# Adaptation in Portuguese cities: some remarks and examples

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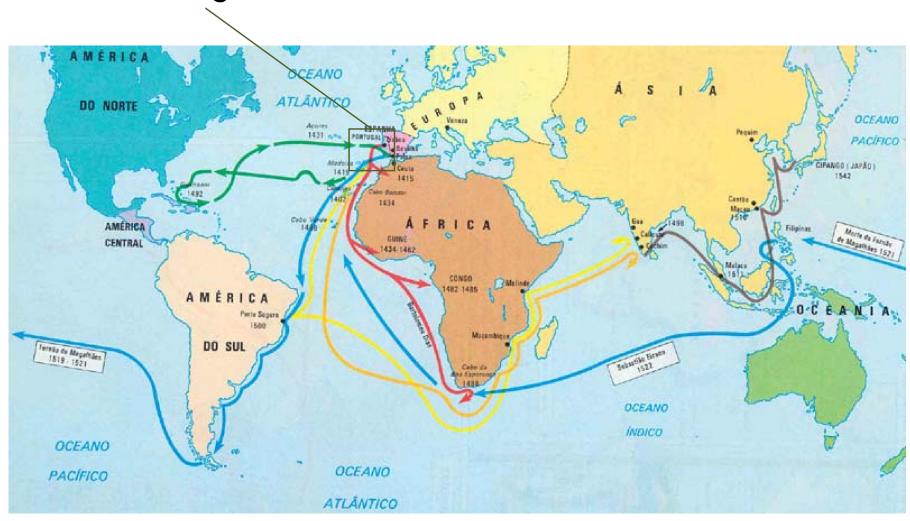
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### Portugal



### Portugal: a brief description



§ Total area: 92 090 km<sup>2</sup> (35 645 sq mi)

§ Coastline: 943 km (mainland) + 917 km (islands)

§ Population: 10.64 million

§ 61% urban population

§ Population density: 115 inhabitants/ km2

- § Life expectancy at birth= 78.7 years
- § Mean years of schooling= 8 years;
  School life expectancy= 16 years
- § GDP pcapita, 2009 = 21 370 USD (PPP)
- § HDI= 0.889 (very high human development),41st among 187 countries and territories





### Portugal: a brief description (cont.)

§ One of the oldest countries in Europe (sovereign nation since 1143)

§ Republic (since 1910), with democratic parliamentary government (democracy since 1974)

§ Member of the United Nations (1955), and member of the European Union (EU) since 1986



### Portugal: a brief description (cont.)

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As part of the EU, many of the economic and political decisions are coordinated among the 27 Members States, through a system of supranational independent institutions and intergovernmental negotiated decisions.



### Climate change Adaptation in Europe

- A \*\*\*\*
- § Climate change mitigation and adaptation are priorities in European policy agenda
- § Main expected impacts of climate change in Europe include: increased risk of coastal and river floods, droughts, loss of biodiversity, threats to human health, and damage to economic sectors (e.g., energy, forestry, agriculture, tourism)

### Projected impacts in Europe



### Arctic

Decrease in Arctic sea ice coverage Greenland ice sheet loss Higher risk of biodiversity loss

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### Northern Europe (boreal region)

Less snow, lake and river ice cover Northward movement of species More energy by hydropower Lower energy consumption for heating Higher risk of damages by winter storms Increased river flows Higher forest growth Higher crop yields More (summer) tourism

### North-western Europe

Increase in winter precipitation Increase in river flow Northward movement of freshwater species Higher risk of coastal flooding

### Mountain areas

High temperature increase
Less glacier mass
Less mountain permafrost
Higher risk of rock falls
Upwards shift of plants and animals
Less ski tourism in winter
Higher soil erosion risk
High risk of species extinction

### Coastal zones and regional seas

Sea-level rise

Higher sea surface temperatures Northward movement of species Increase in

of species
Increase in
p hytoplankton biomass
Higher risk for
fish stocks

### Central and eastern Europe

More temperature extremes Less summer precipitation More river floods in winter Higher water temperature Higher crop yield variability Increased forest fire danger Lower forest stability

### Mediterranean region

Decrease in annual precipitation Decrease in annual river flow Increasing water demand for agriculture Lower crop yields More forest fires Less energy by hydropower More deaths by heat waves More vector-borne diseases Less summer tourism Higher risk of biodiversity loss Higher risk for desertification



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## Adaptation

- § In April 2009, the European Commission presented the White Paper on Adaptation- a policy paper with the framework for adaptation measures and policies to reduce the European Union's vulnerability to the impacts of climate change, emphasizing the importance of **knowledge** and **information** sharing....
- ... complementing technology, ecosystem-based, and behaviour/management/policy adaptation measures, at the regional, national and local levels

### Climate change in Portugal



- § Mild climate, with Atlantic influence in the North, and Continental and Mediterranean in the South
- § Average daytime max. temperature: 12°C (Winter, Dec-Feb), 22°C (Spring, March-May; Autumn, Sept-Nov), 25°C (Summer, June-Aug) but can go up to 40°C



Climate change is expected to modify the timing of seasons: shortening the growing season (Spring), prolonging drought periods, which contributes to soil degradation and increased risk of desertification especially in the South

### Climate change in Portugal (cont.)



§ Portugal has 10 river basins, of which 4 (Minho, Douro, Tejo and Guadiana) are internationally shared with Spain





Water management, in cooperation context, is the oldest and most important area of environmental public policy in Portugal

§ In Portugal, the current *Water Law* (2005) is the national correspondence to the European *Water Framework Directive* (2000) - the main legal framework to protect and restore clean water and ensure its long-term, sustainable use

### Adaptation in Portugal: examples



§ Prepare for intense rainy events and the risk of floods in river basin areas



European *Floods Directive* (2007) - legal framework for the assessment and management of flood risks

§ In Portugal, the *Instituto da Água* (INAG, water institute) monitors the levels and the quality of water ...

... through modern radar for meteorological observations



Expl: Municipality of Loulé (Algarve) radar that captures data on intensity of rain within 200km distance

### Adaptation in Portugal: examples (cont.1)



INAG also implementing projects to prevent floods, especially near by urban areas, controlling flows



**Torres Vedras** 



**Torres Vedras** 



**Odivelas** 



Palmela

### Adaptation in Portugal: examples (cont.2)



§ Urban green infrastructures can also make cities more resilient to climate pressures



Under the management of local municipalities, there is now a total of 3 900 Waste Water Treatment Plants (ETARs) treating the water from industries and homes of 76% of the Portuguese population, and reducing the pollutants before discharges

Municipalities currently promote the construction of buildings with infrastructures to re-use water from rain for non-drinkable usages (e.g., gardening, washing car)



### Other Adaptation examples



§ **Mobility**, vital in a city, is an area where much can be done in terms of reducing GHG, air pollution, noise, and land-take for roads and parking areas

European cities favour the use of collective public transports, aiming for an even greater attractive frequency, comfort, easy access, reliability of services, and intermodal integration

Metro, Oporto



Metro, Paris





Barcelona Bici



**Amsterdam** 

Several European cities are also encouraging cycling as a mean of regular transport, building dedicated paths in roads

### Concluding remarks

- § Cities are ecosystems, open and dynamic; they develop and adapt, through human action and in interaction with other ecosystems;
- § Rethinking urban design, infrastructures, and transports; having better information (and sharing them); and improving urban planning through coordinated efforts at local, national and regional levels...
- ... seems a necessary way to turn urban ecosystems at the forefront of climate change mitigation and adaptation and to improve the quality of our lives, now and in the future!

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- European Environment Agency, 2010, " *The European* environment - state and outlook 2010
- European Commission, Directorate-General for the Environment: http://ec.europa.eu/dgs/environment