

# **Morocco (Al Mamlakah al Maghribiyah)**

**Last updated: 31-01-2004**

## **Location and area**

Morocco is a hereditary monarchy in northwest Africa, bordered on the north by the Mediterranean Sea, on the east and southeast by Algeria, on the south by Western Sahara, and on the west by the Atlantic Ocean. The southeastern boundary, in the Sahara Desert, is not precisely defined. Within Morocco are the Spanish exclaves of Ceuta and Melilla, on the Mediterranean coast. Several small islands off the northern coast of Morocco are also possessions of Spain. The area of Morocco is 453,730 km<sup>2</sup>. Since 1979, Morocco has also occupied the adjacent region known as Western Sahara (formerly Spanish Sahara).

## **Topography**

Morocco has the broadest plains and the highest mountains in North Africa. The country has four main physiographic regions:

1. An area of highlands, called Er Rif, paralleling the Mediterranean coast;
2. The Atlas Mountains (with Toubkal 4,165 m as highest mountain), extending across the country in a south-western to north-eastern direction between the Atlantic Ocean and Er Rif, from which the mountains are separated by the Taza Depression. Elevations in Er Rif attain heights of about 2,400 m;
3. The Atlantic coastal plain along the Atlantic Ocean, framed in the arc formed by Er Rif and the Atlas Mountains;
4. The plains and valleys south of the Atlas Mountains, which merge with the Sahara along the southeastern borders of the country.

Morocco has many rivers, which are used for irrigation and for generating electric power. The chief rivers are the Moulouya, which drains into the Mediterranean Sea, and the Sebou, which flows into the Atlantic Ocean.

## **Climate**

Along the Mediterranean coast, Morocco has a subtropical climate, tempered by oceanic influences that give the coastal cities moderate temperatures. At Essaouira (Mogador) temperatures average 16° C in January and 23° C in August. Towards the interior, winters are colder and summers warmer. Thus, in Fès the mean temperature is 10° C in January and 27° C in August. At high altitudes temperatures of below -18° C are not uncommon, and mountain peaks are covered with snow for most of the year. Rain falls mainly during the winter months. Precipitation is heaviest in the northwest and lightest in the east and south. The average annual precipitation is about 950 mm in Tangier, 430 mm in Casablanca, 280 mm in Essaouira, and less than 100 mm in the Sahara.

## **Land use**

Morocco is primarily an agricultural country, although no more than about 22 per cent of the land is cultivated. Much timber is cut for use as fuel. The southern part of the country is mainly desert. (Microsoft Encarta Encyclopedia 2002).

## Wetlands

According to Britton & Crivelli (1993) Morocco has 2 km<sup>2</sup> of freshwater marshes.

## Peatlands

On the soil map of Africa, Schokalskaja (1953) indicates soils complexes of podsollic soils, mountain meadows, and mountain peatlands for the Atlas Mountains in Morocco. For the Rif range she points at the presence of peatlands soils with species like *Menyanthes*, *Juncus squarrosus*, and *Ranunculus flammula*, referring to Emberger & Maire (1934)

Possible peatland areas in Morocco may be included in the Iriki seasonal swamp (200 km<sup>2</sup> in the wet season, 0 in the dry season), the shallow lake Zima (6 km<sup>2</sup>) and in shallow lakes of the Moyen Atlas (8 km<sup>2</sup>) (cf. Howard-Williams & Thompson 1985).

According to the interpreted World Soil Map (Van Engelen & Huting 2002) no histosols exist in Morocco and 1,140 km<sup>2</sup> of gley soils.

## Mire and peatland losses

Lake Iriki has been fully destroyed

(<http://europa.eu.int/comm/environment/nature/directive/birdactionplan/marmaronettaangustirostris.htm> sites).

### Still to be checked:

**Medail, F. & Quezel, P.** 1999. The phytogeographical significance of S.W. Morocco compared to the Canary Islands. *Plant Ecology, (Vegetatio)*, 140, 221-244.

**Lamb, H., Eicher, U., Switsur, V.R.** 1989. An 18000 year record of vegetation, lake level and climatic change from Tigalmamine, Middle Atlas, Morocco, *J. Biogeography*, 16, 65-74. **1** Daya Abbarete, western Rif, (34°50'N, 4°20'W), 1270m, Morocco. Pollen.

**Reille, M.** 1977. Contribution pollenanalytique a l'histoire holocène de la végétation des montagnes du Rif (Maroc septentrional). In: *Rech. franc. sur le quaternaire, INQUA 1977, Suppl Bull, AFEQ*, 1, 50, 53-76. **2** Laguna de Ouloudia (32°44'N, 9°2'E) 2 m, Morocco. Pollen.

**Ballouche, A., Carruesco, Chr.** 1986. Evolution holocène d'un écosystème lagunaire; la lagune de Oualidia, (Maroc atlantique) *Rev. de Géol dynam. et de Géogr Phys.* 27,2, 113-118. **3** La Tessaouat (30°40'N, 7°20'W), 2900 m, Morocco. Pollen.

**Reille, M.** 1976. Analyse pollinique des sédiments postglaciaires dans le Moyen Atlas et le Haut Atlas marocain : premiers résultats. *Ecologia Medit.* 2, 153-170. **4** Daya Tighaslant, High Atlas, (31°26'N, 7°27'E), 2000 m, Morocco. Pollen.

**Bernard, J., Reille, M.** 1987. Nouvelles analyses polliniques dans l'Atlas de Marrakech, Maroc. *Pollen et Spores*, XXXIX, 2-3, 225-240.

**Reille, M., Andrieu, V., de Beaulieu, J.** 1996. Les grands traits de l'histoire de la végétation des montagnes méditerranéennes occidentales. *Ecologie*, 27,3, 153-169.

**Cheddadi, R., Lamb, H. F., Guiot, J., Van Der Kaars, S.,** 1998. Holocene Climatic Change in Morocco: a Quantitative Reconstruction From Pollen Data. *Climate Dynamics*, 14, 883-890.

**Ballouche, A. & Damblon, F.** (1988) Nouvelles données palynologiques sur la végétation Holocène du Maroc. *Inst. Fr. Pondichery, Trav. Sec. Sci. Tech.*, tome 25: 83-90

**Bernard, J., Reille, M.** (1987) Nouvelles analyses polliniques dans l'Atlas de Marrakech, Maroc. *Pollen et Spores* XXIX, 2-3: 225-240

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Biogeography 16: 65-74

**Reille, M.** (1977) Contribution pollenanalytique à l'histoire holocène de la végétation des montagnes du Rif (Maroc septentrional). Recherches Françaises sur le Quaternaire INQUA 1977, Suppl. Au Bull. AFEQ 1977-1, no. 50: 53-76.

**Reille, M.** (1979) Analyse pollinique du lac de Sidi Bou Rhaba, littoral atlantique (Maroc). *Ecologia Mediterranea*, 1979/4: 61-65.

**Wengler, L. & Vernet, J.-L.** (1992) Vegetation, sedimentary deposits and climates during the Late Pleistocene and Holocene in eastern Morocco. *Palaeogeogr., Palaeoclimat., Palaeoecol.* 94: 141-167.

**Emberger, L. & Maire, M.** 1934. Tableau phytogéographique du Maroc. Première partie. Mémoires de la Société des Sciences Naturelles du Maroc, Nr. 1, Rabat, pp. 1.