

BOX 14.3: ENSURING THE KNOWLEDGE BASE

The Law for Enhancing Motivation on Environmental Conservation and Promoting Environmental Education was established in July 2003 and enforced in October 2004 to promote environmental education in schools and community workplaces and enhance public awareness and education about the different issues of environmental protection and the conservation of natural water bodies. Some of the programmes and campaigns aimed at public

education are National Water Day on August 1, the Annual Forum on the Water Environment and the Disaster Prevention Poster Competition, among other local activities.

In addition to universities, there are several high-level research institutes and centres that focus on issues concerning water resources, environmental protection and disaster prevention. These institutions not only pursue

scientific research and development but also actively make policy recommendations for better management. The National Institute for Land and Infrastructure Management (NILIM) and the Public Works Research Institute (PWRI) in Tsukuba City are the leading water-related research institutes in the country, the latter of which hosts the International Centre for Water Hazard and Risk Management (ICHARM) under the auspices of UNESCO.

The Sediment-Related Disaster Prevention Law was enacted in 2000 with the aim of implementing comprehensive non-structural measures that would protect people from sediment-related disasters. Measures included raising public awareness on high-risk areas prone to sediment-related disaster, the development of a warning and evacuation system, the restriction of new land development for housing and other purposes and the promotion of relocation for some existing houses. After the revision of the Law in 2005, new regulations to prevent housing development in hazardous areas were introduced and the preparation and dissemination of hazard maps for smooth evacuation mechanisms made obligatory.

The development of advanced forecasting and warning systems in Japan is backed by the dense network of rain gauges and water-level telemeters. These observation points, in combination with twenty-six radar systems, provide high precision information concerning the spatial and temporal distribution of rainfall (see **Chapter 10**).

Conclusion

Risk reduction and the mitigation of water-related disasters is considered as one of Japan's main challenges. Accordingly, it has revised and amended disaster-related legislation. To ensure the sustainability of water resources, comprehensive water resource development plans have been put into action and the efficient use of water resources have been promoted in all sectors. In the sanitation sector, the government is attempting to expand the coverage of the public sewer system. In order to combat environmental degradation caused by human activities new legislation to regulate the use and discharge of effluent has been brought into action. Water-related decisions and policies aim to increase public prosperity by integrating the needs of modern life into a well-functioning healthy ecosystem. In the light of these facts, the Government of Japan is continuously striving to overcome current and future water challenges.

6. Kenya

Kenya is a water-scarce country. Located in East Africa, Kenya sits on the coast of the Indian Ocean, which serves as an important outlet. Surface waters cover only 2 percent of Kenya's total surface area. The climate varies from tropical along the coast of the Indian Ocean to arid in the interior, and two-thirds of the country is covered by semi-desert or desert land. As a result, only about 160,000 km² of land, most of which is situated in the wetter southwest area, is suitable for the current population of approximately 33 million. Per capita available water is about 650 m³/year. Future projections show that by the year 2020, per capita water availability will drop to 359 m³ as a result of population growth.

The uneven distribution of rainfall in addition to temporal and spatial variations often lead to recurring droughts in the north and east and flooding during rainy seasons. More than 50 percent of annual water abstraction is used for domestic purposes and livestock production, and the remainder is used for irrigated agriculture. The demand management strategies are lacking, and water resources allocation decisions related to surface and groundwater abstractions are made without adequate data. It is estimated that more than 50 percent of water abstractions are illegal. Water metering systems are used in few projects; as a result, revenue

collection is very low and corresponds to just 55 percent of the total operation and maintenance costs.

Major challenges: Poverty, access to safe water and sanitation, food and energy

Due to a steady decline in economic performance during the last two decades, the level of poverty in Kenya is steadily increasing, especially in semi-arid and arid areas. The welfare monitoring survey indicated that between 1994 and 1997 the poverty level rose from 47 to 53 percent in

rural areas and from 29 to 49 percent in urban areas. As of 2005, approximately 42 percent of the population is below the national poverty line (UNDP, 2005). The poverty line for urban settlements is about US \$35 per adult per month and US \$16 for rural settlements.

In order to alleviate poverty levels, the Kenyan Government proposed the Economic Recovery Strategy for Wealth and Employment Creation (ERS), which charts the country's economic course from 2003 to 2007 and asserts that past institutional arrangements were simply insufficient to win the battle against poverty. The ERS promotes initiatives that would facilitate the achievement of MDGs, recognizes water as a pivotal element in poverty reduction and emphasizes the importance of providing services to the poor while ensuring adequate water for competing demands. It suggests undertaking comprehensive institutional reforms to facilitate 'pro-poverty water and sanitation programmes'. In this context, Kenya's poverty reduction strategy programme, initiated in 2000, commits the government to providing water and sanitation services to the majority of the poor at a reasonable distance (less than 2 km). The proposed strategy is to involve communities and local authorities more actively in the management of water and sewerage systems and services.

Over 70 percent of the population, about 24 million people, live in rural areas. However, half of the urban population is settled in informal settlements. The percentage of people with access to safe water is 68 percent in urban areas and 49 percent in rural settlements, according to the most recent data from 2003. In urban areas, almost 40 percent of water goes unaccounted for, lost through either leakage or illegal connections. Access to sanitation in urban areas is at 65 percent compared to 40 percent in rural areas. Accordingly, water-borne or sanitation-related diseases make up the majority of Kenya's morbidity rate and are responsible for over 60 percent of premature deaths. The most common instances of disease in Kenya are malaria (32.6 percent), respiratory system infections (24.6 percent) and diarrhoea and intestinal worms (17 percent).

Agriculture is the leading sector of the national economy, employing about 80 percent of the population and accounting for 26 percent of Kenya's GDP. However, Kenya has not yet put its available land resources to full use. Out of 9.4 million ha of potentially cultivable land, only 2.8 million ha are devoted to agriculture, which heavily relies on rainfed production with very little irrigation. The irrigation potential for the country is estimated at approximately 550,000 ha, but only about 109,000 ha has been put to use. Irrigation is the only way to ensure food security considering the variation in rainfall patterns and recurring droughts (Box 14.4). Kenya has been struggling to achieve food security for the last two decades; however, recent surveys reveal that the situation is getting worse. For example in 2004, the 'food poor', those who cannot meet the daily necessary minimum of 2,250 kilocalories, stood at 15 million people, up from 7.3 million in 1973. Of these, 3 million are in constant need of relief, and the number of malnourished children is also mounting.



Map 14.7: Overview of the river basins in Kenya

Source: Prepared for the World Water Assessment Programme by AFDEC, 2006.

Kenya is mainly dependant on biomass for energy. Both fuelwood and charcoal accounted for 66 percent of the total energy consumption in 1996. In the same year, petroleum ranked second in energy production (24 percent) and electricity (hydropower combined with geothermal energy) produced the lowest amount of energy (9 percent). Seventy percent of the electricity supply comes from hydropower generation. Official technically feasible hydro potential is 2,023 MW, of which 677 MW (about 33 percent) is put into use. Generally, a heavy dependence on hydropower increases vulnerability to droughts, as low water supplies can cause power shortages. However, new hydropower projects have been implemented less frequently since 1996, decreasing the percentage of hydroelectricity in energy production. Instead, Kenya is becoming more dependent on fossils fuels, which emit higher amounts of greenhouse gases and other pollutants.

While less than 10 percent of the population is connected to the national grid, demand for power is increasing at the rate of 6 percent per year. This lag in the development of energy supply has had a negative impact on urban and industrial development. In 1997, reforms initiated in the power sector led to the creation of the Electricity Regulatory Board (ERB), which formulates policy and regulates the energy sector. The objectives of the energy sector are to enhance the energy supply and delivery capacity to

all sectors of the economy, institutionalize environmental impact assessments in energy development, promote energy conservation through the use of efficient and cost-effective technologies and create an enabling environment for private sector participation in the supply of energy including electricity. Currently, the Kenya Generating Company (KenGen) is the major supplier of energy and provides almost 90 percent of national power. The Kenya Power and Lighting Company (KPLC) is the only organization responsible for the transmission and distribution of power.

Water sector reform

The level of water scarcity in some regions of Kenya has become a serious limiting factor for development activities. Consequently, the need to change the scattered structure and functioning of the water management system has arisen. In 2002, major reforms were initiated with the revision of the Water Act, which defines clear roles for the different actors involved in the decentralized institutional framework that separates policy formulation from regulation and services provision. When possible, the participation of stakeholders in the decision-making process is promoted by involving communities and other actors such as NGOs, community-based organizations (CBOs) and the private sector.

Under the revised system, the Ministry for Water Resource Management and Development (MWRMD) is responsible for formulating the National Water Policy and for carrying out reforms by bringing together all the

stakeholders in the water sector. This is achieved through transferring the responsibility of water management to basin organizations. Furthermore, since 2004, the provision of water and sanitation services are being transferred to private companies as a part of the decentralization process.

National legislation like the Environmental Management Coordination Act from 1999 aims to ensure the sound management of the environment. All projects that might have a potential impact on water bodies must complete an Environmental Impact Assessment. In addition, there are approved standards for drinking water quality and effluent discharges; however, the relevant rules and regulations are not strictly enforced due to a lack of skilled personnel and limited funds. As a result, water pollution from urban and industrial wastes continues to degrade water quality; the heavy use of pesticides and fertilizers in agriculture leads to deterioration of surface water and underground resources; deforestation for firewood production continues at an increasing pace; and the overall exploitation of the country's resources remains an imminent threat to ecosystems.

Enhancing water sector capacity

Water education in Kenya is carried out through university degree programmes at both the undergraduate and graduate levels. In addition, the Kenya Water Institute provides short-term courses tailored to meet the specific needs of clients in the water and sanitation sectors. These courses train approximately 600 candidates per year on topics like water

BOX 14.4: DISASTERS AND INCOME

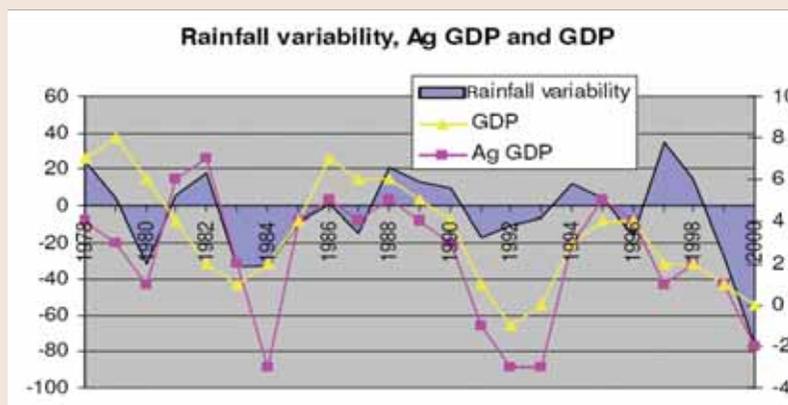
The effects of natural disasters on the national income

In the past, disaster management has not been viewed as an integral part of development planning, and water-related disasters have been responded to in an ad hoc manner whenever they occurred. Similarly, the important elements of disaster management, such as prevention, mitigation, disaster preparedness, recovery and rehabilitation have been either ignored or haphazardly dealt with. As Kenya's economy heavily relies on rainfed agriculture, the variation in rainfall has a significant effect on the gross domestic product (GDP). The following figure shows the rainfall variability between 1979 and 2000. During drought years, the agricultural GDP shows a massive deficit with the overall GDP following it.

The effects of drought have become more pronounced in recent decades: in the 1990s,

there were three major droughts. The effect of the 1991–1992 drought in the arid districts led to livestock losses of up to 70 percent and high rates of child malnutrition of up to 50 percent. During this drought, 1.5 million people in seventeen arid and semi-arid districts of four provinces received relief food assistance. The second major drought occurred in 1995–1996

and affected an estimated 1.41 million people. The third and worst drought affected Central, Eastern, Rift Valley, Coast and North Eastern Provinces, with 4.4 million people requiring food assistance in the year 2000. The energy sector, which suffered huge financial losses, and rice production, which dropped by 40 percent, were particularly impacted.



meter installation, servicing and reading; the operation and maintenance of pumping and treatment plants; and water pollution control assistants. Although these efforts are a good way to build up the necessary technical human resources base, a detailed analysis of the water sector has not yet been done to identify current existing gaps in capacity (i.e. required skills, levels of competency and experience), which makes it difficult to estimate the impact of higher-level water education and short courses for technician training.

Conclusion

The food deficit in Kenya is a major problem, resulting in millions of chronically undernourished people. National food policies, while aiming to

boost productivity, do not address access to food and quality. Access to safe water and sanitation services have not caught up with the needs of the growing population. Inadequate funding curbs the rehabilitation and expansion of the water supply and sewerage systems, and as a result, many diseases claim the lives of poor people every year. The need for domestic, industrial and agricultural water supply is growing, but the absence of demand-management strategies means that the increase in demand will likely outstrip the available supply. The construction of new dams is essential for providing the energy needed for development and meeting the increasing demand for drinking and irrigation water. The absence of international funding, however, remains a major obstacle for development efforts.

7. Lake Peipsi/Chudskoe-Pskovskoe

Lake Peipsi/Chudskoe-Pskovskoe (referred to here as Lake Peipsi) is the fourth largest and the biggest transboundary lake in Europe. It consists of three unequal parts: the biggest northern Lake Peipsi sensu stricto (s.s.)/Chudskoe, the southern Lake Pihkva/Pskovskoe and the narrow strait-like Lake Lämmijärv/Teploe connecting Lake Peipsi s.s. and Lake Pihkva/Pskovskoe.

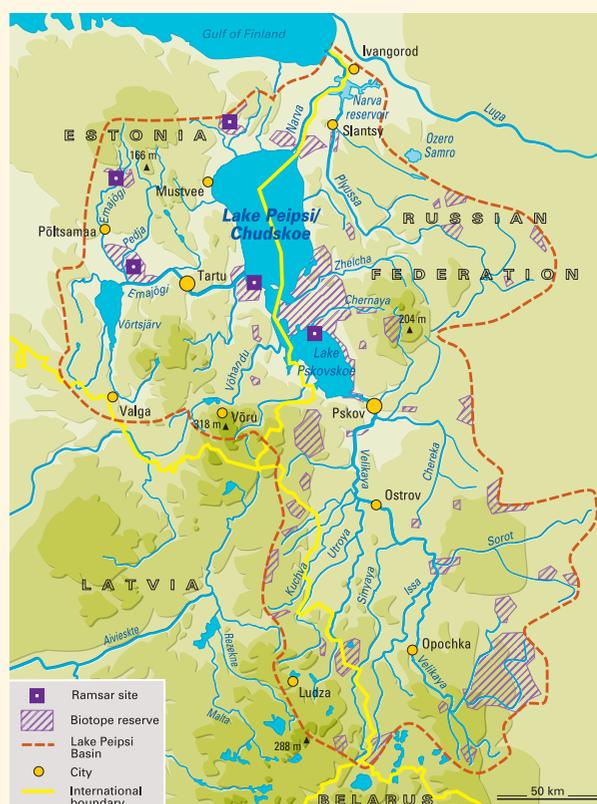
The Lake Peipsi Basin is situated in Russia (59 percent), Estonia (33 percent) and Latvia (8 percent), although the last has a negligible effect on the basin. It is officially managed by a joint commission of Estonia and Russia; Latvia is not a member of any agreements or commissions concerning the lake.

The case study report published in WWDR1 (see WWDR1 case study) concluded that lake pollution (see Chapter 12), eutrophication and economic growth were the most critical problems facing the region. The fishing industry, which has been the lake's major economic activity, has suffered from environmental damage inflicted by pollution and overfishing, both of which have led to a depletion of fish populations. Although some improvements have taken place, the prior trends have not significantly changed.

Changing climatic and socio-economic contexts

Although there has been no specific research conducted on the effects of climate change in the region, the analysis of data collected over the last fifty-four years shows a slight decrease, approximately 3 cm, in the average thickness of ice cover.

There has been a slight change in the demographic characteristics of the region (the birth rate in Russia has started to increase). However due to aging populations in both countries the departure of younger and educated people for big urban areas continues to be a problem. On the other hand, economic activities in the region are improving and diversifying in both Estonia and the Russian Federation. This change is



Map 14.8: Overview of the Lake Peipsi/Chudskoe-Pskovskoe Basin

Source: Prepared for the World Water Assessment Programme by AFDEC, 2002.

due to several factors, including the accession of Estonia into the European Union, the economic recovery of the Russian Federation from its recent crisis and an increased profit from oil exportation because of record high prices. Furthermore, both countries are eager to develop joint economic activities and gain more access to neighbouring markets. Accordingly, economic difficulties are easing, and the high levels of unemployment are decreasing.