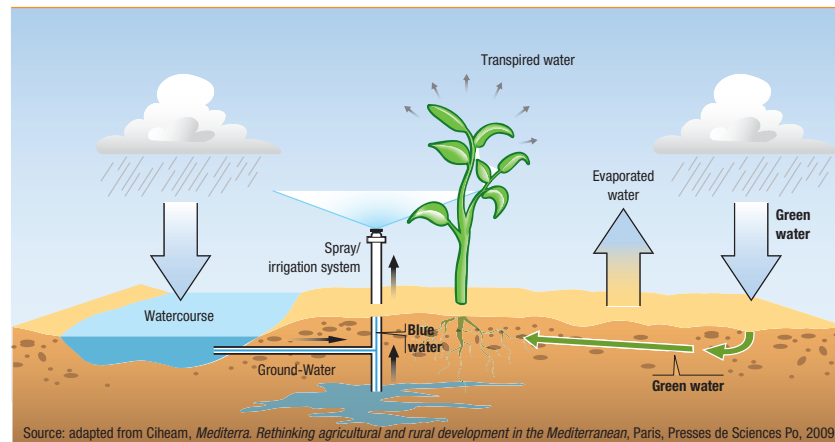


WATER SCARCITY AND WATER GAPS

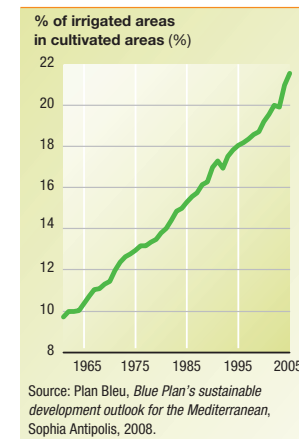
In order to get around water scarcity, the people of the Mediterranean, and in particular the Nabateans and Arabs, developed efficient systems of water engineering, which they used mainly for watering their crops. In Egypt, where crops cannot grow without irrigation, numerous techniques have been used for thousands of years to exploit Nile spates. But it was in the 20th century that irrigation was developed most, at least in terms of areas covered. This revolution in hydraulics, which was based on a supply policy, i.e. a policy of using a variety of facilities (such as dams, pipelines, etc.) to mobilise water, came about in various political and economic contexts. The southern and eastern Mediterranean countries based their independence on efforts to acquire food autonomy by launching major water engineering schemes designed to boost agriculture in an arid environment. This was the case in particular in Egypt, Syria and Morocco. In Algeria, Lebanon and the Palestinian Territories, this water scheme momentum was reduced by agricultural policy choices or geopolitical vagaries. Turkey has lagged far behind in this field but is now catching up with its programme for developing south-east Anatolia involving the eventual construction of 21 dams to irrigate 1.7 million hectares with water from the Euphrates and the Tigris. In Europe, the massive recourse to irrigation is to be explained by the Common Agricultural Policy and its productivist slant. In Spain, work started on designing hydraulic engineering schemes back in the 1930s in the context of inward-looking development based on self-sufficiency in agricultural production. Planning then developed towards a model which was geared more to agricultural exports and was confirmed by integration into Europe in 1986. Spain, France, Italy, Turkey and Egypt are the irrigation giants; the countries on the southern shores are much less developed

GREEN, BLUE AND EVAPOTRANSPIRED WATER

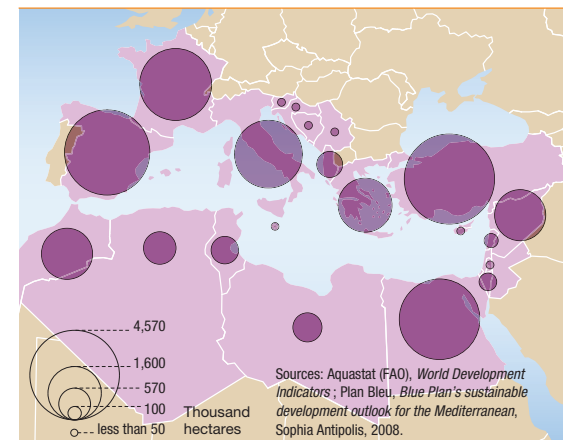


in this field. The predominance of these giants in the irrigation field is connected with the abundance of arable land (in France, Spain and Italy) or, in the case of Egypt, with the fact that agriculture is simply inconceivable without irrigation. This dependence on irrigation is also confirmed in the other southern and eastern Mediterranean countries, given their more arid climate. This need for irrigation is clearly illustrated when water supply is divided into blue water (surface or groundwater supplied by irrigation) and green water (precipitation water that is absorbed directly by the plant): in the southern and eastern Mediterranean countries with the exception of Turkey the share of blue water by far exceeds the share of green water, unlike the situation in the northern Mediterranean countries, where blue water accounted for 17% of agricultural water demand in 2005 and green water 83%.

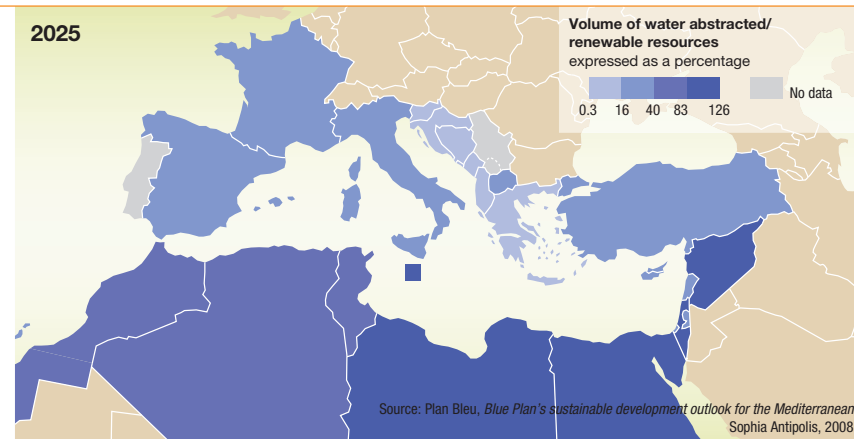
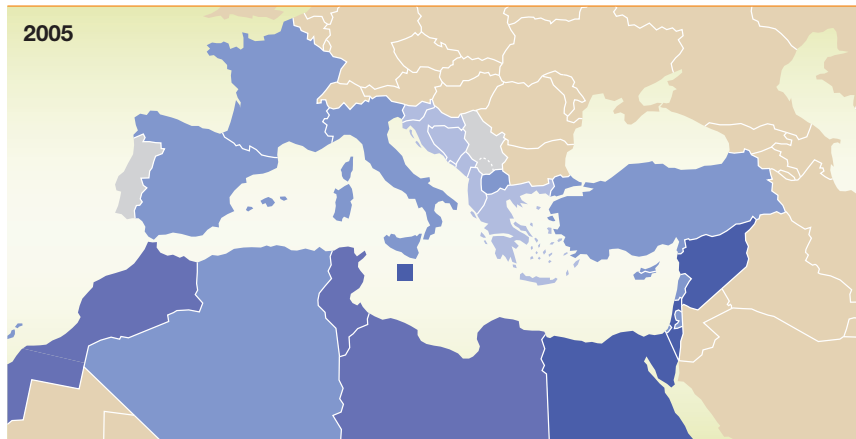
IRRIGATION, 1961-2005



IRRIGATED AREA, 2005

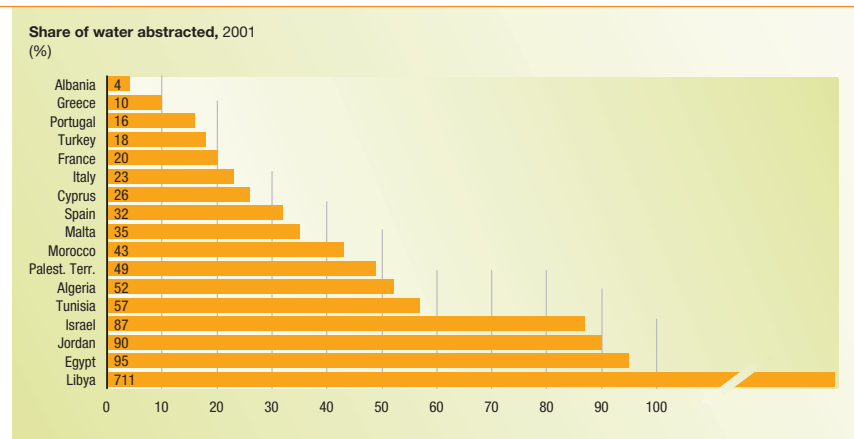
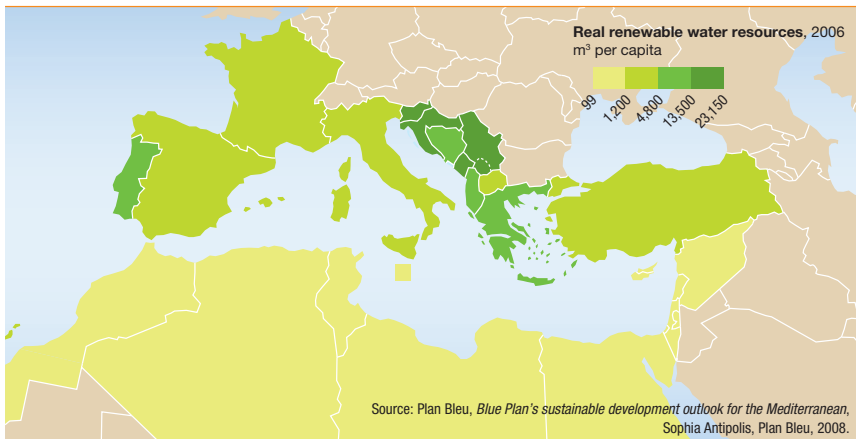


RENEWABLE NATURAL WATER RESOURCES EXPLOITATION INDEX



Atelier de cartographie de Sciences Po, 2009

WATER RESOURCES AND ABSTRACTION



Atelier de cartographie de Sciences Po, 2009

SIGNS OF EXHAUSTION AND STRESS

Irrigation is no doubt reaching its limit after years of rapid development, particularly in the southern and eastern Mediterranean countries, which are amongst the least endowed in the world in terms of available water resources: half of the world's "water-poor" (less than 1000 cubic metres per capita) live in the region. The natural resources exploitation index (the ratio between the volumes abstracted and the renewable water resources available) gives a worrying indication of the pressure that now weighs on water resources. Most of the southern and eastern Mediterranean countries have an exploitation index of over 50%, for instance, but it is the situation in the east of the basin that is reason for the greatest concern. With the exception of Lebanon and Turkey, both of which have water resources, the indexes are already very high (over 75%) and, to judge by trend scenarios, are liable to rise further. These quantitative limits are compounded by signs of deterioration in water quality. The increase in the volume of water abstracted from groundwater aquifers, for example, makes these aquifers more sensitive to marine intrusion. This is the case in particular in coastal regions such as islands, especially in Cyprus.

Water geopolitics. This deterioration in the water situation could be exacerbated by the effects of climate change, which are already being felt. Rainfall, which is already limited on the southern and eastern shores, seems to be becoming rarer and more sporadic. Water stress is all the more worrying since river basins or underground aquifers are sometimes shared by rival countries. Water management policy is indeed a major issue in the Mediterranean, in the basins of the Jordan, Euphrates, Tigris and Nile, to cite but the most crisis-prone examples. The situation is particularly tense in the

case of the Jordan basin. Since 1967, Israel has been establishing a number of mechanisms for preventing excessive abstraction of groundwater resources by the Palestinians (irrigation quotas, control of drilling, etc.), which will have to be called in question in the context of any real peace process. In the absence of binding international water law, and in a context of water stress, cooperation is the only way to facilitate access for as many people as possible to drinking water and irrigation water.

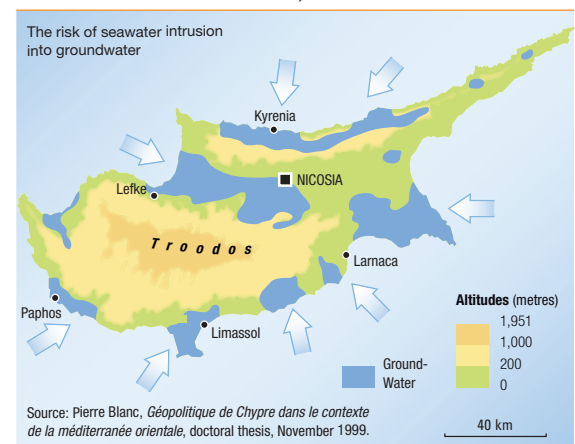
THE NEW HYDRAULIC REVOLUTION

Supply policy does not offer any major opportunities for expansion in order to cope with these problems, despite the progress that has been made in seawater desalting techniques (particularly in Algeria, Israel, Spain, and Cyprus) and in techniques for reusing waste water (in Egypt and Israel). The future of water in the Mediterranean region must now be approached from the angle of better demand management. The time has come for a new hydraulic revolution based on water savings. In the southern and eastern Mediterranean countries, where water shortage is flagrant, irrigation is the field that offers the greatest opportunities for water savings. Irrigation accounts for over 70% of water demand, and the techniques used are wasteful, particularly in Morocco, Egypt, Syria and Turkey, where gravity-fed irrigation is predominant, in contrast to France, Israel and Libya, where precedence is given to sprinklers or drip irrigation. The transition to more economical irrigation techniques is all the easier if a pricing system prompts farmers to economise. But this presupposes two imperatives: first, farmers must be properly connected to markets so that they can sell their produce in good conditions and thus be duly remunerated, which in turn will mean that their water control invest-

ments pay off; and secondly, water management must be shared, namely through irrigator associations. The water issue remains first and foremost a question of agricultural development.

Taking the Mediterranean basin as a whole, it is conceivable that countries turn to crops that are more water-economical or more water-efficient. The water-poorest countries already import virtual water through trade by buying agricultural commodities (but they also export virtual water – Moroccan tomatoes are an example here). It is an approach for the future of regional cooperation in view of the challenges posed by climate disruptions that are already taking place in the Mediterranean region, where the water issue has become more crucial than ever. ■

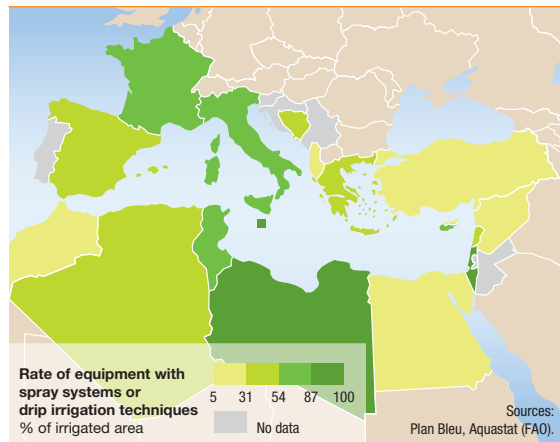
GROUNDWATER IN CYPRUS, 2000



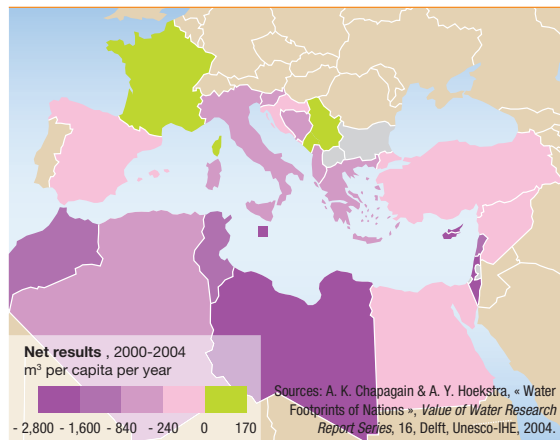
WEST BANK AQUIFERS



IRRIGATION SYSTEMS, 2005



NET RESULTS OF VIRTUAL WATER FLOWS



VIRTUAL WATER, 2004

