



# Morocco

## Economic development and climate change

How will climate change impact on the economic development of Morocco? This article provides an excellent case study for the topics of climate change, urban issues and economic development

**N**estled on the northwest tip of Africa, Morocco is, unfortunately, vulnerable to the challenges of climate change. With a gross national income (GNI) per capita of \$7,690 (2015, World Bank), Morocco is considered a lower-middle income country (LMIC), in Stage 3 of the Demographic Transition Model.

### Climate of Morocco

Morocco has at least four different climate zones: a warm and dry Mediterranean climate, a moist Atlantic

climate, the cooler Atlas mountains and the desert climate of the Sahara (see Figure 1).

There is an upward trend in the frequency of warmer days and fewer cool days. This has considerable negative impacts on water availability and consequently on agriculture. In December 2015, winter temperatures soared to 25°C when they should have been 1–2°C lower. This caused a late apple harvest with only half the expected yield. Generally, the northern areas of Morocco are thought to be the most

A solar 'tree' on display at the COP22 conference in Marrakech

WideworldExtras



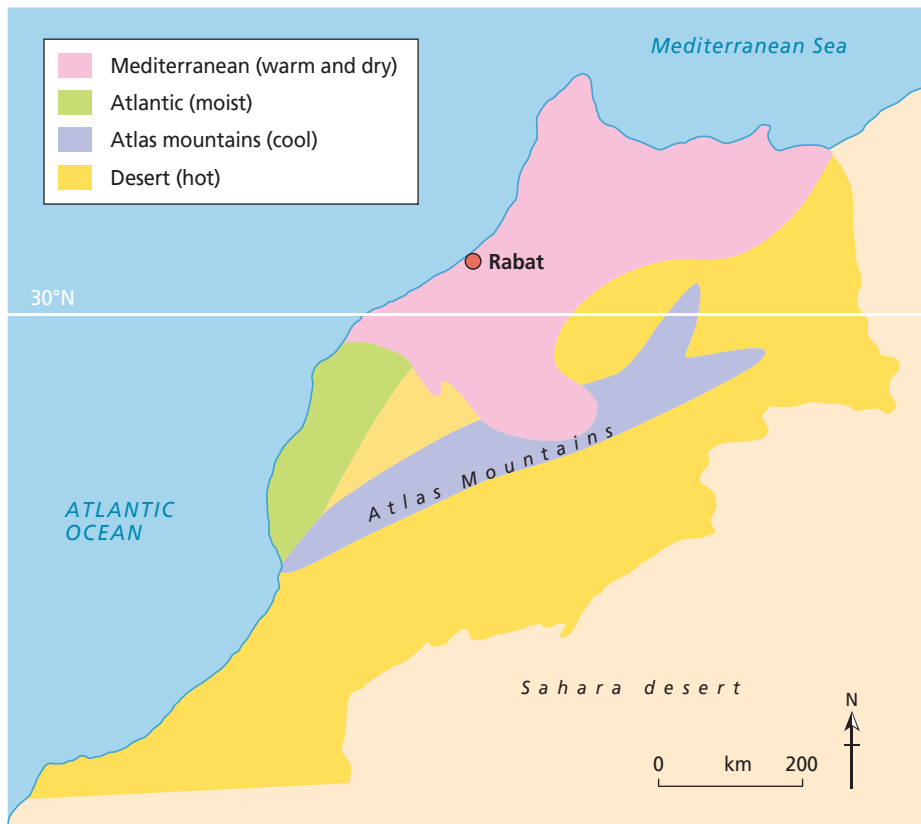
Go to [www.hoddereducation.co.uk/wideworldextras](http://www.hoddereducation.co.uk/wideworldextras) for a lesson plan on climate change in Morocco.

vulnerable to rising temperatures (up to 2.5°C by 2050) and falling precipitation rates, which will significantly impact on agriculture in the long term.

### Agriculture

In addition to the exceptional temperature range in 2015, there was a severe drought in 2015/16 that reduced overall harvests, especially with cereals relying on winter rainfall. More cereal was imported to meet population needs — an additional expense attributable to climate change.

Future climate change is likely to be a significant indirect threat to economic development, through food and water security. For example, 41% of the population work in agriculture, with this



**Figure 1** Climate zones of Morocco

accounting for two-thirds of Morocco’s land use. However, agriculture uses a staggering 83% of harvested water. In a country already considered water scarce, this level of threat will increase significantly until at least 2020.

Roles within agriculture have also changed. Younger men are now moving to the cities in order to find work and send money home, leaving women and older males to work in the fields. There is

every chance these young men will never return to the country.

### Tourism

Tourism is increasing in cities like Marrakech and Tangier as Morocco is one of the more politically stable Muslim countries, so there are opportunities available in this growing tertiary economic sector. Since 2008, tourism in Morocco has grown by approximately

### An electric bus in Marrakech



A leather tannery in Old Fez

25%, and it is hoped the economic shortfall from agriculture will be made up by continued increase in tourism.

### Desertification

The Sahara Desert extends into Morocco as far north as the southern reaches of the Atlas mountains. While this provides great opportunities, such as developing solar farms, the Berber population face challenges of increased soil erosion, water availability (and therefore food insecurity) and out-migration with the resultant threat of **cultural dilution**. **Desertification** is only going to get worse with climate change

### Tanneries

One of Morocco’s main exports is leather, made from sheep, goat, cow and camel hide. The process of turning the skins into products such as belts and shoes dates back to medieval times. However, increasing local temperatures speeds up the drying process, damaging the final piece of leather, and so reducing the profits made.

The supply of water for the soaking processes will become scarcer with increased evaporation rates from rivers and reservoirs. After 25 days the water has to be renewed with the old



water ending up in local rivers. This contaminates ecosystems, presenting problems for drinking water and urban healthcare.

## Energy

There are no fossil-fuel reserves in Morocco, so the country has historically relied on imports from other countries. Notably, there has been a dramatic increase in the use of solar panels since 2016. Morocco is investing heavily in the use of solar panels on city rooftops and along roads in rural areas, in addition to

building the world's largest solar farm on the edge of the Sahara. The target by 2020 is for 42% of energy generated to be from renewable energy, mostly solar, hydroelectricity and wind.

Moving towards an energy mix enables businesses to become more secure in their operation and production (see Figure 2). This in turn improves economic stability and energy security for the country.

## COP22

In November 2016, Marrakech held the twenty-second Conference of Parties (COP22) in the battle against climate change. Nearly 200 country representatives arrived, with the opportunity to put in place agreements from the Paris meeting the year before.

In preparation for COP22, Marrakech took a number of measures to improve the sustainability of the city and reduce its contribution to atmospheric pollution:

- the introduction of a rather unsuccessful bicycle scheme (Medina bikes, resembling London's 'Boris bikes')
- the development of solar street lights
- reinforcing the reduced use of plastic bags and replacing these with biodegradable cellulose and paper bags
- encouraging hotels to use **grey water** for watering gardens
- supplementing energy needs by using rooftop solar panels

## Glossary

**COP22** A meeting of countries held by the United Nations Framework Convention on Climate Change in order to discuss and put in place international plans to mitigate and adapt to climate change.

**Cultural dilution** Fewer people practising the traditional culture as young people migrate to the cities and towns.

**Desertification** The process by which land becomes drier and degraded, as a result of climate change and human activities.

**Fog harvesting** The collection of water from fog using large pieces of vertical canvas to make the fog droplets flow down towards a trough below the canvas, known as a fog fen.

**Grey water** Waste water from people's homes that can be recycled.

**Intermediate technologies** Simple, easily learned and maintained technology used in LICs for a range of economic activities.

**LUCF** Land use change and forestry

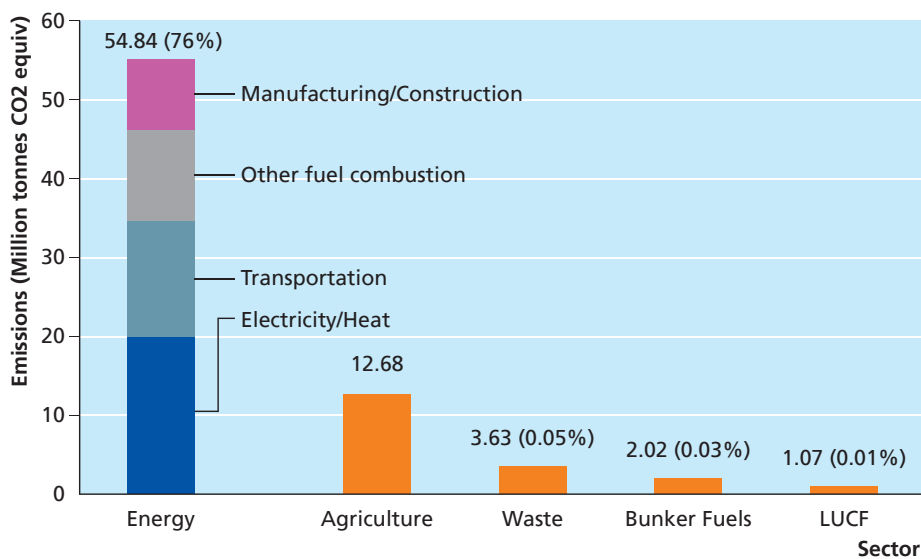
- using shuttle buses to transport guests, thereby reducing the use of hire cars and taxis

## Fog harvesting

Another initiative has been the country's development and use of the world's largest **fog-harvesting** project. Along the Atlantic coast, this has provided a vital water source for five villages, also reducing the effects of out-migration from the area. It has also meant that women no longer need to spend the day collecting water.

## Conclusion

Morocco is not only an excellent example of a country mitigating the causes and effects of climate change. It also demonstrates a range of appropriate, sustainable solutions and **intermediate technologies** to adapt current farming methods to meet the challenges of soil management, agricultural water control and climate risk management applicable to other African countries.



**Figure 2** Morocco's emissions by sector and percentage of total emissions (2012)