EUROPEAN
COMMISSION

Brussels, 23.7.2014
SWD(2014) 242 final

PART 15/23

COMMISSION STAFF WORKING DOCUMENT
Accompanying the document

COMMUNICATION FROM THE COMMISSION

Sixth report on economic, social and territorial cohesion: Investing in Europe's Future

{COM(2014) 473 final}

4.2. National and local policies can shape the location and land use intensity of new developments by promoting more compact cities

Compact cities can offer major savings in terms of infrastructure and travel time, so reducing the damaging environmental effects of built-up areas and high energy consumption. Matsumoto[1] has defined the following key features of compact cities:

- Contiguous development patterns: new urban development is typically located at the fringes of existing urban areas and urban sprawl is avoided.

- Dense built-up areas: urban land is used intensively, with more residents and more activities in a given size of built-up area.

- High levels of accessibility: mass-transit links ensure a high-level of mobility in the urban areas and a mixed use of land ensures that people enjoy fast access to services.

These features were taken into account in using the Land Use Modelling Platform to define two scenarios of future land use[2]: a business-as-usual one and a compact city one. Both scenarios incorporate estimates of the impact of Cohesion Policy (based on the RHOMOLO results) and improvements in accessibility. Cohesion policy support for investment in specific policy areas is also allowed for (e.g. in R&D facilities, health and education, waste and wastewater treatment, and urban regeneration). The main difference between the two scenarios is that in the first no specific urban land use policies are assumed to be put in place, while in the second a policy in favour of more compact cities is assumed.

Comparison of the two scenarios indicates many benefits from developing compact cities. Although in both scenarios, the intensity of land use continues to fall, the reduction is less in the compact city one, in which, in addition, there is less urban fragmentation, more infill development and the emergence of large city centres. In the business-as-usual scenario, there is more urban sprawl and more use of cars, with consequently higher energy consumption, illustrating the fact that such a pattern of development tends to lock people into a car-dependent lifestyle.

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[1] OECD, 2012, *Compact City Policies: A Comparative Assessment*, OECD Publishing. http://dx.doi.org/10.1787/9789264167865-1-en

[2] Batista E Silva F, Lavalle C, Jacobs C, Ribeiro Barranco R, Zulian G, Maes J, Baranzelli C, Perpiña Castillo C, Vandecasteele I, Ustaoglu E, Lopes Barbosa A, Mubareka S., 2013, *Direct and Indirect Land Use Impacts of the EU Cohesion Policy. Assessment with the Land Use Modelling Platform*. Publications Office of the European Union; JRC87823.

5. IMPROVING ECO-SYSTEMS AND REDUCING ENVIRONMENTAL IMPACTS CAN MAKE THE EU MORE EFFICIENT AND A BETTER PLACE TO LIVE

5.1. Preserving water quality and protecting species and habitats

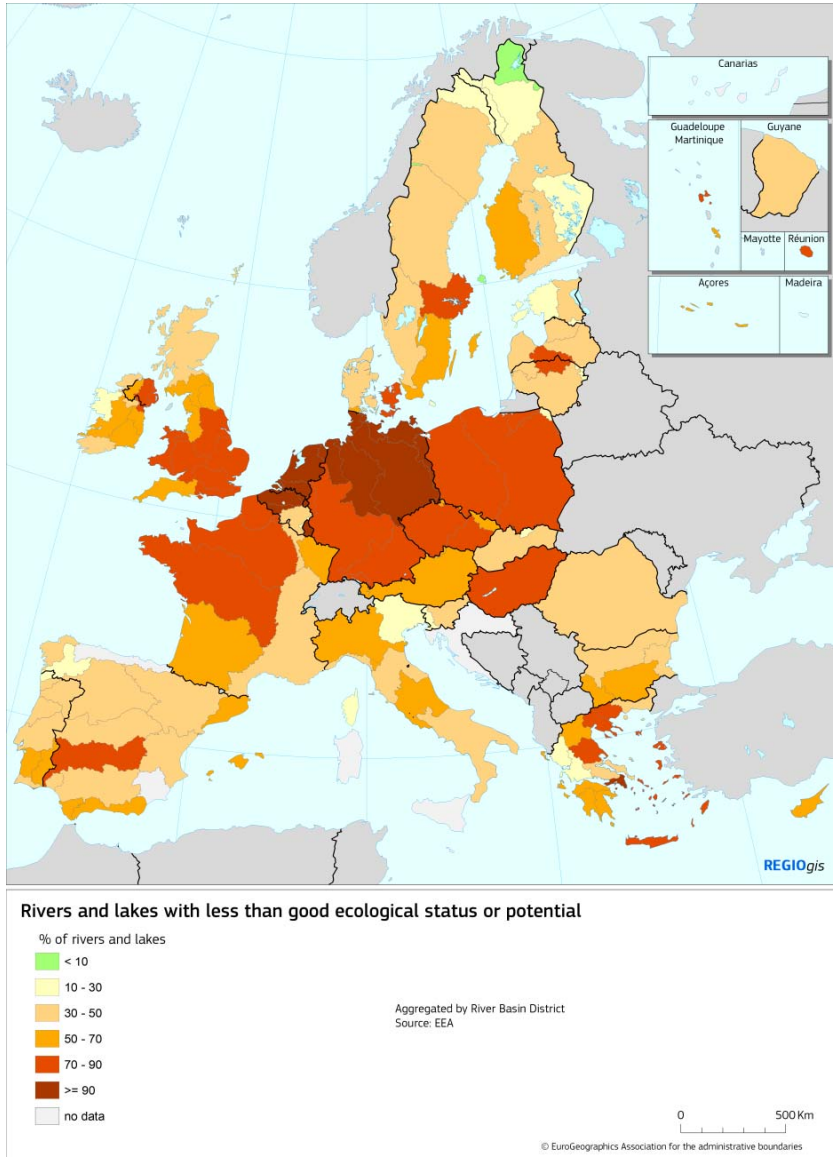
Water is, of course, a key natural resource which plays a central role in the functioning of the biosphere and in supporting all forms of life as well as being vital for agriculture and many other economic activities. In addition, freshwater and coastal ecosystems serve a range of regulating functions, such as controlling floods and breaking down pollutants. They are also essential to the health of marine ecosystems.

However, water resources are under increasing pressure, often as a result of human activity. Such pressure has different origins. Changes in land use and the development of economic activities is often accompanied by pollution and landscape interventions. The latter implies canalisation, disconnection of flood plains, reclamation of land, the construction of dams, and the extension of impervious surfaces, all of which alter the hydrological system. For instance, urbanisation tends to be accompanied by soil sealing and modifications to the existing sewerage and drainage systems that increase the risks of flooding and affect habitats and the aquatic environment. Water reserves are also often subject to extreme abstraction, due, for example, to the heavy use of water for irrigation by agriculture in some parts of the EU, especially during the summer, so increasing the risk of drought. Climate change exerts additional pressure since it is likely to increase the frequency and severity of both droughts and floods, as well as the temporal distribution of water availability, especially in areas where gradual snowmelt and water recharge becomes dominated by rapid thawing and flash floods. This calls for investment in disaster risk management.

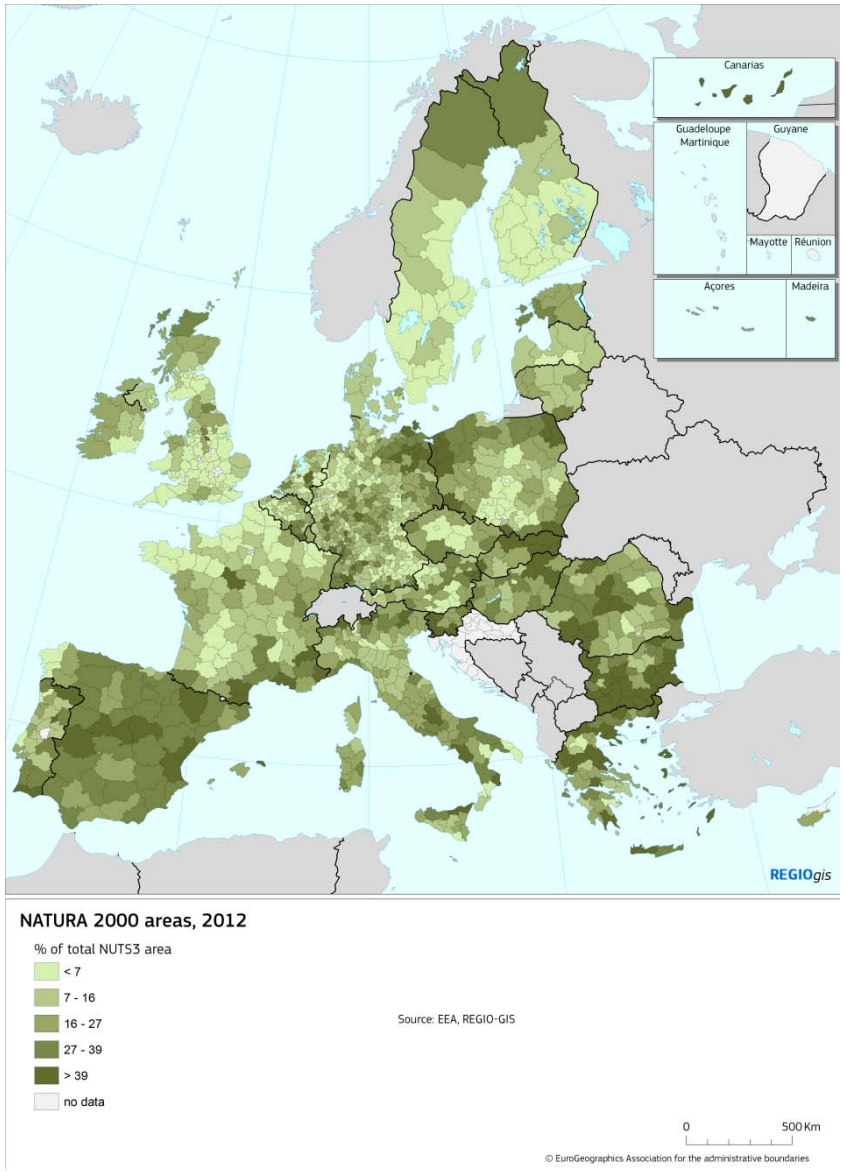
Performance in preserving aquatic ecosystems varies considerably across the EU. In a number of regions, many water bodies have been subject to various kinds of action which have affected their hydrology (the movement, distribution and quality of water) or their morphology (through straightening water courses, canalisation or disrupting the connection to flood plains). This is particularly so for most regions in Belgium, the Netherlands, the Czech Republic, Germany, Poland and Hungary. In France, Sweden, Spain and the UK, water bodies in many regions have also been affected by such pressure[3] (Map 68). Many of the changes date back to the early industrial era, such as the straightening of the Rhine (which occurred between 1817 and 1876), or earlier, such as the reclamation of land from the sea in the Netherlands.

[3] See European Environment Agency, 2012, *Water resources in Europe in the context of vulnerability*, EEA 2012 state of water assessment, EEA Report No 11/2012.

Map 1 Ecological status of main water bodies



Map 2 NATURA 2000 areas, 2012



The quality of water and the ecological status of aquatic ecosystems are also affected by pollution-causing nutrient enrichment in particular. More than half of the surface water bodies (lakes, rivers, wetlands and groundwater under the surface) in the EU are reported as not meeting the standards defined by Good Environmental Status (GES)[4] or Good Environmental Potential (GEP) and require remedial measures being taken to meet the EU Water Framework Directive objectives.[5] The worst cases are in the north-west of the EU, where over 90% of water bodies are in a poor ecological state, mainly as a result of intensive agriculture, resource-intensive industries and high-population density.

Box - Environmental policy and EU territories

EU environmental policy is pursued through Action Programmes. The 7th Action Programme, *Living well, within the limits of our planet*[6], is the most recent. It draws on a number of recent environmental initiatives, including the Resource Efficiency Roadmap, the 2020 Biodiversity Strategy and the Low Carbon Economy Roadmap, in order to reduce environmental disparities across the EU. The policy is implemented through various means (initiatives, taxes, Directives, charges, emissions' trading, green procurement and networks) and has significant effects on less developed regions as well as on different types of area (urban, rural, marine, island, mountain etc.) and social groups (such as the unemployed).

The EU environmental policy supports the installation of green infrastructure[7] as they can provide ecological, economic and social benefits through natural means. It can avoid relying on infrastructure that is expensive to build and is particularly important in cities,[8] where it can deliver health-related benefits such as clean air and better water quality.

Creating green infrastructure can also generate a greater sense of community and combat social exclusion and isolation as well as opportunities for connecting urban and rural areas and providing attractive places to live and work in[9] together with more jobs [10].

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4 The Water Framework Directive classification scheme for water quality includes five status classes: high, good, moderate, poor and bad. 'High status' is defined as the biological, chemical and morphological conditions associated with no or very low human pressure. Assessment of quality is then based on the extent of deviation from these reference conditions. 'Good status' means 'slight' deviation from the reference conditions. The definition of ecological status takes into account specific aspects of the biological quality elements, for example "composition and abundance of aquatic flora" or "composition, abundance and age structure of fish fauna" (see WFD Annex V Section 1.1 for the complete list).

5 Ibid.,

6 http://ec.europa.eu/environment/newprg/pdf/7EAP_Proposal/en.pdf

7 European Commission, 2013, *Green Infrastructure (GI) — Enhancing Europe's Natural Capital*, COM(2013) 249

8 Communication from the Commission to the Council and the European Parliament on a Thematic Strategy for the urban environment. COM(2005) 718 final.

9 Reports, studies and review documents supported by the European Commission — http://ec.europa.eu/environment/nature/ecosystems/studies.htm.

10 See case examples of GI creating jobs in Table 2 of Commission Services Working Document (SWD(2013) 155 final).

Natura 2000[11] areas are designated to protect EU most threatened habitats and species, but they also provide opportunities, for the development of tourism, recreation, agriculture, forestry sustainable fisheries and aquaculture as well as nature-based means of controlling floods, adapting to climate change and producing other ecosystem services, the total benefits amounting to an estimated EUR 200-300 billion a year.[12] The establishment of NATURA 2000 is not yet complete but considerable progress has been achieved with more than 15% of the EU's territory proposed for conservation under the network (see map).

Investing in Natura 2000 on land and at sea can also be an opportunity for advancing cross-border and multi-region cooperation, for example in respect of the strategy for the Danube strategy or mountain ranges (e.g. the Alpine-Carpathian Corridor Project has helped greatly to reduce the fragmentation of the landscape in Austria, Czech Republic and Slovakia through the construction of 'green bridges' and the creation of suitable habitats).

The impact of legislative and regulatory measures (e.g. Directives and EIA standards) on economic and social cohesion is more ambiguous[13]. On the one hand, the improvement of the environment in less favoured regions increases their attractiveness for external investors and for tourism and helps to strengthen their regional identity. On the other hand, the economic and financial implications of legal provisions can constrain development in both the short and longer-term.

5.2. The treatment of urban wastewater is necessary for ensuring high quality of water

Wastewater also poses significant pressure on the aquatic environment because of the organic matter and nutrients as well as hazardous substances and metals that it contains. Nutrient pollution is the main cause of eutrophication (excessive algae growth and oxygen depletion) and one of the biggest threats to reach good status of both fresh and marine waters. Appropriate collection and treatment of wastewater is therefore essential to preserve the quality of water reserves (from surface water to reservoirs supplying clean drinking water), bathing water and marine ecosystems. Proper sanitation is also a basic human right and essential to human health, which has been recently highlighted again by the first European Citizen's initiative (ECI) 'right2water'[14]. The EU Urban Wastewater Treatment Directive makes it mandatory to collect and treat wastewater in all settlements and areas of economic activity with the equivalent of over 2,000 inhabitants.[15]

The level of required treatment depends on the sensitivity of the area for discharges of waste water. Primary (mechanical) treatment removes part of the suspended solids and required in areas for which discharges of waste water do not adversely affect the environment ('less sensitive areas', rather exceptional and due to specific local conditions) , secondary (biological) treatment decomposes most of the organic matter but retains some of the nutrients and is the minimum requirement in all

[11] Natura 2000 is an EU wide network of nature protection areas established pursuant to the Birds and Habitats Directives

[12] According to recent Commission study "The Economic benefits of the Natura 2000 Network; http://ec.europa.eu/environment/nature/natura2000/financing/docs/ENV-12-018_LR_Final1.pdf

[13] European Commission, 2001, *Spatial impacts of Community policies and costs of non-co-ordination*, DG REGIO..

[14] See COM(2014)177final.

[15] The concept of population equivalent takes account of the load generated by the resident population, the non-resident population (largely tourists), and the industries covered by Art.11 of the Directive.

‘normal areas’, while tertiary (advanced) treatment removes almost all the organic matter and required in the ‘sensitive areas’, characterised by increased risks for adverse effects from discharges or requiring specific protection such as drinking water abstraction areas.