Table 14.1: Number of people affected by recent droughts

Year	Population affected	Food assistance requirements (number of people)
1990	3,429,900	374,400
1991	1,850,000	838,974
1992	5,228,530	1,288,737
1993	1,644,040	739,280
1994	889,000	577,586
1995	3,994,000	492,460
1996	3,153,000	253,118
1997	1,932,000	199,846
1998	5,820,415	572,834
1999	2,157,080	1,138,994
2000	7,732,335	836,800
2001	6,242,300	639,246
2002	5,181,700	557,204
2003	14,490,318	1,461,679
2004	9,369,702	964,690

institutional capacity-building efforts are currently underway. For example, the fifteen-year Water Sector Development Programme (WSDP) was put into effect in 2002, and the Water Resources Management Proclamation was issued the same year to provide legal ground for the implementation of the Water Policy. The Water Sector Development Programme is composed of five programmes and sets the targets on water supply and sewerage, irrigation and drainage, hydropower development, general water resources programme and institutions/capacity-building. Furthermore, vocational and technical training centres, operational since 2003, have been established to train technicians on irrigation development schemes and water supply and sanitation services. In addition, the government has taken the initiative to establish basin institutions. For this purpose, with the financial and technical aid of international donors, an institutional study has been initiated for the Blue Nile (Abbay) Basin as a pilot project. Upon the successful completion of this project, the establishment of similar institutions in other basins are foreseen. However, awareness-raising activities to disseminate existing plans and policies at various levels (public and national institutions) are lacking. Furthermore, due to the absence of a functioning monitoring and evaluation system, the rate of implementation and the effectiveness of policies have not yet been assessed.

Conclusion

most of the Ehiopians do not have access to safe water and sanitation. The Water Sector Development Programme (WSDP) prepared for 2002-2016 aims to improve the existing situation; however, the investment required for the implementation of this programme cannot be financed by national funds alone. Attracting international donors will therefore likely remain a priority in order to alleviate the heavy burden of disease, poverty and hunger that the country currently faces.

4. France

Excluding its overseas territories, over 60 million people live in France, within a surface area of 551,695 km^2.

There are six major river basins in France: the Adour-Garonne, the Artois-Picardy, the Loire-Britanny, the Rhine-Meuse, the Rhone-Mediterranean and the Seine-Normandy. These basins are managed by separate basin agencies that were established by the 1964 Water Law and further reinforced by the 1992 Water Act.

The WFD is similar to the French institutional system in that it requires the implementation of IWRM at the basin level. The most recent French water law (passed in 2003) takes the WFD into account, calling on all EU Member States to achieve 'good status' for all of their water bodies by 2015 (see **Box 14.1** on the WFD and the case studies for the Danube River Basin and the Lake Peipsi/Chudskoe-Pskovskoe Basin for further information on the implementation of the WFD).

France's six major river basins have different climatic, hydrological and socio-economic characteristics. Consequently, six basin agencies have been set up to address the differing challenges of each basin. The specific basin challenges are briefly summarized below.

Map 14.5: Overview of the river basins in France

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

The Adour-Garonne Basin

The Adour-Garonne Basin covers 116,000 km^2, or 21 percent of France. In this basin, 35,000 farmers irrigate 645,000 ha of land, approximately 40 percent of the total irrigated surface area in France. Although there is a dense network of tributaries, there are no major rivers. Low rainfall in the summers results in severe low-water levels from the end of spring. Normally, irrigation water accounts for 35 percent of the water abstracted throughout the year; however, this ratio increases to 80 percent during low-water-level periods. In order to cope with the adverse affects of such conditions, planning tools like strict low-water target flow (DOE, Débit Objectif d'Etiage) and low-water management scheme (PGE, Plans de Gestion d'Etiage) were put into practice. DOEs are the fixed flow rates at strategic points of the basin during low water periods. PGEs involve all relevant stakeholders and set the rules concerning how to allocate limited water resources at the basin scale and specifically in water deficit areas. Those tools have had overall positive results, such as the establishment of better dialogue among stakeholders and reduced frequency of low water crises. Furthermore, the basin administration constantly provides sound advice for promoting rational water use and equipment for monitoring water abstraction. However, irrigation charges are still highly subsidized, and as a result, the revenues collected for irrigation water are still far from adequate for meeting the real cost of providing services (€3.83 million collected in 2002 versus a full cost of €107 million) (see **Chapters 7** and **3**).

The Artois-Picardy Basin

The Artois-Picardy Basin covers 3.6 percent of the national territory. As an area previously dominated by the coal and steel industries, both surface water and groundwater resources have been highly contaminated by various hydrocarbons and toxic metal salts. Furthermore, the abundant water resources of the region were previously used by factories in an unsustainable fashion, which resulted in a considerable lowering of the water table. In order to preserve water resources, groundwater abstraction and pollution charges were implemented and have been kept consistently high since the 1970s. As a result, pollution has been considerably reduced. Discharges of organic matter went down from 440 to 74 tons a day. Furthermore, underground water abstraction has decreased from 300 million tons in 1971 to 100 million tons in 2003. Undoubtedly, the adoption of technical solutions, such as wastewater treatment plants, recycling of water and utilization of advanced manufacturing processes, to reduce or in some cases omit water usage has played an important role in reducing the damage caused to the basin's water resources (see **Chapter 8**).

The Loire-Brittany Basin

The Loire-Brittany Basin is the biggest basin in France, covering 28 percent of the country: 58 percent of the total number of farms and 65 percent of the livestock production in France is located in this basin. The surface area utilized for agricultural purposes covers 64 percent (100,000 km^2) of the basin and produces 50 percent of national cereal production. Following the end of Second World War, policies were adopted towards ensuring food for all and creating jobs. Although this resulted in a boost in the productivity of livestock-raising and cereal production, it resulted in excessive nitrate pollution in surface and underground waters. After the reform of the Common Agricultural Policy (CAP) in 1992, appropriate measures were taken, such as agro-environmental measures and a nitrogen absorption programme at the European level, to reduce the impact of agricultural activities on water quality. In addition, the farm pollution management programme (PMPOA, Programme de Maîtrise des Pollutions d'Origine Agricole) was introduced at the national level to monitor pesticides and fertilizer pollution, which provides financial incentives through subsidies for the farmers to upgrade their livestock effluent management. Despite positive signs emerging in some sub-basins concerning nitrate and pesticide content, the overall progress on water quality remains modest thus far. However, given that most developments have been undertaken recently and agro-environmental policy is based on voluntary participation, it will take some time to observe the real outcomes.

The Rhine-Meuse Basin

The Rhine-Meuse is a transboundary basin that encompasses nine countries: Austria, Belgium, France, Germany, Italy, Liechtenstein, Luxembourg, the Netherlands and Switzerland. The Rhine River is 1,320 km long and the size of its catchment area is 186,765 km^2. The biggest part of the basin lies in Germany (106,000 km^2), followed by Switzerland (28,000 km^2), France (23,000 km^2) and the Netherlands (22,700 km^2). The total population of the catchment area is 78 million inhabitants, 1.7 million of which live in France. In order to create a transboundary cooperation forum among the Rhine Basin countries, the International Commission for the Protection of the Rhine (ICPR) was established in 1950. The ICPR was given the task of determining pollution levels and adopting appropriate measures for the protection of the Rhine. In 1986, an industrial accident in Basel, Switzerland caused approximately 20 tons of highly toxic pesticides to flow into the Rhine. This has had a devastating impact on the ecosystem. Following this incident, the Rhine Action Plan (RAP) was put into effect in 1987 and completed in 2000. Within the RAP framework, a warning network with six international warning centres has been set up to notify downstream states and riverside inhabitants in case of accidents. Based on the achievements of the RAP, the Rhine 2020 Programme on Sustainable Development of the Rhine was initiated in 2001. In addition, an action plan on flood defence was adopted in 1998. Combined, they focus on flood protection, prevention and improving water quality through waste discharge control, industrial accident prevention and the ecological restoration of the Rhine. The adoption of the WFD is likely to have a positive effect on the quality of the Rhine River, as by 2015 all the rivers in EU states will be required to reach 'good water' status (see **Chapter 11** and **Box 14.1**).

The Rhone-Mediterranean Basin

The Rhone-Mediterranean Basin covers 25 percent of the surface area of France. The basin is characterized by a dense network of rivers of varying length, 6,500 of which are longer than 2 km. The Rhone River, the

biggest river in the basin, is shared with Switzerland. In order to meet the energy requirements of developing industry, the construction of hydroelectric power plants (HEPP) was started in 1946, and by 1986, eighteen HEPPs were installed on the Rhone River. Overall, the dams installed in this basin generate 64 percent of the national hydroelectric production and 8 percent of the total national energy production. Today, hydropower ranks as the second biggest (after nuclear) source of energy production in France. The dams built for energy production also serve different purposes, such as flow regulation and water supply for drinking, irrigation, navigation and recreational activities. However, the dams divert more than 80 percent of the river flow and so have a direct impact on the aquatic environment by preventing fish migration and altering the natural flow regime. These problems are being addressed by specific action plans that aim to increase water flow in the bypassed sections of the river. Consequently, a reduction of eutrophication and an increase of flora and fauna diversity has occurred. However, the measures taken to restore the free movement of fish have not been successful, due to a lack of monitoring and enforcement.

The Seine-Normandy River Basin

The Seine-Normandy River Basin accommodates 17.5 million people, which corresponds to 30 percent of the overall population of France. The capital city, Paris, and other big urban settlements such as Rouen, Caen, Le Havre, Reims and Troyes, are also located in this basin. Of the 1.5 billion m^3 water used in the basin, 40 percent comes from surface waters and 60 percent from groundwater resources. The main problem in the basin remains improving water quality under the strain of increasing pollutant concentrations, particularly nitrates and pesticides. Given this problem, it is anticipated that despite the current action plans and high capacity wastewater treatment plants, meeting the targets required by the WFD will not be possible for many years to come (see **WWDR1 case study**).

Conclusion

France's great productivity in agricultural and industrial products has caused complex environmental problems, stemming from the pollution of surface and groundwater resources by agricultural, domestic and industrial wastes. Water legislation reform of 1992 laid out the principles for a balanced management of water resources with the aim of keeping the needs of humans and the environment in balance. Furthermore, the WFD has already been integrated into French law. However, finding a compromise between the needs of ecosystems and other water uses continues to be a real challenge for the six basin agencies.

5. Japan

Located off the East Asian coast in the North Pacific Ocean, Japan is comprised of a chain of 6,852 islands. The four largest islands – Hokkaido, Kyushu, Honshu and Shikoku – make up 98 percent of Japan's total land area of 377,899 km^2 (see WWDR1 case study for a discussion of the water challenges of the Greater Tokyo region).

Japan receives abundant precipitation, due to regular monsoons. Nevertheless, water shortages are frequent, due to the spatial and temporal variation of rainfall, marked topographic differences, small river catchments and sudden drops in altitude causing short and swift rivers. This situation is further aggravated by severe droughts. The amount of available water resources per capita is 3,300 m^3/year.

Total annual water use is approximately 85.2 billion m^3, 88 percent of which is obtained from rivers. The agriculture sector makes up more than 65 percent of annual water abstraction, followed by domestic and industrial uses (20 and 15 percent respectively).

Ensuring drinking water supply and access to sanitation

Based on the 1961 Water Resources Development Promotion Law, comprehensive water resources development (including infrastructure like water supply reservoirs) and efficient use of water resources have been advanced in order to ensure a stable supply of water resources over a wide area to respond to the rapid development of industry and increase in urban population. Nearly 100 percent of the population in Japan is connected to safe drinking water supplies. The average per capita daily water consumption of 320 litres (L) has remained unchanged since the 1990s. The total population connected to public sewerage was estimated to be about 68 percent in 2004, whereas the rate in towns and villages with population less than 50,000 is only 36 percent. The government's target for 2007 is to expand the coverage of the public sewer system to 72 percent and increase the proportion of population served with advanced wastewater treatment from 13 to 17 percent. Thanks to the adoption of proper waste management techniques, water-borne diseases have been drastically decreased.

Safeguarding ecosystems

Japan's varied landscape and climate provide a rich but fragile natural environment for thousands of different plant and animal species, which has been deteriorated by industrialization and urbanization. In order to prevent further degradation of freshwater sources and the surrounding environment, the government strictly regulates effluent from the industrial and public sectors and imposes regulations on agricultural chemicals. Accordingly, the environmental quality parameters (e.g. biological and chemical oxygen demands) of rivers, lakes and reservoirs are improving.