The environment

Viriato Soromenho-Marques

Brief geographical description of Portugal

In his «Lessons on the Philosophy of Universal History» (*Vorlesungen über die Philosophie der Weltgeschichte*), the philosopher Hegel made the following statement about Portugal: «It is in Portugal that the rivers of Spain find their way into the sea. It would be thought that, since Spain has rivers, it should also have a relationship with the sea; but this relationship was particularly developed by Portugal.» (Hegel, 1968: 197).

In fact, if Portugal, besides being one of the world's oldest nation-states, has played a role of universal significance in the history of humankind, successfully transcending the small size of both its territory and population, such a fact is due, amongst other causes, as Hegel so shrewdly observed, to the special relationship that it enjoys with the sea. This unique relationship reached its peak in the long period of the Portuguese Maritime Discoveries, beginning in the first quarter of the 15th century and being continued by the remarkable feats of Bartholomew Dias, Vasco da Gama, Álvares Cabral, and many other navigators and warriors.

Portugal's geography — even after its imperial cycle was brought to an end bet-

Fonte ?????????

ween the recognition of the independence of Guinea-Bissau, on 10th September 1974, and the devolution of the administration of Macau to the People's Republic of China, on 20th December 1999 — continues to be marked by a (dis)continuity in which the Atlantic Ocean plays a key role.

The basic trunk of the Portuguese territory is situated in the extreme west of the Iberian Peninsula, with a latitude that is defined by the parallels of 37.ºN and 42.ºN and a longitude ranging between 6.ºW and 9.º 30'W. However, 1240 kilometres to the west of the continental land mass is to be found the archipelago of the Azores, with its nine islands organised into three groups (Eastern, Central and Western groups). Further south, some 900 kilometres from the Portuguese mainland, and 600 kilometres from the coast of Morocco, lies the archipelago of Madeira, consisting of the inhabited islands of Madeira and Porto Santo, and the uninhabited islands of the Ilhas Desertas and the Ilhas Selvagens. In total, the Portuguese territory covers an area of 91,905.955 km^2, with a population that, due to a recent influx of immigration, already numbers more than 10 million inhabitants. Its extensive border with the Atlantic Ocean (in mainland Portugal alone, the coastline stretches over a distance of 832 kilometres) makes Portugal the country with the largest Exclusive Economic Zone (EEZ) in the European Union.

Winter in North-East Trás-os-Montes.

The most comprehensive view of Portuguese geography, understood in its many different aspects, from relief to biogeography, and including the cultural characterisation of its populations, can be found today in the works of the great masters, such as Orlando Ribeiro, Hermann Lautensach (who began his academic career as a Professor of Geography in Hannover, before the outbreak of the First World War), Suzanne Daveau and Manuel Viegas Guerreiro, amongst others.

Orlando Ribeiro offers us an impressive geographical picture of the country when he suggests that we should see both the Portuguese land and culture as being marked by a dialectic between the predominantly Atlantic characteristics of the northern coastal area and the Mediterranean components that tend to predominate in the most extensive part of the territory. In this way, the central chain of mountains, which is the most distinctive feature in the relief of the Portuguese mainland, would not therefore be seen as a factor causing an abrupt separation between the more mountainous north and the more gently undulating south, but rather as an intermediary element for the most influential factor in the Portuguese landscape: the human labour that has become lost in the mists of many millennia of human occupation.

The Atlantic-Mediterranean dialectic was to be the basis for identifying the three fundamental regional divisions of the territory of mainland Portugal: the Atlantic

Arrábida mountains: Portuguese Mediterranean landscape.

North, the «Transmontano» North (the northern area of Trás-os-Montes, the region «beyond the mountains») and the South. However, in a more refined analysis, Orlando Ribeiro identifies a total of 23 sub-regions (see Map 1), which gives us a clearer picture of the great diversity of the Portuguese territory. Other dividing lines can be identified in mainland Portugal: a) the contrast between a northern region, with its greater availability of water resources and greater population density, and a drier southern region with a sparser population; b) the contrast between the coastal region and the inland region, which explains, on the one hand, the way in which the human occupation of the country has been concentrated along a coastal strip on the western side of a line running from Braga to Setúbal, complemented by a more recent occupation that coincides with the Algarve coastal region, and, on the other hand, certain aspects in the continuity of the wooded areas from Trás-os-Montes to the Alentejo and the Algarve, where, amongst other species, it is possible to observe oaks, chestnut trees, cork-oaks, holm-oaks, olive-trees, fig-trees and almond-trees; c) the contrast between the highlands and the lowlands, where the most notable features are the archaic traces of a life based on agriculture and grazing, and the planting of vineyards and fruit trees (Orlando Ribeiro, 1991: 131 ff.).

The two Portuguese archipelagos in the Atlantic Ocean are of exceptional interest and beauty. Both are situated in the biogeographical region of Macaronesia (Archipelagos of the Azores, Madeira, Canaries, Cape Verde, and some areas on the North African coast). The islands of the Azores, which are the result of more recent volcanic activity, are surprising because of the diversity of their landscapes. Madeira is remarkable for its evergreen Laurissilva Forest, which was classified by UNESCO in December 1999 as being of world interest. The Madeiran Laurissilva Forest, composed of such species as fetid laurel, Madeiran mahogany, bay laurel and rare cedars, is a surviving relict of a forest that once spread over a vast area, covering a large

part of southern Europe. With the alterations in the climate, namely the succession of glacial periods, this flora only survived in the region of Macaronesia (Raimundo Quintal, 1999: 16).

As far as the people are concerned, it may perhaps be said that the most distinctive feature of the Portuguese cultural identity is to be found, on the one hand, in the ancient nature of the settlement of its mainland territory and original homeland, and in the profound intermingling of peoples and ethnic groups, from the Celts and the Iberians to the Romans, Germanic tribes (in particular the Swabians), Arabs and all the other peoples that the reconquest of the territory from the Moors and the era of the Portuguese Maritime Discoveries and Overseas Empire caused to converge and become part of the Portuguese destiny.

Environmental awareness and society in Portugal

Portugal was not a pioneer in matters of environmental awareness, because it was also not a pioneer of modernity, with its long parade of industrial revolutions signalling the first surge of the wave of destruction that has altered the planet's ecosystems and marked the Earth's history over the last two centuries.

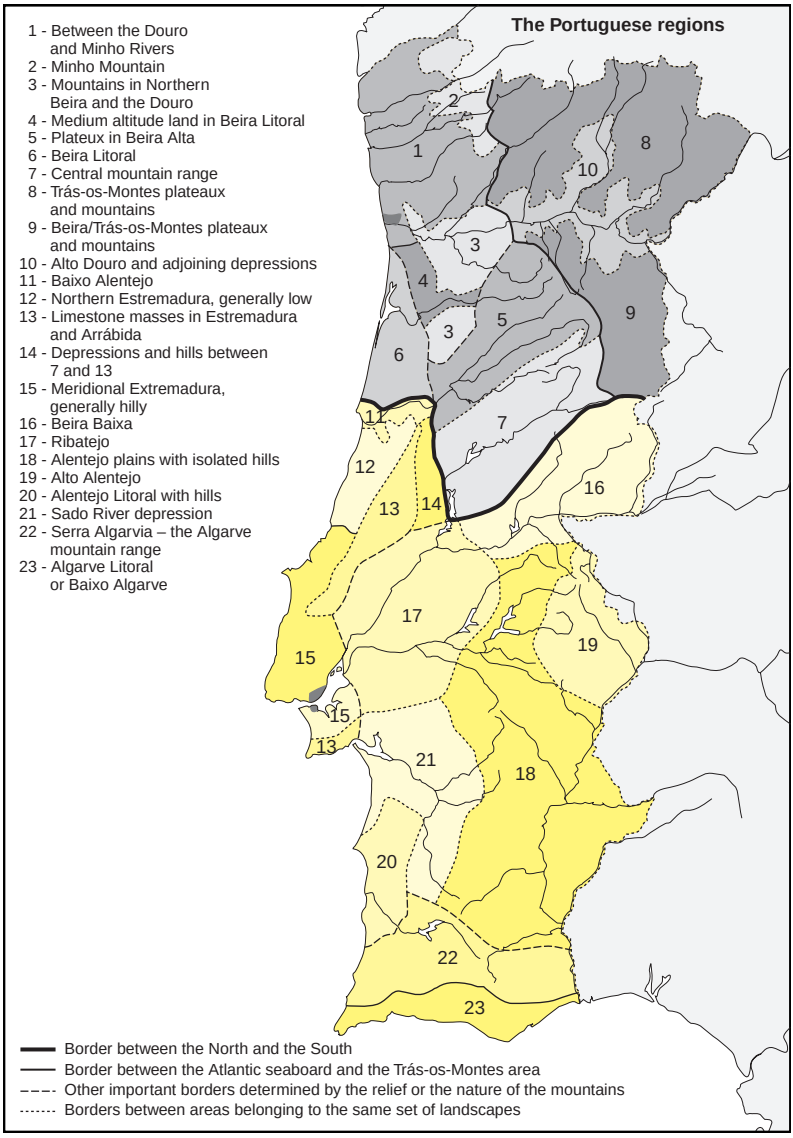
As far as the policy of nature conservation is concerned, attention is drawn to the pioneering work of the personalities, almost all of them originating from academic and scientific circles, who joined together in 1948 to found the *Liga para a Protecção da Natureza* (LPN — League for the Protection of Nature). Shortly before this, there had appeared the excellent study by Francisco Flores, who, in an essay published by the *Revista Agronómica* in 1939 made an important summary of the doctrines and policies being followed on an international scale in the area of nature conservation, in so far as this was possible at that time (Flores, 1939).

In the literature of that time, we find, amongst others, two pioneering works in relation to the question of environmental awareness: *Os Pescadores* (The Fishermen) by Raúl Brandão (1923), a genuinely premonitory denunciation of how fishing resources were being destroyed by the unscrupulous nature of industrial fishing, and the great work by Aquilino Ribeiro

Madeira Island: a laurel-wood landscape by the Janela brook.

Quando os Lobos Uivam (When The Wolves Howl, first published in 1958), which shows how intensive forestry policies, especially those linked to the expansion of the cellulose industry, also represent a threat to the cultural aspects related to mountain life and the rural world. (Queirós, 1997: 175-180).

The main obstacles to the early development of both an environmental awareness and an environmental policy in Portugal can be explained by the enduring persistence of pre-modern characteristics in Portuguese society: from its heavy stress on the rural way of life to the low competitiveness of its fragile industrial



Regional map of Portugal.

Source: adapted de Ribeiro, Portugal, o Mediterrâneo e o Atlântico, Lisboa: Sá da Costa, 1992, p. 173.

The Azores: Fire Lake in Sao Miguel. A beautiful, delicate ecosystem.

fabric, and not forgetting the State's incapacity in matters of public education. The almost fifty years of dictatorship (1926-1974) were to further aggravate the country's deficiency in terms of civic participation, which is one of the most important factors behind the development of environmental policies.

The first phase of a public environmental policy in Portugal

On 19th June 1971, the National Environment Commission was created — whose president, both before and after the revolution of 25th April 1974, was José Correia da Cunha — which may be considered as the first Portuguese institution responsible for defining a public environmental policy.

Fishing boats in Sesimbra: an ecological and social challenge.

The government of Marcelo Caetano, condemned to international isolation as a result of its colonial policy, took the invitation to participate in an environmental conference seriously. Portugal was represented by large and highly qualified delegations, both at the Stockholm Conference and in the various preparatory meetings held at that time. As part of the preparation for the above-mentioned conference, a preliminary report was also drawn up about the state of the environment, which was published in the same year of 1971.

A quarter of a century ago, Portugal followed the world trend towards creating structures that would progressively turn the environment into a horizon capable of integrating public policies that were previously neglectful of the subject or else were to be found scattered in fragmented fashion around other executive bodies. However, the similarity of the Portuguese situation to that of other OECD countries was not without certain clear and fun-

damental limits. Whereas the creation of political structures in the area of the environment by governments such as those of the USA, Sweden, Germany, etc. was the result of a decade of intense democratic and civic activities that had taken place throughout the 1960s, the creation of the National Environment Commission in Portugal resulted predominantly not from the irresistible *endogenous pressure* of civil society — whose capacity for democratic expression had been blocked by the long lethargy of a repressive dictatorship — but instead from the effects of a *reaction to an outside impulse*.

Another hugely important moment in the presence of this «outside impulse», with all the positive and negative implications that this had, occurred in the study prepared for Portugal's accession to what was then the European Community. Some of the basic political conditions for being able to talk about an environmental policy already existed in the 1970s, immediately after the April revolution, namely the pioneering recognition of environmental rights in the country's Constitution, drawn up in 1976. On the other hand, and this is to be considered yet another positive aspect, since 1983 Portugal has had an important and original instrument for the management of its territory: the National Ecological Reserve (*Reserva Ecológica Nacional* — REN). However, only after 1986, as a consequence of Portugal's membership of the European Community, did we see a speeding up in the introduction of the mechanisms that would allow for the definition of a more agile environmental policy.

The state of the environment in Portugal: a brief overview

Despite the decline in some economic indicators in recent years, Portugal has experienced some very high growth rates, not only since the country's accession to the European Community, but in the course of a long period that began a decade before the 1974 revolution: this is clearly proved by both economic and social indicators (Barreto, 1996). The environmental impact of this growth must be studied with great care and attention.

Such growth has been achieved at the cost of a highly intensive use of energy, with an excessive consumption of raw materials in industrial processing, as well as at the cost of a production of large quantities of waste, even hazardous waste, not to mention the exponential growth in urban solid waste, an area where Portugal has one of the most critical situations within the Organisation for Economic Co-operation and Development (OECD). This means that the increase in the Portuguese Gross Domestic Product (GDP) is being achieved, in comparison with the average of the other countries in the European Union or the OECD, at the cost of a greater waste of energy, not only in terms of production, but also, and above all, at the level of transports, and with greater pressure being exerted on resources and raw materials, with all the problems that are associated with this in terms of urban and industrial waste.

It is important now to examine the great lines of force that characterise the state of the environment in Portugal.

Climate change

In comparative terms, Portugal's contribution to the changes taking place in the world's climate is notably less than that of its European partners. For this reason, in the Burden-Sharing Agreement (2002), signed between the EU countries under the scope of the joint fulfilment of the Kyoto Protocol (1997), Portugal managed to obtain permission for a 27 % increase in its emissions of the six greenhouse

Petroquímica Chemical plant in Sines: difficulties in meeting the Kyoto Protocol targets.

gases covered by the agreement over the period from 1990 to 2012. Recent studies have, however, shown that there has been a very significant slip in the achievement of these targets and that they may reach as high as 53 % more than the base data for emissions in 1990 (26 % above the authorised level). The government has already recognised that these emissions will be roughly 10 % higher than the permitted levels (5.8 million tons per year of equivalent carbon dioxide), which will be covered through the mechanisms provided for under the terms of the Kyoto Protocol. In 2004, according to the Portuguese Environment Institute, the national increase in greenhouse gas (GHG) emissions was already higher than 41 %.

Despite the existence and updating of public policy instruments designed to combat climate change in Portugal, such as the National Programme for Tackling Climate Change (*Programa Nacional para as Alterações Climáticas* — PNAC), which has had two versions published in 2004 and 2006, and the National Plan for the Allocation of Emission Licences (*Plano Nacional de Alocação de Licenças de Emissão* — PNALE), whose second version for the period from 2008 to 2012 was produced in 2006, the fact remains that the reasons for the upward trend in GHG emissions continue to exist. The causes for this increase are essentially to be found in the sectors of electric power production (the burning of fossil fuels at thermal power stations) and transport, in particular the combination of increasing emissions from private motor vehicles and the road transport of goods. To correct these negative trends, strict and radical measures will have to be taken in the alteration of transport policy, mainly in the metropolitan areas of Lisbon and Porto, with investments being made in improving public transport and increasing the transport of goods by rail and sea.

Energy

The national energy system is characterised by a heavy dependence on supplies from abroad, which has consequently led to an increase in the country's energy bill.

In 2001, 84 % of the energy consumed in Portugal was imported. In the European Union, only Luxembourg ranks higher than Portugal in its dependence on oil: roughly 70 % of all its primary energy, as against the average figure of 40 % for the Union as a whole.

Between 1990 and 2004, Portugal increased its primary energy consumption by 50 %. Such growth also resulted in an excessive increase in the energy used by our economy, despite some positive facts that have occurred in recent years: two natural gas combined cycle power stations have come into operation (Tapada do Outeiro and Carregado); and, since then, there has been a greater use made of cogeneration (electricity production that is increased with the use of hot gases) for energy production.

Although Portugal is not rich in fossil fuels, it is a different case with renewable energies, whose use is not only a recent phenomenon, but is also far from reaching its great potential. Except in the case of hydroelectricity. So far, the measures taken have been essentially limited to the sector of electricity production. This is the case with the Energy Efficiency and Endogenous Energies (E4) Programme, which aims to reach a target of 39 % of all electricity produced from renewable sources by 2010. More recently, new initiatives have been taken, with a sharp increase being planned in wind and solar power.

Transport

The pollutant emissions associated with transport have been increasing. As we have seen, together with the energy production sector, transport is responsible for the GHG emissions in Portugal. Besides carbon dioxide (CO2), transport is also responsible for emissions of carbon monoxide (CO), nitrogen oxides (NOx) and particles, pollutants that also contribute to surface ozone. Recent studies have confirmed the highly negative impact of road pollution on public health, particularly in urban centres.

As far as road accidents are concerned, there has been a positive trend in this area, which should be stressed. Road deaths in Portugal fell from 2262 in 1980 to 1316 in 2001. There has been an even more positive continuation of this trend in 2006.

Over the last decade, there was a fall in the total length of railway lines in operation (a fall of 302.8 kilometres between 1991 and 2001). Investment did, however, increase in the modernisation of the rail transport system: there was a significant increase in electrified lines (an increase of 443.7 kilometres between 1991 and 2001), especially in densely populated areas.

As far as port activity and maritime transport are concerned, it should be noted that, despite the publication of the White Paper for the sector in 1997, there has continued to be much hesitancy about the real potential of this means of transport, particularly short-distance maritime transport: our ports have lost competitiveness in terms of the length and depth of their quays, and in the structure of their support machinery and transport equipment.

In the area of air transport, there was a clear increase in the number of passengers transported between 1991 and 2001. There was, however, a fall in the number of domestic passengers, a fact which is not unrelated to the development of motorways. The decision to build a new Lisbon international airport at Ota continues to give rise to heated discussion and is far from achieving the desirable national consensus.

Nature Conservation

In comparison with its other EU partners, Portugal has a relatively rich and

White storks in Alcácer do Sal: biological diversity that needs protecting.

diversified natural heritage, which gives the country a particular responsibility for protecting a wealth that must be considered the common property of Europeans.

Nature conservation in Portugal results from a combination of a varied national and international legislation, which includes the Directives about Habitats and Birds (the joining together of which resulted in the setting up of the Natura 2000 Network), the Ramsar Convention, and various programmes from the Council of Europe and UNESCO. The Basic Law governing Protected Areas (1993) establishes a typology with four main categories for the designation of areas, most notably the National Protected Areas Network, which includes one National Park, 13 Natural Parks, 9 Nature Reserves, 6 protected landscape areas and 5 natural monuments. These areas are also joined by several classified sites. Counting all the models for protection, including the Natura 2000 Network, more than 20 % of Portugal's territory is covered by some form of protected status.

Despite the fact that the National Strategy for Nature Conservation and Biodiversity (*Estratégia Nacional de Conservação da Natureza e da Biodiversidade* — ENCNB) came into force in 2001, public policy in this area continues to present difficulties that it has taken a long time to overcome. The most notable of these areas are:

A significant contrast between the powers and duties and the human and material resources placed at the disposal of the Nature Conservation Institute (*Instituto de Conservação da Natureza* — ICN) for the performance of its broad remit (extended even further, a few years ago, to include the management of the coastline).

A chronic delay in the implementation of the regulatory instruments that are essential for nature conservation.

An insufficient capacity for implementing and monitoring already existing plans.

Endemic difficulties in coordinating nature conservation with the activities of agriculture, forestry, hunting, mining, quarrying, tourism and energy (including renewable energies).

As a general rule, in the management of protected areas, there is a low level of adherence to the aims of conservation on the part of local authorities and the populations residing in the respective areas.

Land use, Forests and Agriculture

Land use in Portugal is subject to significant natural limitations. 60 % of the land, which originates from schist, greywacke and granite, is composed of thin soils which have low fertility and are easily eroded. 15 % of the total land area derives from sand and arenites, where the soil has difficulty in retaining water and nutrients. Roughly 10 % of soil is derived from limestone, which in this case is thin and rocky.

Traditionally the area of land used for agricultural purposes has been much higher than the 10 % of soil considered suitable for farming. With Portugal's entry into the European Community, there has been a decline in the cultivated area and an increase in the forested area.

The dominant tree species in mainland Portugal are maritime pine, cork-oak, eucalyptus (whose exponential growth has shown itself to have highly negative environmental impacts), holm--oak and stone pine. Although Portugal takes part in international schemes seeking to promote multiple-use forestry and respect for the forest as a habitat and ecosystem, the fact remains that vast areas where only maritime pines and eucalyptus are grown have led to the outbreaks of large summer forest fires, which, in recent years, have diminished in number, thanks to a more organised strategy for fighting them.

Large-scale social and demographic changes have led to major alterations in this field. Agriculture and forestry is responsible for roughly 71 % of land use in mainland Portugal. In the regions of Entre Douro e Minho, Beira Litoral and the Algarve, between 1989 and 1999, there was a fall of 31 % in the number of farms and a fall of 3.6 % in the total of the country's Utilised Agricultural Area (UAA).

One of the greatest risks facing farmland is the fact that most areas of highest productivity, such as the western Ribatejo region and the Algarve Coastal Strip, are to be found in regions where there is great pressure for changes in land use, namely through urban and industrial expansion, the building of tourist developments and the demand for second homes, amongst other purposes.

A third of the national territory is exposed to a serious process of desertification, which interacts negatively with the growing trend towards the depopulation of the inland region and the rural world in general.

The forested area covers roughly 38 % of mainland Portugal, corresponding to 12,400 companies, responsible for 3 % of employment and 11 % of exports. The fragility of the forestry sector, particularly in view of summer fires, is very closely related to the high degree of disorder within the sector, resulting in vast areas of single-species plantations (especially maritime pines and eucalyptus), which are afforded little or no maintenance. One of the main reasons for this disorder has to do with the great dispersion in terms of land ownership. Despite the publishing of countless laws, there has been a continuous failure in the capacity to provide a response to the decline in the forestry sector, as was unfortunately demonstrated by the arid disaster areas that developed in 2003 and 2005.

Water Resources

The structural deficiencies in water policy were the main strategic target of investment under the scope of the 2nd and 3rd Community Support Frameworks (1994-2006). Despite the progress made (see Table 1), the fact remains that Portugal is still faced with a series of significant challenges in this area:

The country's great dependence on Spain (the EU country with the greatest water storage capacity) in terms of discharges from international rivers. In 1998, a new agreement was signed for the management of Portuguese-Spanish water catchment areas, the scope of which has been regarded with some scepticism by many specialists.

The chronic delay in the drawing up of strategic planning instruments, as in the case of the National Water Plan (2001) and the management Plans for Water Catchment Areas.

Insufficient monitoring of ground water quality, even though many municipalities continue to depend on aquifers to guarantee the supply of drinking water.

The difficulty in guaranteeing a water supply to the population in perfect conditions of quality. It is calculated that there are 200,000 people served with

Farmlands in the Alentejo: the future of the environment depends on better physical planning.

water of deficient quality, especially in inland areas.

A restricted view of water planning, with its use tending to be concentrated in agriculture, industry and as drinking water, underestimating the importance of the ecological dimension. This has been the main reason for persistent controversy about irrigation limits, under the scope of the future gigantic Alqueva dam and reservoir (River Guadiana).

Serious wastages of water, both in agricultural use and in drinking water distribution systems. As a result of negligence, we continue to lose roughly 40 % of drinking water in the distribution network, as well as in agricultural use.

Slowness in the transposition of the

Overview of Portuguese water policy in 1995-2004

- A very sizeable figure for water availability (6,200 m3/per capita/per year).
- A sharp contrast between the north and south of the country (in southern regions there are cyclical droughts and periods of intense water shortages).
- Portugal is a downstream country, which shares with Spain the catchment areas of five major international rivers: Minho, Lima, Douro, Tagus and Guadiana. Roughly 56% of the water resources available each year in Portugal are generated upstream in Spain (see Map No. 2).
- In 1995, only 79.6% of the Portuguese population were connected to drinking water supply systems. In 1984, this figure was much lower: 52%. The average figure for the European Union is 91.5%. By 1998, this figure had risen to close on 90%.
- In 1995, only 55% of the population were served by sewage disposal systems. By 1998, this figure had risen to close on 65%.
- In 1995, only 21% of the population were served by a suitable sewage disposal system linked to a sewage treatment plant. By 1998, this figure had risen to close on 40%.
- In 2003, under the scope of the Strategic Plan for Water Supply and Waste Water Treatment (*Plano Estratégico de Abastecimento de Água e de Saneamento de Águas Residuais* — PEAASAR, 2000-2006), the following figures were achieved: 92% of the population supplied with drinking water at their homes; 74% of the population served by sewage disposal systems; 60% of the population served by sewage disposal systems linked to sewage treatment plants.

Sources: MARN — *Instituto da Água, Recursos Hídricos de Portugal Continental e sua Utilização,* vol. 1, Lisbon, 1995; Direcção-Geral do Ambiente, *Relatório sobre o Estado do Ambiente*, 1998; Instituto do Ambiente, *Relatório do Estado do Ambiente,* 2004.

strict European legal framework governing water distribution and supply, as well as the difficulties in adopting the integrated view that this promotes. The need still remains for an extensive and coherent adoption of the principles of polluter-payer and user-payer.

Coast and Ocean Management

With the largest Exclusive Economic Zone in Europe, because of the combination of its vast continental coastline and the extensive ocean area corresponding to the archipelagos of the Azores and Madeira, Portugal enjoys both the physical and natural conditions to be the European country in which there is greatest justification for an integrated coast and ocean management.

Let us review some of the main characteristics of the state of the environment in this area:

Portugal has some particularly sensitive coastal areas, protected by international conventions, such as the Ramsar Convention on Wetlands. Such areas include, from the north to the south of the country, the Ria de Aveiro, the estuaries of the Tagus and Sado rivers and the Ria Formosa.

The Portuguese coastline is particularly vulnerable to pollution by hydrocarbons due to the daily passage through the area of hundreds of oil--tankers. One of the twelve largest oil spillages in history occurred on the Portuguese coast, in January 1975, with the Jacob Maesk oil-tanker being responsible for the discharge of 84,000 tons of crude oil. Once again, in 2002, the country came very close to suffering serious damage as a result of the «Prestige» shipwreck off the coast of Galicia.

Fonte: ????????

The Algarve: an example of the pressure exerted by tourism on the coastline.

Our coastline shows high levels of erosion (as is the case with the strip between Espinho, Cortegaça and Furadouro): there are pressures from both the tourism and building sectors; and there has been a sharp drop in the deposition of sediments resulting from alterations in the flow of rivers subjected to intensive hydraulic works (<85 % of the drained area), and possibly also as a result of the profound global changes in the climate.

From an economic standpoint, Portugal is particularly sensitive to the evolution in the stocks of fish species with the greatest commercial value. At the same time, cases of deterioration in the quality of bathing water have had a negative impact on tourism. Another aspect that has been important for reducing environmental impacts in coastal areas is the profound restructuring taking place in relation to the national port policy, where environmental protection and a greater rationalisation of resources have been two strategic priorities.

Pressures from tourist activities are also responsible for some significant conflicts in coastal management. The Plans for the Management of the Coastal Strip (*Planos de Ordenamento da Orla Costeira* — POOC) have met with serious resistance on the part of municipal governments and some economic groups.

Portugal has struggled to ensure that the protection of the oceans remains an open topic on the international environmental agenda. In this sense, we can record as positive the fact that, under the scope of the European Union, Portugal has been given leadership of the European Agency for Maritime Safety, which unfortunately continues without suitable premises for its full and proper operation.

Air

Despite the fact that Portugal's most densely populated areas are exposed to the winds blowing from the Atlantic Ocean, the country still has some critical areas in terms of air pollution. Greater urbanisation and the great increase in road transport are the main causes for the degeneration in air quality in Europe and Portugal.

The most sensitive areas, corresponding to the sites of the stations of a

network set up for measuring air quality, which must nonetheless be considered insufficient, are the urban areas, particularly Lisbon and Porto, and some industrial areas, such as Barreiro-Seixal, Estarreja and Sines. The network for measuring air quality is managed by the Regional Development and Coordination Committees (*Comissões de Coordenação e Desenvolvimento Regional* — CCDR), and the processing of their data has resulted in the production of the Air Quality Index (*Índice da Qualidade do Ar* — IQar). The pollutants measured by this index are: nitrogen dioxide (NO2), sulphur dioxide (SO2), ozone (O3), carbon monoxide (CO) and inhalable particles (PM10). Although the coverage of this index is still insufficient, there has been an improvement in the mechanisms for informing the population when the limit-values are exceeded, and a daily forecast is made of the air quality for the following day. As far as air quality is concerned, Portugal is currently in dispute with the European Commission in view of the high levels of inhalable particles at some of the monitoring stations: the country must greatly reduce its emissions of inhalable particles, particularly those originating from traffic (in Lisbon and Porto).

Between 1990 and 2003, there was a significant reduction in the emission of acidifying substances (roughly 15 %), particularly sulphur dioxide, as a result of reductions in the fuels used in thermal power stations, petrol and diesel. In recent years, there has also been a slight increase in the emission of substances giving rise to tropospheric ozone, namely, nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOCs), carbon monoxide (CO) and methane (CH4), which places Portugal outside both the targets of the Gothenburg Protocol (CLRTAP) for 2010 and the aims of the European Union Directive on ceilings for national emissions for the same year.

As far as stratospheric ozone is concerned, the assessments made by the Institute of Meteorology (*Instituto de Meteorologia* — IM) indicate that Portugal has recorded losses of 3 % per decade over the last thirty years, figures that are similar to those obtained in other regions of the Northern Hemisphere, situated at the same latitude. At the same time, the study undertaken of the process for the implementation of the Montreal Protocol (1987) shows that the fight against the substances responsible for the depletion of the ozone layer has been restricted to the adoption of European directives in this area.

Waste

The greatest successes have been recorded in the area of Urban Solid Waste. In 1996, a Strategic Plan for the Disposal of Urban Solid Waste *(Plano Estratégico de Resíduos Sólidos Urbanos* — PERSU) was launched. In January 2002, the last of 328 municipal dumps in mainland Portugal ceased to receive waste. It should be noted that, in 1997, only 48 % of Urban Solid Waste had what can be considered an acceptable final destination. There has been a large increase in incineration. The second version of this strategy (PERSU II) is currently being prepared.

As far as the negative aspects of Urban Solid Waste are concerned, there has been an enormous *per capita* increase in such waste over the last decade, together with an increase in the spending capacity of the Portuguese population. The measures taken to introduce a preventive strategy founded on the threefold idea of reduction-reuse--recycling have proved to be insufficient. The reuse figures are well below the

targets laid down by the government and the creation of the *Sociedade Ponto Verde* (a non-profit making organisation involved in the recycling of packaging waste) will require an even greater effort to be made in order to be able to contribute towards an effective and more favourable change in direction, enabling the country to achieve the recycling targets set in the European context.

Some progress has also been made in the disposal of hospital waste, with the closure of obsolete incineration systems located at a large number of hospitals. However, the situation is not so favourable in the case of Hazardous Industrial Waste (HIW). Twice, in the late 1980s and in 1994-1995, an attempt was made to build an incineration system for disposing specifically of this type of waste. Between 1998 and 2002, an attempt was made to find a solution based on co-incineration at two cement works. The alternative solutions put forward for the disposal of the different segments of waste, such as solvents or used oils, have given rise to much debate and a number of initiatives. In its turn, the 15th Constitutional Government sought to implement a distinct option based on Integrated Centres for the Recycling and Disposal of Hazardous Waste (*Centros Integrados de Recuperação, Valorização e Eliminação de Resíduos Perigosos* — CIRVER). In 2006, the government returned to the co-incineration option, without any reduction in the protests of local authorities and civic associations.

Prevention and mitigation of natural and environmental risks

Portugal is faced with a number of major natural and environmental risks:

Seismic risk in Portugal is a latent threat, unpredictable over time, with potentially catastrophic repercussions in the south-west of the territory, particularly in the Lisbon and Tagus valley area and the Algarve. Along the Algarve coastal strip and the western coast to the south of Peniche, there is the added danger of seaquakes.

Forest fires are a major risk in Portugal and they have resulted in a high number of personal accidents (more than 50 deaths in recent decades) and economic losses of hundreds of millions of euros. In 3 years (2003 to 2005) roughly 8 % of the country was burned

Forest fires: serious environmental, economic and social loss.

Flooding in the Tagus Basin.

(not only forests, but the whole territorial area, including the Azores and Madeira): roughly 880,000 hectares!

Floods are a major threat in mainland Portugal, particularly in the built-up areas of the floodplains of the country's main rivers (e.g. Tagus, Douro, Mondego, Sado and Guadiana), but also in small water catchment areas that are subject to rapid or flash flooding.

Coastal erosion has had a variety of causes in Portugal over the last century: (i) the reduction in the inflow of sediments into the ocean, especially since the 1950s, with the building of dams; (ii) the uncontrolled occupation of the coastal strip, with the building of houses and infrastructures; (iii) the eustatic rise in the sea level as a consequence of the thermal expansion of ocean water.

Encroaching desert: one of the results of climatic changes.

Soil erosion by water is another threat, characterised by the removal of the surface material of the land, leading to the degeneration of its agricultural and ecological potential.

Desertification is a complex process that affects roughly a third of the total area of mainland Portugal. The most serious risk situations are to be found in the Alentejo, particularly in the Guadiana basin, on the Algarve coast, the Douro valley, Trás-os-Montes and the border region of Beira Baixa.

Climate change in Portugal has negative economic impacts, but it also acts as a catalyst likely to increase a variety of risks. According to the results of the SIAM Project *Climate Change in Portugal. Scenarios, Impacts and Adaptation Measures* (published in two separate reports in 2002 and 2006), the consequences projected for our country, including the autonomous regions of Madeira and the Azores, as a result of the increase in global warming, will be very serious. These include: a) greater desertification; b) more forest fires; c) more extreme phenomena (this was the case with the heat wave of July-August 2003, which, in Portugal alone, caused roughly 2,000 extra deaths; d) the spread of disease vectors that are currently considered to be extinct or under control (such as malaria).

Conclusions and Future Prospects

In short, despite the positive institutional steps already taken in regard to public environmental policies, Portugal continues to display great difficulties in tackling the major environmental threats, particularly those related with five basic areas: a) the contribution to climate change; b) coastal erosion and desertification; c) loss of biodiversity; d) uncontrolled expansion of built-up areas: e) excess wastage of water in urban and agricultural uses.

In order to reverse this situation, we can reduce the main long-term priorities of Portuguese environmental policy to five areas:

Almada: a detail in urban disharmony.

More and better information: Portugal has to be equipped with suitable scientific and technical means in order to have a permanently updated picture of the state of the environment, in its various fronts. Without a permanently updated environmental database, it will not be possible to abandon the unsafe field of political decisions that are taken without sufficient objective justification.

More and better planning: Portugal needs its plans to be effectively implemented. Plans are needed in the area of sustainable development, in order to introduce environment levies and taxes as a means of realising the established principles of polluter-payer and user--payer; in the area of all types of waste; in the spheres of environmental education and education about nature conservation; in the fields of occupational safety, public health (through action programmes in the areas of environment and health), agriculture and spending patterns; in the area of energy conservation, efficiency and substitution; in the field of town planning, transport and infrastructures; on the fundamental horizon of water policy, involving inland waters, but also the coastal strip and the oceans. In order to cement all of these plans and give them greater coherence, Portugal needs a genuine and fully operational National Strategy for Sustainable Development.

More and better coordination: Environment policy is not the exclusive domain of the Ministry of the Environment. It must be conceived and implemented as a policy of the government as a whole and based on broad political and social consensus. All segments of government, particularly the local authorities, must set environmental aims and establish forms for ensuring that they are fulfilled. Without such coordination, the production of plans, programmes and strategies will not result in the positive shaping and transformation of reality, but will instead lead to a noisy and inefficient bureaucracy.

Better participation: Environment policy seeks to attain sustainability, i.e. it seeks to counteract the present collision course between our technical-scientific civilisation and the natural ecosystems on which we depend. Both through each citizen and through various types of associations, civil society must be given a say not only in the formulation, but also in the implementation of sectoral and global environment policies. The participation of Environmental NGOs must be enlarged, so that their voice can be heard, particularly those whose contribution to the Portuguese environmental agenda has been most important, such as Quercus, the National Association for the Conservation of Nature (*Quercus--Associação Nacional de Conservação da Natureza*), the League for the Protection of Nature (*Liga para a Protecção da Natureza* — LPN), and the Land Management and Environmental Study Group (*Grupo de Estudos do Ordenamento de Território e Ambiente* — GEOTA).

Greater responsibility: Those in charge of environmental policy and the political and economic agents involved in the process must be made responsible for their acts. Policies have to be monitored and assessed. Amongst other things, this implies greater speed in the mechanisms of justice, without which the rule of law will become nothing more than a merely rhetorical device. Closer and stricter accompaniment of the implementation of policies will make it possible to check on the reliability of the information used, the success of plans and their implementation, as well as the results made possible by increasingly complex forms of coordination and participation.