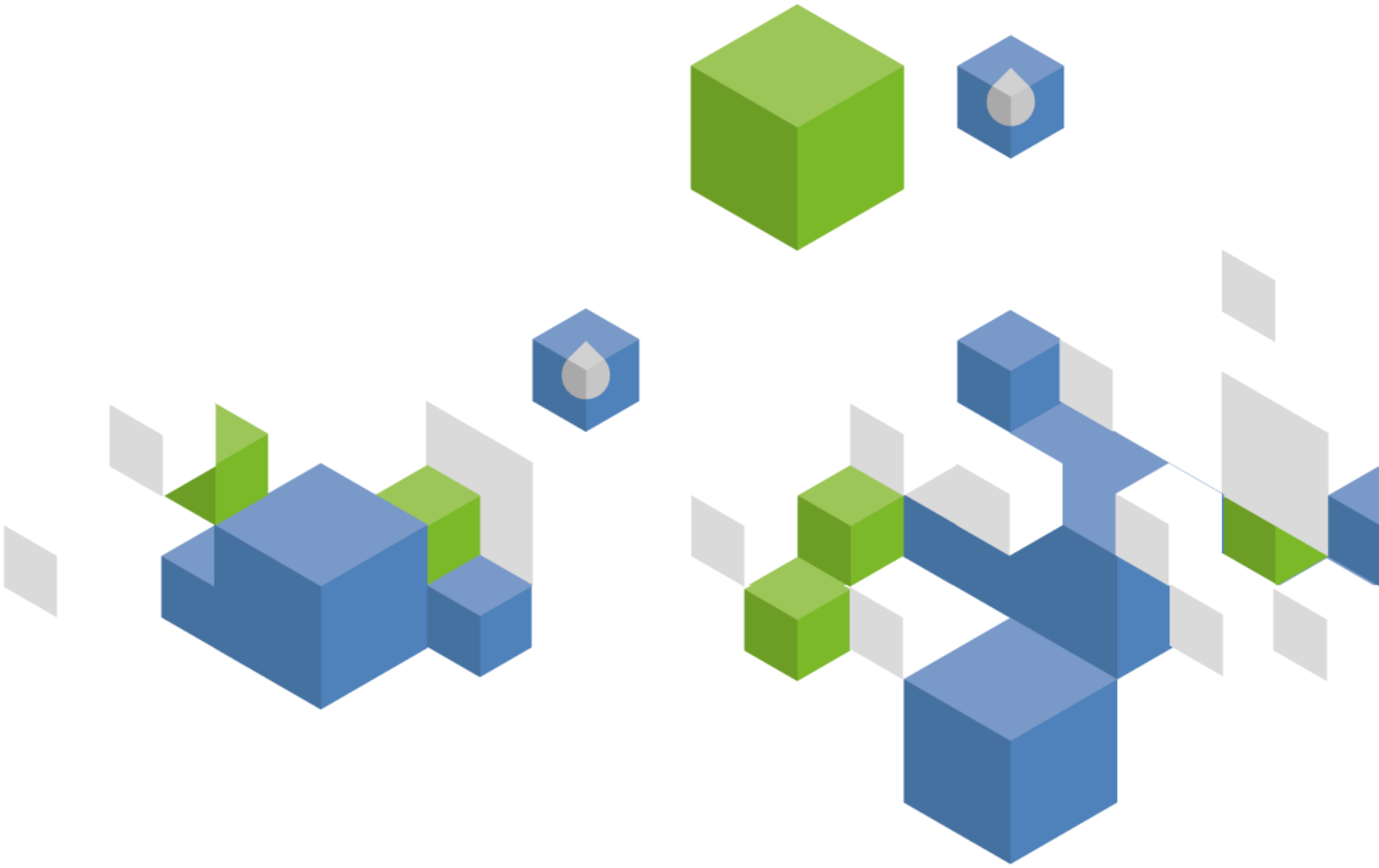
Food and Agriculture Organization
of the United Nations

FAO
AQUASTAT
Reports

Country profile – Eritrea

Version 2005



Recommended citation: FAO. 2005. AQUASTAT Country Profile – Eritrea.
Food and Agriculture Organization of the United Nations (FAO). Rome, Italy

Eritrea

GEOGRAPHY, CLIMATE AND POPULATION

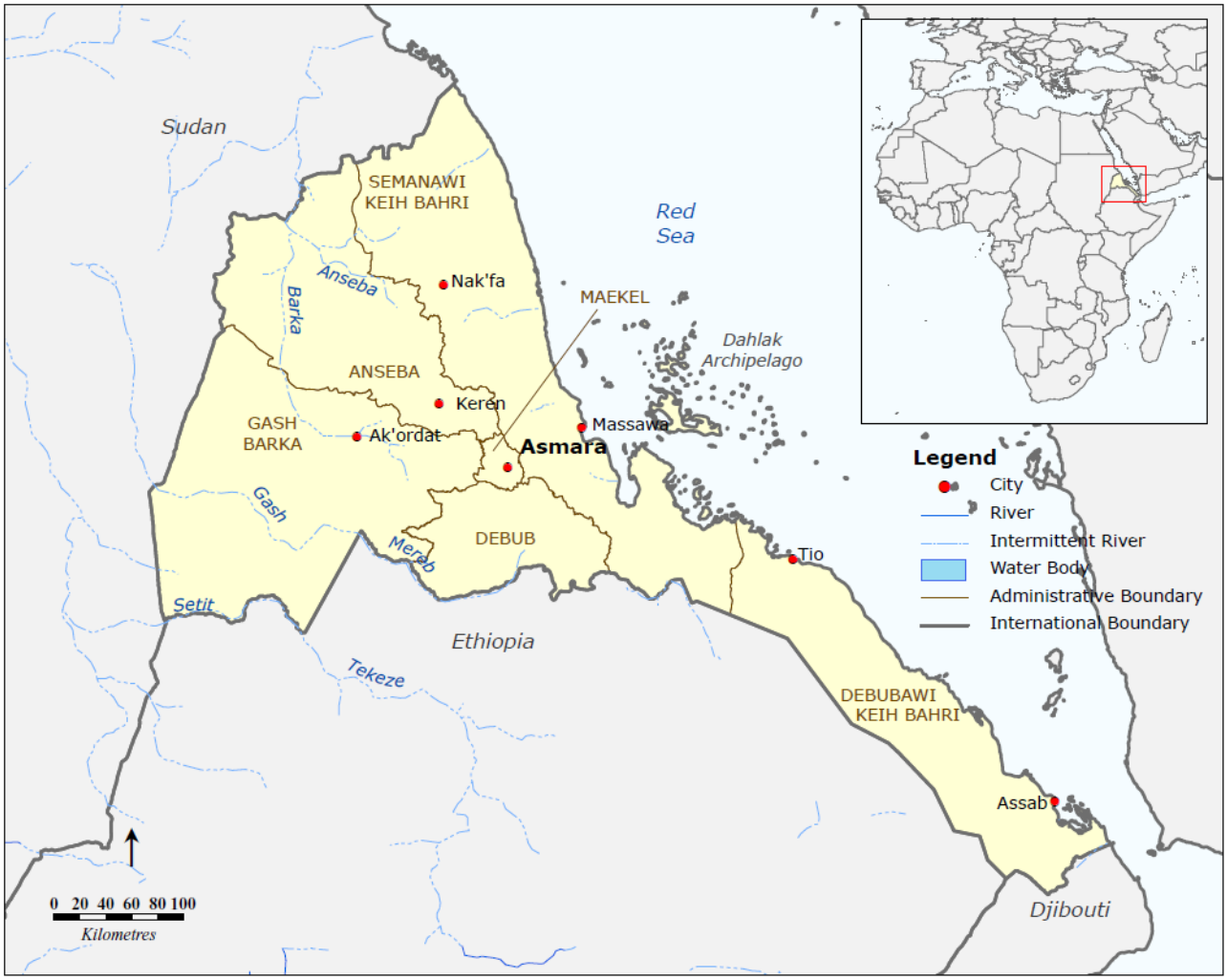
Geography

Eritrea covers an area of 117 760 km^2 and has a coastline of over 1 000 km. It is situated in the Horn of Africa, neighbouring Sudan, Ethiopia and Djibouti and bordered to the East by the Red Sea. The total cultivable area is estimated at around 1.6 million ha. The total cultivated area was 503 000 ha in 2002, of which 500 000 ha arable land and 3 000 ha permanent crops (Table 1). Most of the country consists of savannah, steppes and desert, particularly in the south-western lowlands and in the east near the Red Sea. The highlands, where altitudes range between 1 500 and 2 000 m, are among the oldest areas cultivated by humans and are showing signs of overuse. Administratively, Eritrea is divided into six zobas. Six different major agro-ecological zones can be distinguished, with crop production being concentrated on the moist highlands and the lowlands (Table 2).

TABLE 1
Basic statistics and population

Physical areas:			
Area of the country	2002	11 760 000	ha
Cultivated area (arable land and area under permanent crops)	2002	503 000	ha
• As % of the total area of the country	2002	4	%
• Arable land (annual crops + temp fallow + temp. meadows)	2002	500 000	ha
• Area under permanent crops	2002	3 000	ha
Population:			
Total population	2004	4 297 000	inhabitants
- Of which rural	2004	80	%
Population density	2004	37	inhabitants/km^2
Economically active population	2004	2 101 000	inhabitants
- as % of total population	2004	49	%
- female	2004	49	%
- male	2004	52	%
Population economically active in agriculture	2004	1 603 000	inhabitants
- as % of total economically active population	2004	76	%
- female	2004	50	%
- male	2004	50	%
Economy and development:			
Gross Domestic Product (GDP) (current US$)	2003	734	million US$/year
• Value added in agriculture (% of GDP)	2003	15.4	%
• GDP per capita	2003	177	US$/year
Human Development Index (highest = 1)	2002	0.439	
Access to improved drinking water sources:			
Total population	2002	57	%
Urban population	2002	72	%
Rural population	2002	54	%

FIGURE 1
Map of Eritrea



FAO - AQUASTAT, 2005

ERITREA

Disclaimer

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

TABLE 2
Agro-ecological zones in Eritrea

Agro-ecological zone	Coverage (%)
Moist highland zone	8.7
Arid highland zone	2.5
Moist lowland zone	15.9
Arid lowland zone	33.3
Sub-humid escarpment zone	0.9
Semi-desert zone	38.7
Total	**100.0**

Climate

Eritrea is located in the Sahelian rainfall zone, with rainfall provided by the south-western monsoons. Climate ranges from hot and arid near the Red Sea to temperate sub-humid in the eastern highlands. Average annual rainfall is about 380 mm, varying from less than 50 mm to over 1 000 mm. Over 90 percent of the total area receives less than 450 mm and only 1 percent receives more than 650 mm of annual rainfall. Rainfall in Eritrea is torrential, of high intensity, short duration, and varies greatly from year to year. The rainy season for the highlands and western region extends from June to September. As a result of the topographically ragged nature of the highlands, thin soil formations and a completely deforested terrain, most of the runoff turns into violent flash floods. Mean temperature varies between the agro-ecological zones, ranging from 18°C in the highlands to 35°C in the lowlands. Annual evapotranspiration rates range from 1 900 mm in the northern Red Sea coastal basin and plains, to 1 700-2 000 mm in the northern highlands and 8 000 mm in the Gash-Barka basin.

Population

Total population was estimated at almost 4.3 million in 2004, with a population growth rate of 2.1 percent in 2003. Demographic growth in Eritrea will be mostly from the resident population, but also from repatriated refugees. National population density reaches 37 inhabitants/km^2. Although the highlands comprise only 19 percent of the land surface, 65 percent of the population is settled there. Only about 20 percent of the population lived in urban areas in 2004. Safe drinking water was available to 57 percent of the population in 2002 (72 percent in urban areas and 54 percent in rural areas) (Table 1). Life expectancy was 52 years in 2002. Net primary school enrolment was 61 percent. About 7 in 10 persons live below the minimum standard of living threshold and 66 percent of the population is estimated to be poor.

ECONOMY, AGRICULTURE AND FOOD SECURITY

Eritrea's economy in general and the agricultural sector in particular were seriously affected by the combination of war, recurrent droughts and degraded lands. Agriculture, which is based on smallholder farming, accounted for 15 percent of GDP in 2003. Up to 80 percent of the population depends on farming. Currently the food supply is highly dependent on imports and food aid. The contribution of agriculture to the trade balance is negative. The contribution of the sector to exports and imports was 7 percent and 11 percent respectively in 2001. Food imports as a result of food shortages amounted to 20 percent of total imports between 2001 and 2002. The main agricultural product imported in 2001 was wheat (46 percent of all imports) and the main exports were sesame seeds and flour (89 percent of all exports).

The main factors constraining crop production are low total rainfall and its distribution, insufficient availability of ploughing animals, problems of access to quality seeds, rapid degradation of land and water resources owing to soil and water erosion, inefficient agricultural extension services, and poor or inadequate rural infrastructures.

The farming system comprises: (i) rainfed crop systems using traditional methods with very low input levels, mainly in the central and southern highlands; (ii) irrigated agriculture systems using mainly spate irrigation in the western and eastern lowlands; (iii) agro-pastoralist and nomadic pastoralist systems, mainly in the lowlands and escarpment zone (agro-pastoralists derive their livelihoods from cattle, sheep and goats, while nomadic pastoralists often keep camels as well).

WATER RESOURCES

Three main drainage systems can be distinguished:

- The Mereb-Gash and Tekeze-Setit River systems, draining into the Nile River;
- The eastern escarpment and the Barka-Anseba River systems, draining into the Red Sea;
- The river systems of a narrow strip of land along the south-eastern border with Ethiopia, draining into the closed Danakil Basin.

Although no measurement of runoff is available, the internally produced renewable water resources are estimated at around 2.8 km³/yr, most of which are located in the western part of the country (Table 3).

TABLE 3
Water resources

Renewable water resources:			
Average precipitation		384	mm/yr
		45.16	10^9 m^3/yr
Internal renewable water resources		2.8	10^9 m^3/yr
Total actual renewable water resources		6.3	10^9 m^3/yr
Dependency ratio		55.56	%
Total actual renewable water resources per inhabitant	2004	1 466	m^3/yr
Total dam capacity	1998	94	10^6 m^3

There is only one perennial river, the Setit River, which also forms the border with Ethiopia. All other rivers are seasonal and contain water only after rainfall and are dry for the rest of the year. There are no natural fresh surface water bodies in the country. Artificially dammed water bodies are found here and there in the highland parts of the country.

Groundwater can be tapped in all parts of the country but not in the quantities and of the qualities desired. Four hydro-geological units, based on the different geological units, recharge conditions and hydraulic characteristics, can be detailed:

- Granular aquifers, which cover large areas in the western and eastern lowlands and along river valleys and flood plains. Unconsolidated aquifers consisting of the alluvial and colluvial sediments are also found in the Asmara area, Red Sea coastal plains and at the foot of fault scraps and mountains;
- Fissured and jointed volcanic aquifers, which are found in the central highland plateau southeast of Asmara and west of Assab, the Alid hot spring and in the southern part of the country;
- Fissured and karstic aquifers of consolidated sedimentary rocks, limestone, coral reefs, evaporate deposits and the marbles of metamorphic assemblages;
- Fissured aquifers of the basement rocks of crystalline metamorphic rocks and associated intrusive rocks, which are localized along weathered and fractured zones, with limited groundwater resources,

The recent water point inventory counts 5 365 water points. About 3 374 are unprotected dug wells and 1 233 are contaminated surface water points. Typical borehole depths are in the range of 20 to 70 m.

Deep aquifers are not known. Problems of groundwater depletion have been reported in various parts of the country. Apparently there are a few natural springs, but an inventory is not available.

Currently there are about 187 dams with a capacity of over 50 000 m^3 each. About 42 percent are for municipal use and irrigation, 40 percent for municipalities only, 13 percent for irrigation, and 5 percent are not used. The total capacity reaches 94 million m^3.

INTERNATIONAL WATER ISSUES

Eritrea is part of the Council of Ministers of Water Affairs of the Nile Basin States (Nile-COM) as an observer, together with Burundi, the Democratic Republic of the Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, the United Republic of Tanzania and Uganda. It is a prospective member of the Nile Basin Initiative. The Setit and Mereb-Gash rivers are shared with Ethiopia.

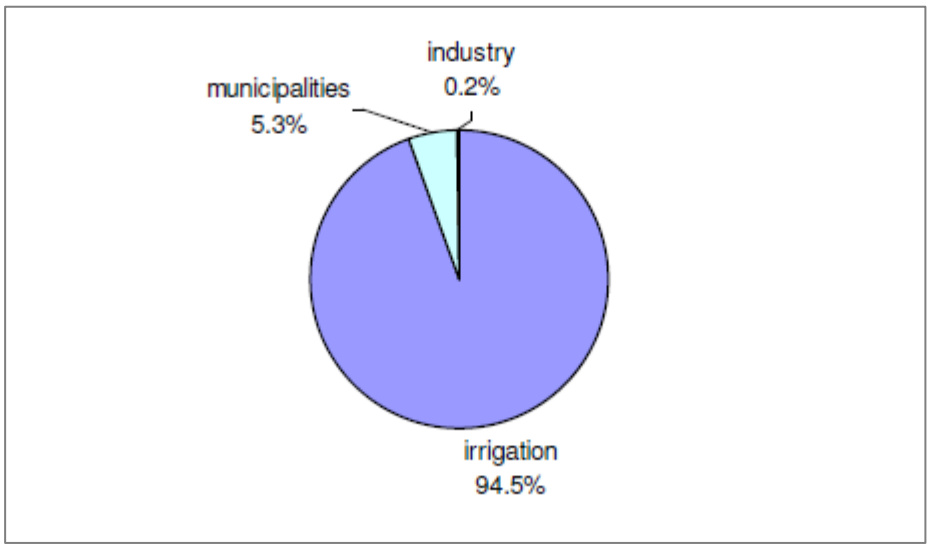
WATER USE

Groundwater is the basis of municipal water supply. Total water withdrawal was estimated at 582 million m^3 in 2004, of which 550 million m^3 for agriculture (94.5 percent), 31 million m^3 for municipal consumption (5.3 percent) and 1 million m^3 for industry (0.2 percent) (Table 4 and Figure 2).

TABLE 4
Water uses

Water withdrawal:			
Total water withdrawal	2004	582	10^6 m^3/yr
- irrigation + livestock	2004	550	10^6 m^3/yr
- municipalities	2004	31	10^6 m^3/yr
- industry	2004	1	10^6 m^3/yr
• per inhabitant	2004	135	m^3/yr
Surface water and groundwater withdrawal	2004	582	10^6 m^3/yr
• as % of total actual renewable water resources	2004	9.2	%
Non-conventional sources of water:			
Produced wastewater	2000	18	10^6 m^3/yr
Treated wastewater		-	10^6 m^3/yr
Re-used treated wastewater		-	10^6 m^3/yr
Desalinated water produced		-	10^6 m^3/yr
Re-used agricultural drainage water		-	10^6 m^3/yr

FIGURE 2
Water withdrawal
Total 0.582 km^3 in 2004



The quantity of municipal wastewater can be estimated at 50 000 m³/day. Treatment of municipal and industrial effluents has not yet begun.

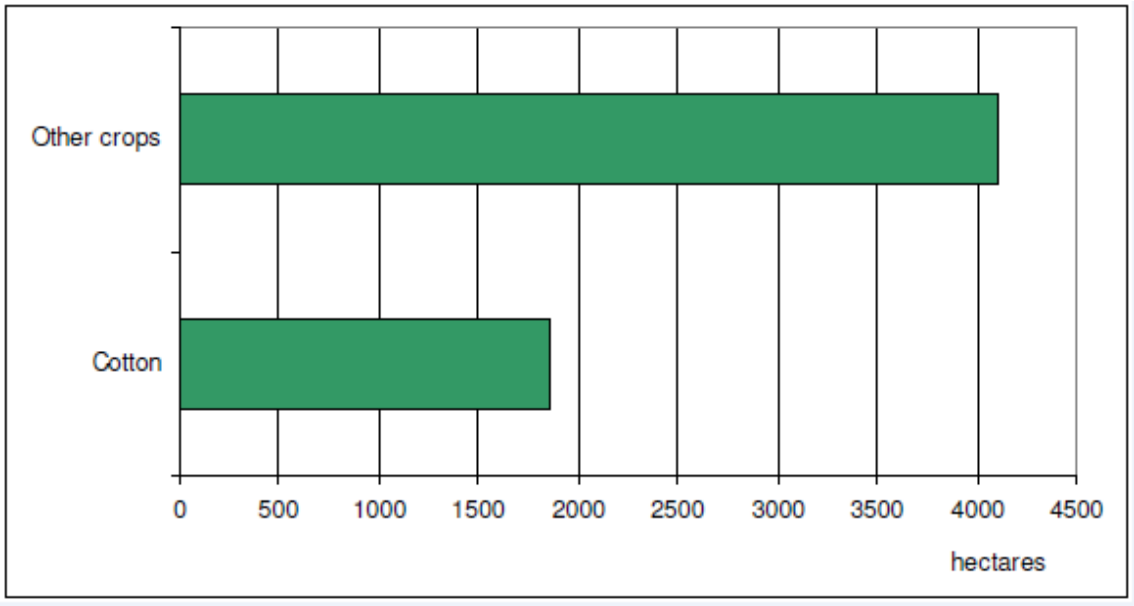
IRRIGATION AND DRAINAGE

Estimates of irrigation potential vary from 107 000 ha to 567 000 ha, the latter not taking into account the water availability. Based on water availability, it can be estimated at 187 500 ha.

In 1993, an estimated 4 100 ha was under perennial irrigation from dams, springs and wells, irrigating mainly fruits, vegetables and cotton (Figure 3 and Table 5):

- Approximately 1 300 ha were irrigated through the pumping of shallow groundwater along the Gash and Barka rivers;
- Some 140 ha comprised the Elaberet and Mai Aini citrus/horticultural plantations presently under government management;
- About 2 590 ha were cropped by small farmers in the highland provinces mainly through the pumping of groundwater from open wells;
- The balance of 70 ha was irrigated from springs.

FIGURE 3
Main irrigated crops in 1993



The area equipped for spate irrigation covers 17 490 ha, of which 15 650 in the eastern lowlands and 1 840 ha at Alighider on the lower Gash and a small area along the Barka. The traditional technique of spate irrigation depends on the diversion of floods, a resource that is available at irregular and unpredictable intervals and only for a few hours at a time. The contribution of the spate irrigation to total crop production is negligible.

TABLE 5
Irrigation and drainage

Irrigation potential			**187 500**	**ha**
Water management				
1. Full or partial control irrigation: equipped area		1993	4 100	ha
- surface irrigation		1993	4 100	ha
- sprinkler irrigation		1993	0	ha
- localized irrigation		1993	0	ha
• % of area irrigated from groundwater		1993	96.3	%
• % of area irrigated from surface water		1993	3.4	%
2. Equipped lowlands (wetland, ivb, flood plains, mangroves)			-	ha
3. Spate irrigation		1993	17 490	ha
Total area equipped for irrigation (1+2+3)		**1993**	**21 590**	**ha**
- as % of cultivated area		1993	4.3	%
- average increase per year over the last 10 years			-	%
- power irrigated area as % of total area equipped			-	%
- % of total area equipped actually irrigated			-	%
4. Non-equipped cultivated wetlands and inland valley bottoms			-	ha
5. Non-equipped flood recession cropping area			-	ha
Total water-managed area (1+2+3+4+5)		**1993**	**21 590**	**ha**
- as % of cultivated area			4.3	%
Full or partial control irrigation schemes:	**Criteria**:			
Small-scale schemes	< ha		-	ha
Medium-scale schemes			-	ha
large-scale schemes	> ha		-	ha
Total number of households in irrigation			-	
Irrigated crops in full or partial control irrigation schemes:				
Total irrigated grain production			-	tonnes
- as % of total grain production			-	%
Total harvested irrigated cropped area			-	ha
- Annual crops: total			-	ha
- cotton		1993	1 860	ha
- other annual crops		1993	4 109	ha
Irrigated cropping intensity			-	%
Drainage - Environment:				
Total drained area			-	ha
- part of the area equipped for irrigation drained			-	ha
- other drained area (non-irrigated)			-	ha
- drained area as % of cultivated area			-	%
Flood-protected areas			-	ha
Area salinized by irrigation			-	ha
Population affected by water-related diseases			-	inhabitants

WATER MANAGEMENT, POLICIES AND LEGISLATION RELATED TO WATER USE IN AGRICULTURE

Institutions

The institutions involved in water resources management are:

- The Ministry of Land, Water and Environment (MoLWE) with the Water Resources Department (WRD), which has the followings functions according to the Draft Water Law (1997):
    - Assess and evaluate the water resources' potential of the country;
    - Function as a resource centre for water-related data/information;
    - Manage and develop national water resources;
    - Evaluate, monitor and supervise all water-related studies, development projects and programmes of national interest;
    - Grant, manage and inspect the implementation of water permits and waste discharge permits.
    - The Ministry's mandate further includes legislation, and establishing a system of water rights and obligations. The WRD is divided into two divisions according to these two different tasks: Water Resources Management and Use Division and the Water Resources Assessment Division. As regards water supply, the WRD initially served the entire country, even including maintenance and repair of equipment, but services have been decentralized since 1996. The problem is that the regional authorities, which are now responsible for the implementation and maintenance of rural water supply projects, do not have the capacity to effectively take over this responsibility and several units of the WRD are therefore still involved in local project implementation.
- The Ministry of Agriculture (MoA) and its Soil Conservation and Irrigation Development Unit, which is part of its Department of Land Resources and Crop Development;
- The Ministry of Local Government (MoLG), responsible for the Regional Administrations;
- The Ministry of Health (drinking water supply);
- The Ministry of Transport and Communication, through its mandate for meteorological data collection.

Policies and legislation

All land was brought under state ownership by the Land Proclamation of 1994. This law provides farmers with a lifetime right of usufruct over currently held land, removing the previous risk of periodic redistribution. Land is not inheritable and cannot be sold, but it can be leased. Lessees have to use the land leased to them if they are to maintain their rights.

In 2003, the Draft National Water Policy Framework (1997) was still not officially adopted. A recent effort to formulate water policies and strategic approaches is the report titled "Planning, management & advocacy tools for rural water resources development", which is the result of an interministerial workshop in Asmara. This framework defines the following policy objectives:

- Provision of safe, adequate and accessible water for all;
- Improved coverage of appropriate sanitation in both urban and rural areas;
- Integrated management and fair allocation of the available water resources to meet the needs of all sectors of the population;
- Assessment, conservation, regulated utilization and quality protection (that is, maintenance or enhancement) of all water resources, and also the mitigation of water-related hazards;
- Economically and environmentally sound and sustainable water resources development, according to a prioritized schedule.

The Draft Water Law, in preparation since 1996, was still to be finalized and adopted in 2003. No formal legislation and no formal system of permits or licences are in place and local traditional customs prevail. For example, the communities affected by water shortage have the right to benefit from an available supply in their nearest neighbourhood. In principle, water is public property and controlled by the government. However, national or regional plans do not exist and the ground rules for the actual water allocation are not clearly defined. Because of the lack of a promulgated, effective water law, activities in the water sector are still uncoordinated.

A draft strategy document on rural water supply and sanitation was drawn up between 1995 and 1997 and its final report was issued in December 2000. Unfortunately this document has never been officially endorsed or adopted.

ENVIRONMENT AND HEALTH

Salinity problems are present in most aquifers in the coastal areas. Generally, the salinity levels increase with the distance from the recharge area (the foothills of the eastern escarpment) and seawater intrusion has reportedly been observed up to about 20 km inland. Several saline geothermal springs are present along the eastern escarpment. Salinity is also common in the northwestern lowlands.

Fluoride concentrations exceeding international limits have been found mainly in the Anseba region and are probably related to the presence of certain rock types.

Bacteriological contamination is very common as many water points are not protected or are not at a sufficient distance from sources of pollution. Between 40 and 90 percent of the water sources analysed during the Rural Water Point National Inventory have been found to be biologically contaminated in the various regions.

Pollution problems are basically related to municipal sewage. A large part of the groundwater in the Asmara area has a very high nitrate content, which is due to the effects of the many latrines located in the town. Industrial pollution as well as irrigation-related pollution is not yet a problem because of the limited activities of the two sectors.

Malaria incidence and prevalence are increasing. Malaria affects about 67 percent of the population and forms about 30 percent of total outpatient morbidity. It is the major cause of morbidity and mortality of women and children. *P.falciparum* is the cause of 94 percent of all cases of malaria.

PROSPECTS FOR AGRICULTURAL WATER MANAGEMENT

The WRD/UNICEF report of 2003 "Eritrea - Planning, management & advocacy tool for rural water resources development" mentions a goal of safe water sources coverage of 60 percent of the rural population by 2015.

Irrigation-related objectives on the 2010 horizon are to add 20 000 ha by the construction of small dams and wells, development of joint irrigation-hydropower schemes, and a survey of the water resources. The WRD also has plans and strategies to introduce cost-effective and environmentally friendly water technologies and sustainable water supply management systems.

Water resources availability does not seem to be the immediate constraint. The problem is mainly the absence of a water policy and effective institutional capacity to manage the water. Another constraint is the lack of legislation to regulate water control in respect of both supply and demand. At present, much of the scarce water is being wasted due to lack of management. One of the challenges of the management will be to cope with the high variability of the availability of resources.

MAIN SOURCES OF INFORMATION

FAO. 1993. *Eritrea - Agricultural sector review and project identification.* TCP/ERI/2353.

FAO. 1995. *Eritrea - Special programme on food production for food security in low-income food-deficit countries.* Exploratory mission report.

FAO. 2000. *Eritrea - World Food Summit follow-up. Strategy for national agricultural sector. Horizon 2010.*

FAO. 2001. *Water resources management.* TCP/ERI/0169.

FAO. 2003a. *Water resources monitoring in Eritrea.* Consultancy Report by R. Seidelmann - Project TCP/ERI/0169.

FAO. 2003b. *Eritrea - Strategy brief for national food security and agricultural development. Horizon 2015.*

Geraghty P., Temnewo, G. 2000. *Water resource development and management in Eritrea.* Proceedings of IWRA's Xth World Water Congress, Melbourne, 2000/03/12-2000/03/16.

MoA. 2002. *National report on the implementation of the UNCCD.*

MoA. 2004. *National report on the implementation of the UNCCD.*

Stillhardt B., Ghebru B., Mehari Haile, A. 2003. *Small-scale micro-irrigation in Eritrea.* World Bank. 1996. Proceedings of the World Bank sub-Saharan Africa water resources technical workshop, Nairobi, Kenya, 1996-02-12 / 1996-02/15.

UNEP. 2001. *Overview of the socio-economic aspects related to the management of municipal wastewater in west Asia (including all countries bordering the Red Sea and Gulf of Aden).*

UNEP. 2005. *Assessment and mapping of the water resources in the IGAD sub-region. Consultancy report.* (as yet unpublished).