2006)

### Box 2.8: The Rural Water Supply and Sanitation Initiative (RWSSI)

The RWSSI strategy focuses on the following key elements:

- Raising awareness about the rural water supply and sanitation situation in Africa;
- Mobilizing more funds from donors, RMCs, NGOs, and other stakeholders;
- Adopting fast track mechanisms for national RWSS programs;
- Adopting a demand-driven programmatic approach, as opposed to a multi-project approach;
- Prioritizing sanitation, focusing on hygiene, and on public health education;
- Strengthening the capacity of decentralized government institutions, communities, the private sector, and artisans;
- Ensuring beneficiary participation, in the design phase as well (in an IWRM context);
- Enhancing sustainability by promoting technology, water innovation, and indigenous knowledge, based on beneficiary consensus, ease of implementation, cost-recovery schemes, and local knowledge for operations and maintenance

Until 2002, over 80 percent of Bank Group AfDB financing for water supply and sanitation focused on urban areas, as did most other donor support. Since over 65 percent of Africans live in rural areas, the Bank Group made a strategic decision in 2003 to shift its water supply and sanitation financing to rural areas, which have the lowest access to basic services and the highest poverty levels. The target of the RWSSI is to increase safe water and basic sanitation coverage to about 80 percent of the rural population by 2015. If fully successful, the achievement of the RWSSI targets will expand access to potable water supply to 277 million people, and sanitation services to 295 million people by 2015.

While this challenge holds the significant promise of improving sustainable livelihoods as well as rural water and sanitation services in Africa, its achievement over the 2000–15 period has huge investment implications. The cumulative investment for achieving the targeted 80 percent coverage by 2015 is estimated at USD 14.2 billion over the 15-year period. The Bank is committed to financing 30 percent of the total costs from its African Development Fund (ADF) and African Development Bank (ADB) windows. It has called on multilateral and bilateral donors to provide 50 percent of the financing, and on RMC governments and beneficiary communities to contribute 15 and 5 percent, respectively. Since the launching of the RWSSI in 2003, the Bank has approved 13 RWSSI programs and projects for a total of USD 536 million in financing.

*Source:* African Development Bank, Water and Sanitation Department

has supported these and other efforts in Africa to cope with the problematic water situation. Several international agreements and protocols have been established, especially in responses to escalating conflicts over shared watercourses. Examples of such internationally motivated initiatives include the Regional Program for the Sustainable Development of the Nubian Sandstone Aquifer (NSA), the Southern

African Development Community (SADC) Protocol on Shared Water Courses, and the Nile Basin Initiative, described in Box 2.5.

### **Forestry Management in Africa**

Several African governments are currently shifting emphasis from passive to active involvement in the forestry sector (for

**Box 2.9: Trade-Off Between Poverty and Deforestation — Win-Win Approaches?**

There is a potential dilemma of trade-offs between poverty reduction and environmental protection: deforestation causes environmental damage, but it also increases the supply of farmland and generates rural income and employment (sometimes sustainable, sometimes not). However, recent comprehensive studies suggest that poverty reduction and environmental protection are not inherently in opposition (at 'loggerheads'), nor are they automatically aligned. Outcomes depend on the policies adopted and on specific conditions on the ground. In other words, there are ample options for 'win-win' approaches, especially when labor demand can be boosted outside agriculture. Key approaches include:

- Tenure, zoning, and land-use regulation – for example, revisiting the ownership and management of government lands, regulating exploitation of private lands and promoting participatory land management;
- Making forest management more attractive to agriculture – for example, by funding markets for environmental services and removing barriers to sustainable management of forests for timber and other products; and
- Coordinating regional development interventions – such as road networks and agricultural policies to achieve synergies where possible.

Source: Chomitz (2006)

example, Nigeria is conducting a comprehensive inventory and valuation of its forests and woodlands). Governments are also introducing mechanisms that will encourage sustainable utilization of forest and woodland resources, including the issuance of concessions on standing volumes rather than on harvested volumes. Specifically, governments are putting in place stronger policies and allocating additional resources to enforce them. This is based on the recognition that conservation and the sustainable use and management of Africa's forests and woodlands are the necessary foundation for the promotion, development, and growth of other sectors. In its 2006 report, "Forests and Woodlands in Africa" the UNEP<sup>66</sup> recommends that countries develop and implement national biodiversity strategic action plans, nature reserves, and protected

<sup>66</sup> Ibid.

area systems. Setting actual targets on biological diversity and continuously monitoring progress are particularly important for the well-being and livelihood needs of Africans. A recent work under the World Bank umbrella<sup>67</sup> focuses on the interrelationships between agricultural land expansion and deforestation processes as evidenced in Africa, for instance, and presents an appealing approach, where a number of tools — often in combination — can be applied to achieve 'win-win' situations (Box 2.9).

Many issues have to be taken into consideration in managing forest resources in Africa. The first and most fundamental is determining which areas can and should be maintained as protected areas, and which should be allowed to be developed for production (cropping, forestry, livestock, and

<sup>67</sup> Chomitz (2006)

### Box 2.10: Integrated Forestry Conservation and Development

Effective resource conservation and management must involve strong local participation. This is fully integrated in the concept of integrated conservation and development, which involves the following key aspects:

- Local people retain the rights to continue traditional use of resources inside state-owned protected areas (to the extent that this is not detrimental to the ecosystem) and are, of course, allowed to continue such activities on all land returned outright to them.
- Local communities are allowed to generate income from protected areas through environmentally compatible activities such as tourism, hunting with traditional weapons, and gathering of non-timber forest products. All of these activities are directly dependent on the protected area. Local communities given exclusive rights to carry out these activities will have an incentive to conserve the forest or wilderness area.
- Commercial logging of protected areas is entirely excluded. Logging can be allowed and carefully managed only in those areas specifically identified for logging, but even then, only with techniques and management practices that ensure long-term sustainability.
- Buffer zones are established around core protected areas, and ownership of the land and associated resources in them is returned to the local people. Buffer zones are meant to provide the local people with sufficient forest and agricultural products to prevent overexploitation of the protected areas. They also serve to keep potentially destructive wildlife away from villages, crops, and domestic livestock.
- Agriculture and social development activities can be provided outside protected areas to attract local people away from (the forest areas) and as an incentive to avoid encroachment.

Source: Cleaver and Schreiber (1994), *Reversing the Spiral* (World Bank)

fisheries); i.e. broader land use planning. In this context, the criteria for selecting natural ecosystems for preservation and protection include the following: biological importance; productive potential; provision of “environmental services” (prevention of soil erosion and flooding, recharge of aquifers, maintenance of river flow); importance of the survival of indigenous peoples and their livelihood systems; productive potential; current status (whether or not the ecosystem is already degraded); and, likelihood of successful preservation.

Reducing pressure on forests at the local level can be achieved by limiting access to them in the first place. This has been done using local forest guards in countries like Nigeria and Ghana to protect the forest from

unlawful exploitation by local people. Reduced access to forest products however, has a number of serious implications including increasing shortage of fuelwood and negative impacts on the income and nutrition status of dependent local people. In such circumstances, government action is needed to address key concerns. Such actions would include actively engaging the private sector and civil society in forestry and woodland resources management, and reviewing the legal and institutional capacities of the public sector institutions responsible for forestry resources. Private investor participation can be enhanced by carrying out up-to-date forest inventories. One of the challenges in this regard is that existing information on forests and woodlands is

**Box 2.11: AfDB Forestry Strategies and Initiatives**

The African Development Bank's engagement in the forestry sector started as far back as 1978. In 1994, the Bank adopted a specific *Forestry Policy*, under its agricultural operations, to guide its lending to the sub-sector. The policy emphasizes the need for sustainable management of Africa's forest resources to ensure a critical balance between ensuring the sustainable supply of wood and non-wood products and maintaining the healthy regeneration capacity of the continent's forests.

Regional cooperation plays a significant role in the conservation of important forest areas. In light of this, the Bank Group continues to work closely with African regional and sub-regional organizations, as well as with technical institutions to establish protected and classified forest areas; promote intra-African trade in wood and non-wood products; create regional and sub-regional forestry projects; harmonize forest policies; set up linkages between forestry sub-regional institutes and forestry faculties of universities; and establish policy and operational networks for exchange of information.

In 1999, the Bank reviewed its forestry portfolio as well as the policies of other donors. Following this review, the Bank shifted the focus of its financing from industrial forestry plantations to social, rural development, and environmentally focused forestry projects. The bulk of the Bank's current forestry portfolio comprises broad-based projects that incorporate an integrated approach to natural resources management. Since 1978, the Bank has financed 31 forestry projects in 21 countries, for a total commitment value of UA 458.47 million. However, a downward trend in the demand for forestry projects has been noted. The projects are designed as integrated programs with components from other sectors such as agriculture and water resources. Most of the interventions have diversified the income sources of rural people and increased employment opportunities. Furthermore, the projects are multi-sector based, collaborative and participatory in nature, and designed within the context of sustainable natural resource management and integrated forestry development. Women, who are sometimes marginalized in decision making in Africa, are key stakeholders in the design (and implementation) of most Bank-financed forestry projects.

*Source:* African Development Bank, Agriculture and Agro-Industry Department

often outdated and incomplete. This is partly because most of it is obtained from secondary sources.<sup>68</sup>

Reflecting the recognition that effective resource conservation and management must involve strong local participation, the concept of "integrated forestry conservation and development" has been gaining traction in forestry development in Africa and elsewhere (Box 2.10). Experience with the implementation of this concept is still limited in Africa. A number of pilot efforts

have been initiated — by the African Development Bank (Box 2.11) — but these are still in the very early stages. A potential danger to watch for is the risk of the "magnet syndrome": priority provision of infrastructure and social services around areas to be protected may, in fact, *attract* people to the area if social and infrastructure development farther away is significantly lagging behind that around the area to be protected.<sup>69</sup>

<sup>68</sup> UNEP (2006)

<sup>69</sup> Ibid.

### **Land Reforms in Africa**

Arguments for land reform programs in Africa typically revolve around issues of equity, poverty reduction, economic development, and political stability — but land reforms are also considered important contributors to human freedoms, civil liberties, and sustainable democracies. Access to land remains critical for people's survival in most developing countries where “land is the primary means for generating a livelihood”. During the 20th century, many governments developed land reform policies aimed at meeting these objectives and at dealing in a controlled way with the demands and tensions around land.<sup>70</sup>

In some African countries, there has been continuity from colonial to post-colonial land reforms. For example, in Kenya, land reforms started by British rulers in the 1950s were pursued with even greater vigour by the first post-independence government. The reasons for this — often problematic — continuity included the weak nature of many post-colonial states, constitutions that preserved existing institutions and laws, the extent and influence of foreign investments, and the need to earn foreign exchange.<sup>71</sup> In other African countries, independent governments implemented their own radical and redistributive land reforms (also see Boxes 2.3 and 2.12). In the 1970s, for example, the Marxist regime in Ethiopia abolished the feudal system of landholding, nationalized all land, and distributed it to those willing to work it. In

<sup>70</sup> DLA (1997); Prosterman & Riedinger (1987); World Bank (2003)

<sup>71</sup> Okoth-Ogendo (1993)

#### **Box 2.12: Land Reform in Botswana**

The commitment of African governments to land reforms can be described by the Botswana land policy paper which is aimed at the “review of all land related laws and policies” and sets out “a comprehensive policy which will promote equitable land distribution and address land use conflicts, land pricing and land rights, as well as strengthen land management. The new policy will establish a favourable environment for both domestic and foreign direct investment, thus contributing to economic diversification and global competitiveness. In addition, a number of land-related Acts will be reviewed, including: the Town and Country Planning Act, the Deeds Registry Act, the Tribal Land Act, the State Land Act and the Land Survey Act. These Acts will be aligned with the Land Policy and other relevant pieces of legislation”.

*Source:* Botswana Minister of Finance, Budget Speech to Parliament, 5 February 2007

Mozambique, the abandonment of farms by the Portuguese at independence made the nationalization of land relatively easy. The land was divided into state farms, cooperative farms, and the distribution of land to individuals was organized through a registered license process that left the state with an overriding power.<sup>72</sup> Land was also nationalized through legislation in many other countries, including: Tanzania, Guinea, Sudan, Mali, Nigeria, Burkina Faso, Zaire, Uganda, Somalia, and Zambia.<sup>73</sup>

Advocates of reforms in land rights and land markets frequently posit two important

<sup>72</sup> Ibid.

<sup>73</sup> Bruce (1993)

**46 African Development Report 2007**

hypotheses: (i) African countries should grant land titles to their citizens because titles increase land tenure security and facilitate access to input, land, and financial markets; and, (ii) land markets constitute the most efficient mechanism for allocating resources and improving access to productive resources by the poor, especially women and other marginalized groups. Land titling, however, is not a panacea for reforming land tenure systems in Africa. Owing to differences in environmental risks, the level of demand for agricultural land, the performance of existing tenure systems, the legacy of colonial and postcolonial reforms, and other socioeconomic factors, the need for, and impact of, titling will also differ. These diverse conditions have led land rights to evolve along different pathways and thus to require different reform options. Because land is an immovable resource, all transactions really refer to the bundles of rights associated with a specific piece of land. Land rights set boundaries for opportunities and constraints regarding the control, management, and use of land, whereas land markets are mechanisms by which right holders and non-right holders can transfer, rent, and acquire different bundles of rights to land.<sup>74</sup>

In addition, the importance of customary land tenure systems varies from country to country. In Botswana, Malawi, Mali, Morocco, Niger, and Zambia, customary land rights are the dominant tenure systems. Under these systems, land values are generally equal to the discounted net present value of current and future productivity per

hectare. As such, land productivity is used to determine the terms of land contracts. These land rights are generally viewed as an impediment to agricultural growth because they entail limited access to formal credit and input markets. Nonetheless, such rights offer many opportunities to poor households because: (1) they are easily acquired through group membership and social networking; (2) land contracts are based on risk-sharing strategies, whereby landowners and tenants share input costs and output; and (3) right holders have informal mechanisms for acquiring credit and avoiding loss of their lands.<sup>75</sup>

In Botswana, Swaziland, and Zambia, distorted land policies have favoured the emergence of landowning elites and private agribusinesses at the expense of small producers. In Tunisia, however, titling is widespread because the government has reduced titling fees and promoted irrigation and production of high value crops (olive and nut trees). Registered customary private land rights are the dominant land rights in North Africa and in a few countries in sub-Saharan Africa (such as the Central African Republic, Kenya, Mali, and Niger). Registration facilitates the recording of all transactions at the local level, reduces the incidence of conflict, and, transforms the value of land. Registration therefore enlarges the possibilities for right holders to make land transactions in both formal and informal land markets, and gives them easier access to credit in state-managed credit schemes.<sup>76</sup>

<sup>74</sup> Tidiane (2004)

<sup>75</sup> Ibid.

<sup>76</sup> Ibid.

Many countries in Africa are clearly struggling to implement the laws and policies that they have formulated in recent years. These difficulties stem from over-ambition, lack of capacity, scarcity of financial resources, and the assumption that customary law can be swept away with the stroke of a pen, or women's land rights protected by another. Social reality at the local level is generally very different from what is imagined in the capital city. Land issues are in fact not new in Africa.<sup>77</sup> The land tenure situation has been evolving in response to demographic and technological changes, wars, conquests, and changes in governance. Moreover, from colonial times to the present, land has been an object of policy intervention and every spot of land in Africa has a history of changing land policies and different forms of land politics. Any new policy must therefore take previous policies and their effects into account in addition to the socio-economic conditions of land tenure they aim to alter.

In conclusion, concerning land relations and policies designed to benefit the poor, there are two competing models of governance and development on offer in and for Africa:<sup>78</sup> The first model involves adopting the agenda of the international community and its international financial institutions and donors by making land available for international investment and development through free and open land markets and homogenized national land laws, thus reaping the benefits of globalization. Such an agenda downplays issues of

security of tenure for the poor, decentralized land management, and women's rights to land. The second model involves developing national agendas to ensure that national considerations are at the forefront of land management. This is not meant to repel globalization, as that would be impractical, but to give primacy of place to the land concerns of the poor, both women and men, who now constitute the majority of land holders in all countries in Africa and are likely to be for considerable time to come.

### Climate Change, Risk Management and Adaptation in Africa

Climate Change is emerging as perhaps the most important international development challenge of the 21st Century. The economic and social welfare of societies and, indeed, their long-term sustainability is highly vulnerable to climate change. The recently published report<sup>79</sup> of the Intergovernmental Panel on Climate Change (IPCC) unequivocally concludes that there is "very high confidence" that increased emissions of Green House Gases (GHG) like carbon dioxide (CO<sub>2</sub>) is the cause of significant climate changes. Developing countries are the most vulnerable and bear the highest risks on their natural resources as climate change and climate variability critically jeopardize their economic development and ability to reduce poverty. In the developing world, the direct and indirect impacts of climate change threaten to reverse decades of development efforts, particularly in Africa.

<sup>77</sup> Lund et al. (2006)

<sup>78</sup> IRLI (2007)

<sup>79</sup> IPCC (2007a)

## 48 African Development Report 2007

Climate change is thus a major threat to sustainable growth and development in Africa, and to the achievement of the Millennium Development Goals. Africa is particularly vulnerable to climate change because of its overdependence on rain-fed agriculture, compounded by factors such as widespread poverty and weak capacity. Climate change is already having profound and irreversible impacts on the African continent. Noticeable impacts, among others, include:

- (i) increased frequency of natural disasters, droughts, floods and other weather extremes that lead to loss of life, economic disruption, social unrest and forced migration as well as major environmental problems;
- (ii) sea level rise and flooding that threaten agriculture, human health, infrastructure, particularly in coastal cities and islands;
- (iii) prolonged drought periods that cause stress on water resources and reduced food security due to diminished agricultural productivity;
- (iv) increase in outbreaks of vector-borne diseases and other health impacts; and
- (v) various threats to forestry, water resources, biodiversity, and other natural resources.

Key sectors such as agriculture, fisheries, forestry, industry, energy and transport are very sensitive to climate change. Natural disasters destroy strategic national investments in infrastructure, while there is no requisite insurance to cover the losses. Small Island developing countries in Africa

are particularly vulnerable. Climate change also negatively affect ecosystems, more specifically coral reefs.

The impacts of climate change are inequitably distributed: poor countries are hardest and earliest hit, while rich countries are responsible for three quarters of GHG emissions that cause climate change. Even if greenhouse gases emissions were curbed immediately, further warming would still be expected with its associated negative impacts. To address these risks, climate change issues and response strategies need to be integrated into the overall development agenda. It is therefore important to build in climate risk management and adaptation into current and future development efforts.

Recognizing the importance of incorporating climate information in the continent's development agenda, the Heads of State and the African Union in 2004 reaffirmed their commitments to establishing and strengthening centers of excellence and networks dedicated to agricultural and environmental issues, and to creating and enhancing regional early warning systems to combat natural disasters.

### ***Impacts of Climate Change on Africa's Natural Resources***

As stated in the previous section, Africa is highly vulnerable to climate change, in particular because of factors such as widespread poverty, recurrent droughts, inequitable land distribution, and overdependence on rain-fed agriculture. Although adaptation options, including traditional coping strategies, theoretically are available, in practice the human, infrastructural and economic response capacity to carry out

timely response actions are well beyond the regions economic means. With respect to natural resources, areas of particular concern include health, forestry, agriculture, water resources, coastal zones, and ecosystems and biodiversity, the hypothesized longer-term impacts include changing rainfall patterns affecting agriculture and reducing food security; worsening water security; shifting temperature affecting vector diseases; reduced economic growth prospects; and more challenging hurdles in reaching the MDGs. According to the recent IPCC report, the cost of adaptation in Africa could be as high as 5 to 10 percent of the continent's GDP. The adverse impact of climate change on the region's natural resources is examined in detail in the following section.

**Ecosystems:** As elaborated in earlier sections water resources, forests, and land areas are under threat from population pressures and poor land use practices. The apparent effects of these threats include loss of biodiversity, rapid deterioration in land cover, and depletion of water availability through destruction of catchments and aquifers. Changes in climate will interact with these underlying changes in the environment, adding further stress to a deteriorating situation.

**Water Resources — Half of Africa will face water stress:** Three-quarters of African countries are in zones where small reductions in rainfall could cause large declines in river water. Some climate models show that 600,000 square kilometers classified as moderately water constrained will become severely water limited. By 2020, between

75 and 250 million people are projected to be exposed to increased water stress due to climate change.<sup>80</sup> Changing climatic conditions are responsible for the melting of glaciers on the mountains of Kilimanjaro and Kenya. This is likely to result in a decline in the water level of some rivers leading to serious water shortages in Lake Victoria. This in turn may affect the flow of River Nile, and may lead to major conflicts in the countries traversed by the river. The same scenario is likely to apply to the Zambezi, Niger and all other major rivers in Africa, since the rivers' sources are in the high rainfall potential areas in the tropical highlands of Africa, which are likely to suffer adverse impacts of climate variability and change.

**Hydrology:** A drop in water level in dams and rivers may adversely affect the quality of water by increasing the concentrations of pollutants in the water, thereby increasing the potential for the outbreak of diseases and reducing the quality and quantity of fresh water available for domestic use. It may also affect the habitats of some species (birds, fish and other aquatic species), which depend on lakes and rivers as a habitat.

**Agriculture, Livestock and Food Security:** Agriculture is the economic mainstay and the lead sector in employment, and farming in large areas depends entirely on the "performance" of the rainy season — a situation that makes the region particularly vulnerable to climate change. Agricultural production, including access to food, is thus projected to

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<sup>80</sup> IPCC (2007b)

## 50 African Development Report 2007

be severely compromised by climate variability and change. This would further adversely affect food security and exacerbate malnutrition in the continent.<sup>81</sup>

**Diseases will likely spread:** Climate change is also associated with the occurrence and spread of pest and diseases affecting plants and livestock.

**Marine Environment Zones, Mangroves and Coastal Ecosystems:** Africa's coastal zone would be adversely affected by sea-level rise associated with climate change. Sea-level rise and climatic variation may reduce the buffer effect of coral reefs and mangrove systems along the coast, increasing the potential for erosion. A sizable proportion of the coastline would be lost through a combination of inundation and erosion, with consequent loss of agricultural land and urban areas. This may have severe and grave effects on many coastal cities. Furthermore, local food supplies are projected to be negatively affected by decreasing fisheries resources in large lakes and in the oceans due to rising water temperatures, which may be exacerbated by continued over-fishing.

### ***Mainstreaming Climate Risk Management and Adaptation in Development***

Adaptation measures to address adverse climate change impacts usually transcend different areas of activities and are often site-

specific, rather than sector-specific. Common implementation challenges for adaptation measures include the following:

- Adaptation technologies most often address site-specific issues, and therefore have to be designed and implemented with local considerations in mind. This may hamper replication on a large-scale and retard the implementation of large-scale programmatic interventions.
- Adaptation technologies primarily aim at preventing or reducing climate impacts on different sectors; as such, adaptation is often not considered a development priority.
- There are difficulties in ascertaining necessary timeframes for adaptation and for overcoming institutional barriers.
- Adaptation issues are (despite the sector focus often applied) usually cross-sectoral and must be dealt with by different ministries in a synergetic manner through powerful integrated strategies. The lack of awareness and recognition of climate threats by policy makers often impede the placement of adaptation and long-term climate risk planning in the economic development agenda.
- Adaptation constraints are compounded by the lack of local institutional capacity and resources to support community resilience building; and the lack of local financial resources in poor communities.

Africa has the lowest GHG emissions, yet it is likely to be hardest hit by climate

<sup>81</sup> Ibid.

change. Adaptation to the unavoidable impacts of climate change will need strong support from the international community and involve all stakeholders, including the private sector. Adaptation to climate change should be understood as a continuous process which addresses current climate variability and extremes and future climate risks. Actions by local communities that are most directly affected play a very important role. Linking climate change adaptation and disaster risk management thus becomes a logical first step (see Box 2.13). However, there is an urgent need for African governments to recognize that future climatic conditions may be much different from present ones — thus the need to anticipate rapid change through improved forecasts and planning and to develop new coping strategies. Furthermore, climate change adaptation is complex, often requires site-specific measures, and will seriously challenge the low institutional and technological capacity in Africa.

Many African economies are highly dependent on natural resources. Appropriate adaptation, therefore, must safeguard natural resources and ecosystems, value the goods and services that they provide, and ensure their environmentally sound and sustainable exploitation. Adaptation approaches based on better management of natural resources, such as “no regrets” options — that is, those measures that are expected to generate benefits even without long-term climate change — are an important avenue to pursue. In addition, following a sustainable development path provides a basis for economic diversification, increased levels of social and environmental resilience and

flexibility and human capital formation, which are all crucial components of adaptation. Indeed, much adaptation is an extension of good development practice and should therefore be integrated into environmentally sound development policy and planning at every level.

Funding is critical but the implementation of adaptation by developing countries will need other types of support from external partners and sub-regional initiatives. The second African regional workshop on adaptation<sup>82</sup>, which took place in Accra in September 2006, highlighted the importance of capacity support (for example, in using general circulation models at national levels to project possible future climate change), and the transfer of low-carbon technologies to Africa where very limited engagement by the private sector and continuing concerns about intellectual property rights, have severely restricted technology transfer. The promotion of regional co-operation efforts was generally recognized as highly desirable in the areas of surveillance and early warning systems, sharing of experiences, and the development of transboundary adaptation projects involving water sharing in Africa's 50 river basins.<sup>83</sup>

African Governments need to respond decisively to the impacts of climate change by diversifying supply, building a low-carbon energy mix, and opening up markets to private sector innovation and investment. Governments need to ensure a transparent and level playing field to create a market for

<sup>82</sup> UNFCCC (2006); (2007)

<sup>83</sup> Ibid.

**Box 2.13: The African Development Bank and Climate Change Adaptation**

To AfDB is engaged in a number of activities aimed at achieving substantive progress in the area of adaptation. Its lending and non-lending operations in this regard include the following:

- (i) Promoting vulnerability assessments, use of risk assessment tools, and of climate adaptation strategies that address different dimensions and root causes of poverty, including gender inequality;
- (ii) Promoting the mainstreaming of climate issues into key national, sub-national, local and sectoral development planning and decision-making processes, such as PRSPs or national and local strategies for sustainable development;
- (iii) Ensuring that development programmes and projects are designed to minimize climate change and variability risks;
- (iv) Increasing access to good quality information about the risks and impacts of climate change and variability. Early warning and information distribution systems are essential in this regard;
- (v) Empowering communities to participate in climate change vulnerability assessments and feed in their knowledge to provide useful climate-poverty information;
- (vi) Promoting traditional risk-sharing mechanisms, such as asset pooling and kinship, potentially complemented by climate specific insurance schemes, such as, weather index insurance and micro-insurance approaches;
- (vii) Improving infrastructure design and investment, both related to the private and public sector, to take into account the potential impacts of long-term climate change and increased climate variability.
- (viii) Helping RMCs Regional Member Countries (RMCs) improve governance, including an active civil society and open, transparent, and accountable policy and decision-making processes;
- (ix) Helping RMCs integrate climate issues into economic planning and management at both the national and regional levels, including high-level inter-ministerial co-ordination at national levels and increased role for regional economic communities.

The impact of climate change is already being felt in Africa and is posited to continue to be a serious challenge in the future. It is therefore vital for African governments to build resiliency into their infrastructure, agriculture, health and education sector developments, to be able to adapt to and combat climate change impacts. The AfDB is seeking ways to collaborate with its partners to assist RMCs build climate resiliency building by developing and mainstreaming climate risk assessment and climate information tools at macro and micro levels to influence development plans, policies and project designs.

low-carbon energy. This is crucial to ensure the long-term security of energy systems and continued economic growth in a world affected by climate change. The Bank's future action in climate change will focus on promoting a broader shift towards low-carbon economies by promoting energy

efficiency and renewable energy; supporting the dissemination of carbon reduction technologies, namely improved and modern biomass technologies; small hydropower and solar and wind; widening access to cleaner second and third generation fossil fuels; and supporting wider use of efficient

and clean technologies to avoid high-carbon technology lock-in.

These responses must take into account not only Africa's acute vulnerability but also its legitimate development needs, and the broader principles of equity and fairness in a global framework aimed at reducing global greenhouse gas emissions. Action is needed at a number of different levels. Faster progress is needed on reducing global emissions. Africa faces massive challenges in adapting to the impact of climate change and in managing the increased levels of climate risk — increased support and financing for this is essential. Africa's need to develop its energy must be recognized. Current carbon finance mechanisms are not delivering the resources which Africa needs and should be re-examined. African governments themselves need to fully integrate their response to climate change into economic planning and management at both the national and regional levels.

### Summary

Africa is endowed with abundant natural resources — about 9 percent of global freshwater resources or 3,930 km<sup>3</sup>/year of internal renewable resources. Average annual rainfall on the continent is about 678 mm per year, but remains highly variable, both spatially and temporarily, with Central Africa and the Indian Ocean Islands receiving more rainfall than North Africa and parts of the Sudano-Sahelian Regions. Most African countries (except some in northern Africa) are not currently threatened by *physical water scarcity*. However, the majority experience *economic water scarcity*, implying

that they lack the resources and means to develop their water resources.

It is projected that 25 African countries will experience water scarcity by 2025. This underscores the relatively low levels of development and exploitation of Africa's water resources, precisely at a time when the continent is lagging behind in terms of the basic water-related indicators of the MDGs. The increasing need for water resource development also raises the potential for conflicts among riparian states, and among competing uses (domestic, industry, and agriculture). Thus, there is a crucial need for cooperation at all levels — local, regional and international — to efficiently manage Africa's water resources. In particular, there is a need to invest in water resource development, which includes the capture, storage, diversion and distribution of water, and to strengthen dialogue with a view to increasing cooperation in water resource management both at the local and international levels. An estimated 300 million people in Africa lack access to adequate water supply and even more lack adequate sanitation. This underscores the crucial role that the state must play in developing policies and strategies, and in undertaking and facilitating investments in the water sector.

Africa has a significant share of the world's forests (30 percent), which support the livelihood of numerous people on the continent, especially in rural areas. Although forest distribution varies among sub-regions, with the bulk of it occurring in Central Africa, the role of the forestry sub-sector in Africa's overall economy remains significant. This role has even broadened in recent times, with

## 54 African Development Report 2007

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recognition of the forests' importance for environmental functions. However, the demand for land and for forest products is also increasing and there is growing concern about the loss of Africa's forest cover; likewise, for new management initiatives to address the challenges. The Report has highlighted some key aspects of these initiatives.

African economies are still dependent on land-based activities such as agriculture, mining, and tourism. Nevertheless, access to land and the ability to trade land rights remains a challenge, although it is recognised as a crucial factor for poverty reduction, economic growth, and private sector investment, as well as for empowering the poor. Access to land issues vary widely across

different parts of the African continent, largely because of differing cultural practices and colonial histories. A common element in all the variants is that land issues in Africa remain largely political and the challenge of addressing land access is largely embedded in the challenge of ensuring good governance.

Finally, climate change has emerged as a significant threat to the management of Africa's natural resources especially in the agriculture sector, where it has very severe food security implications. Therefore, natural resource management policies and strategies need to adequately incorporate climate change issues, particularly the need for adaptation to minimize the continent's vulnerability to the impact of climate change.