Digital tools for a greener Europe: democracy, environmental justice and sustainability in the EU through information and communication technologies and geographic information systems

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ABSTRACT: *In the European Union there is solid legal support for the use of information and communication technologies associated with geographic information systems in favour of the environment. Digital technologies not only shape the way we live but they can be a lever for environmental awareness and protection. The potential of the association between information and communication technologies and geographic information systems is huge in order to deepen the European democracies and to promote sustainable development. The ultimate demonstration is the 2007 Inspire Directive. The advantages of the Inspire Directive for the citizens, the Member States and the European Union in what concerns democracy, environmental justice and sustainability in the EU will be briefly analysed.*

KEYWORDS: *green Europe – sustainability – environmental justice – geographic information systems – Directive INSPIRE.*

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I. Introduction

In the European Union, there is solid legal support for the use of information and communication technologies associated with geographic information systems in favour of the environment.

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The potential of the association between information and communication technologies and geographic information systems is huge in order to deepen the European democracies and to promote sustainable development. The ultimate demonstration is the 2007 *Inspire* Directive.[1]

The advantages of the *Inspire* Directive for the citizens, the Member States and the European Union in what concerns democracy, environmental justice and sustainability in the EU will be briefly analysed.

II. The legal mandate

At the broader level of the United Nations, the use of technologies for sustainable development has been on the table since the 2012 declaration on *"The Future We Want"*. In the final declaration of the United Nations Conference on Sustainable Development in Rio de Janeiro, the General Assembly affirmed that "*information and communications technology is facilitating the flow of information between governments and the public. In this regard, it is essential to work towards improved access to information and communications technology, especially broadband networks and services, and bridge the digital divide, recognizing the contribution of international cooperation*".[2] In 2018, the General Assembly adopted a Resolution declaring that the Economic and Social Council should focus on "*future trends and scenarios related to the* […] *contribution of new technologies, in the economic, social and environmental areas on the realization of the Sustainable Development Goals* […]".[3]

At the regional level, in the European Union, environment-technology nexus is omnipresent.

According to the Treaty on the Functioning of the EU, not only the Union "*shall have the objective of strengthening its scientific and technological bases*"[4] but the environmental policy "*shall take account of* […] *available scientific and technical data*".[5] This means that environmental protection measures must be based on strong evidence on the effects of human activities on ecosystems, and on the evolution trends of natural environments, to act for their protection… before they fade away.

The Charter of Fundamental Rights of the European Union declares that "*it is necessary to strengthen the protection of fundamental rights in the light of changes in society, social progress and scientific and technological developments* […]". These developments can threaten some human rights, but they can also contribute absolutely to the effective safeguard

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[1] Directive 2007/2 of 14 March 2007 establishing an *Infrastructure for Spatial Information* in the European Community (INSPIRE).

[2] Resolution 66/288 adopted by the General Assembly at its sixty-sixth session on 27 July 2012 (§44 page 9).

[3] Resolution 72/305 adopted by the General Assembly on 23 July 2018. Review of the implementation of General Assembly resolution 68/1 on the strengthening of the Economic and Social Council.

[4] Article 179 of the Treaty on the Functioning of the European Union, on the research and technological development policy.

[5] Article 191(3)(1) of Treaty on the Functioning of the European Union.

and reassurance of most of the human rights.

In the context of the *Digital Europe,*[6] digital strategies can contribute to the fulfilment of the noblest European environmental goals. The report on *A Green Knowledge Society* relies on the concept of *"green ICT"* to support an eco-efficient economy.[7]

Finally, the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters,[8] supports the use of information and communication technologies, as it recognizes *"the importance of making use of the media and of electronic or other, future forms of communication".*[9] When the Aarhus Convention was drafted, 20 years ago, it was not so clear as it is today, what the future forms of communication would mean in the future. Two decades later, Aarhus' *sibling* agreement, the new United Nations regional agreement on Access to Information, Public Participation and Access to Justice in Environmental Matters, relies even more on digital tools. Now, besides the information and communication technologies, geographic information systems come into play. For the first time, the Escazu agreement,[10] adopted in 2018 in Costa Rica, for all the Latin America and the Caribbean Region, proclaims that; "*each Party shall guarantee that environmental information systems are duly organized, accessible to all persons and made progressively available through information technology and georeferenced media, where appropriate*".[11]

If we look for practical examples of articulation between technologies and environmental rights, the *Inspire* Directive in the European Union is the best example to demonstrate how geographic information technologies can be used as a tool to reinforce active environmental citizenship and to support well-funded policy decisions likely to affect the environment.

III. The Inspire Directive

Since 2007, the *Inspire* Directive, with its network functioning and interoperability of spatial data, has put in place a *spatial infrastructure* containing geographic data held by the Member States on subjects of major importance both, for citizens and decision-makers. The so called "spatial data themes" correspond to different layers of information that, when put together, will show a clear picture of how we are using our environment and what are the effects that our use of space is triggering on the environment and on ourselves. It is worthwhile to go through the prodigious list of

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[6] *Digital Single Market Strategy for Europe*, (COM/2015/192 final) - Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 6.5.2015. More recently, *A Connected Digital Single Market for All* (COM/2017/0228 final) - Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Mid-Term Review on the implementation of the Digital Single Market Strategy.

[7] *A Green Knowledge Society An ICT policy agenda to 2015 for Europe's future knowledge society*, A study for the Ministry of Enterprise, Energy and Communications, Government Offices of Sweden by SCF Associates Ltd, September 2009, p. 27-30 (available http://camfordassociates.com/wp-content/uploads/2010/11/A-GREEN-KNOWLEDGE-SOCIETY_CREATIVE-COMMONS_WEB.pdf).

[8] The Aarhus Convention was signed by the EU in 1998 and approved in 2005.

[9] §15 of the Preamble.

[10] Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (available at https://repositorio.cepal.org/bitstream/handle/11362/43583/1/S1800428_en.pdf).

[11] Article 6(3) *in fine.*

information that must be displayed in maps available for the EU citizens to confer and the decision-makers to consider.

The first layer of information[12] shows only basic information as names of areas, regions, localities, cities, suburbs, towns or settlements; units of administration separated by administrative boundaries for local, regional and national governance; location of properties based on address identifiers; cadastral parcels, transport networks (road, rail, air and water), hydrographic elements (marine areas, river basins and sub-basins, etc.) or protected sites.

The second layer[13] includes elevations, land cover, orthoimagery (geo-referenced image data of the Earth's surface, from either satellite or airborne sensors), and geology (bedrock, aquifers and geomorphology). The third layer[14] is the most ambitious and promising one. While some of the information is of a purely descriptive character, other information is much more elaborate, complex and revealing.

The primary information on this layer represents the multiple attributes of the environment: the soil and subsoil (according to depth, texture, structure and content of particles and organic material, stoniness, erosion, water storage capacity); the atmosphere and meteorology (precipitation, temperature, evapotranspiration, wind speed and direction); the oceans (currents, salinity, wave heights), the mineral and energy resources (hydrocarbons, hydropower, bio-energy, solar, wind); the species distribution.

The secondary information displays the level and intensity of human presence: population distribution, geographical location of buildings, industrial production sites, water abstraction facilities, mining, storage sites, agricultural (irrigation systems, greenhouses and stables) and aquaculture facilities, and land use (both the current and the future planned functional dimension or socio-economic purpose such as residential, industrial, commercial, agricultural, forestry, recreational).

The tertiary information shows where public authorities are carrying out activities for the prosecution of public goals, such as utility and governmental services (sewage, waste management, energy supply and water supply, public administrations, civil protection sites, schools and hospitals), environmental monitoring facilities (observation and measurement of emissions, of the state of environmental media and of other ecosystem parameters like biodiversity or the ecological conditions of vegetation) and area management and reporting zones (river basin districts and coastal zone management areas, restricted areas around drinking water sources, nitrate-vulnerable zones, regulated fairways at sea or large inland waters, noise restriction zones, prospecting and mining permit areas or areas for the dumping of waste).

The fourth and last level on this layer provides the most sensitive information: knowledge on risk. This includes vulnerable zones that are prone to natural hazards like floods, landslides and subsidence, avalanches, forest fires, earthquakes or volcanic eruptions.

But the most sensitive of all, is the information on human health and safety, which refers to health and wellbeing declines as a direct or indirect result of the deterioration of the quality of the environment. Air pollution, chemicals, depletion of the ozone layer or noise are prominent contributors to the onset of serious health issues in people. Indirectly, food and genetically modified organisms can increase health

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[12] Annex I of the *Inspire* Directive.
[13] Annex II of the *Inspire* Directive.
[14] Annex III of the *Inspire* Directive.

concerns as well.

The *Inspire* geoportal displays not only the causes but also the consequences of environmental degradation, including statistics on the geographical distribution of dominance of pathologies like allergies, cancers, respiratory diseases, decline of fertility or epidemics, fatigue or stress.

This immense quantity of operational information provides the citizens and the States with the power to balance alternatives and to orient individual and collective choices. Considering the volume and quality of information gathered in the *Inspire* geoportal, there is no excuse not to judge and decide wisely.

After the creation of *Inspire*, all EU citizens should have a similar right of access to comparable environmental information, using geographic visualization tools provided at the *Inspire* geoportal.[15]

IV. Active environmental citizenship

An active citizenship is the attitude of EU citizens that regard themselves as main actors of national and supranational socio-economic development.

The opposite to an enlightened and active citizenship is alienated passive citizenship that tolerates bad environmental racism, environmental corruption and environmental myopia, detrimental to present and future generations.

On the contrary, active citizens contribute to the improvement of the aggregate environmental performance by adapting certain behaviour, changing their lifestyles and engaging in activities that ensure environmentally sustainable public policies.

The access to environmental information is the first right inherent to an active citizenship. Environmental information includes, but is not limited to, data on the elements of the environment (air, water, soil, biodiversity), the factors that may affect it (air emissions, effluents, radiation, erosion, degradation, noise, extraction, etc.), the state of human health and safety, conditions of human life, cultural sites and built structures[16]. The *Inspire* thematic categories cover similar data (on infrastructures, polluting facilities, natural values, epidemiology and so on).

The electronic and telematic availability of environmental georeferenced information facilitates the fulfillment of the duty to provide information by public entities as imposed by the Aarhus Convention: *"each Party shall ensure that environmental information progressively becomes available in electronic databases which are easily accessible to the public through public telecommunications networks".*[17]

Beyond information, the existence of abundant environmental georeferenced information, easily accessible and understandable, confers effectiveness to the second right inherent to an active citizenship: the right to environmental participation.

Public participation can be exercised in the context of a series of administrative environmental procedures: in the strategic environmental assessment of plans and programmes,[18] in the authorization procedure for projects subject to environmental

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[15] Yet, when browsing the geoportal (http://inspire-geoportal.ec.europa.eu/) the discrepancies between the amount of data available for different Member States and for each data set reveal that some harmonization still has to be done.

[16] Article 2(1) of the Directive 2003/4 of 28 January 2003 (on public access to environmental information contains the full list of environmental information).

[17] Article 5(3).

[18] Directive 2001/42 of 27 June 2001 (on the assessment of the effects of certain plans and programmes on the environment).

impact assessment,[19] in the preparation of flood risk maps,[20] in the issuing of environmental permits for industrial activities,[21] industrial facilities dealing with hazardous chemicals,[22] waste management facilities[23] or water activities,[24] just to name a few.

Besides, availability of environmental georeferenced information allows avoiding environmental risks and facilitates taking advantage of the benefits provided by ecosystems.

In fact, understanding the territorial incidence of risks allows citizens to adopt self-protection measures against hazards, be they natural (earthquakes, tsunamis), technological (major emissions, explosions) or human-induced (flooding, wildfires). In addition, knowing where the natural values are makes it possible to enjoy ecosystem services in general and specially, cultural ecosystem services.

V. Informed and responsible public policies

In carrying out public policies with environmental and territorial implications, the use of *spatial data infrastructure* makes it easier to respect the ecological requirements in spatial planning. The list of activities in which the environment must be considered is extensive: agriculture, energy, industry, tourism, urban development, transport, waste management, and many others. The likelihood that projects can have significant environmental impacts depends on their size, nature or location. Considering that it is not easy to reduce the size of a project and even less to find alternative projects of a different nature, at the end of the day, geographic location remains the "determining factor" for public decisions to promote sustainable development.

There can be different types of wrong uses: excessive anthropic transformation of the territory (the consequence of which is the scarcity of nature with all its side effects like superficial flooding or soil erosion), activities generating excessive impacts (such as noxious industrial or mining activities and the associated environmental degradation), the fragmentation of the territory with linear projects that do not occupy an extensive territorial area but rather "shred" the territory (such as roads or canals that divide wild animal populations and segment their habitats).

Land-use planning will only be environmentally and socially sustainable if it does not ignore the environmental and social context of the possible locations and the cumulative effects of the intended uses on the territory.

VI. Other advantages

In addition to everything that has already been said, there are other advantages of the *Inspire geoportal:* (i) *Regional diversity* – The fact that the *"Union policy on the environment shall aim at a highest level of protection taking into account the diversity of situations in the various*

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[19] Directive 2014/52 of 16 April 2014 (on the assessment of the effects of certain public and private projects on the environment).

[20] Directive 2007/60 of 23 October 2007 (on the assessment and management of flood risks).

[21] Directive 2010/75 of 24 November 2010 (on industrial emissions).

[22] Directive 2012/18 of 4 July 2012 on the control of major-accident hazards involving dangerous substances.

[23] Directive 2008/98 of 19 November 2008 (on waste).

[24] Directive 2000/60 of 23 October 2000 (establishing a framework for Community action in the field of water policy).

regions of the Union"[25] makes it important to have a clear picture of the regional variations; (ii) *Territorial cohesion* – The environmental information available and organized in geo-referenced thematic categories strengthens the European territorial cooperation, supporting the generation of long-term spatial scenarios on policies with large territorial impacts, contributing to mitigate adverse social reactions and to promote sustainability and territorial cohesion;[26] (iii) *Environmental integration* – Environmental integration derives from the cross-cutting nature of environmental law and is one of the general objectives of the EU as set out in the Treaty: *"environmental protection requirements must be integrated into the definition and implementation of Union's policies and activities, in particular with a view to promoting sustainable development"*;[27] (iv) *Generation of statistical data bases* – The combined use of information and communication technologies and geographic information systems has the potential to generate a large amount of georeferenced statistical data. This is in consonance with the duty to produce statistics in the European Union. Article 338(1) of the Treaty on the Functioning of the European Union establishes that "[…] *the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall adopt measures for the production of statistics where necessary for the performance of the activities of the Union"*.[28]

VII. Conclusion

The list of achievements of an European *infrastructure for spatial information* could go on[29] but the most important function of the *Inspire geoportal* for democracy, environmental justice and sustainability is ensuring the visualization and choice of the best environmental, social and territorial options throughout Europe, warranting that the choices made promote a *"highest level of environmental protection and the improvement of the quality of the environment"*, as required by Article 37 of the Charter of Fundamental Rights of the European Union.

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[25] Article 191(2) of the Treaty on the Functioning of the European Union.

[26] Article 174 of the Treaty on the Functioning of the European Union establishes the Economic, Social and Territorial policy.

[27] Article 11 of the Treaty on the Functioning of the European Union.

[28] According to Article 338(2) of the Treaty on the Functioning of the European Union "*the production of Union statistics shall conform to impartiality, reliability, objectivity, scientific independence, cost-effectiveness and statistical confidentiality; it shall not entail excessive burdens on economic operators*".

[29] For instance, the fact that it allows the reuse of public sector information. Bastiaan van Loenen and Michel Grothe, "INSPIRE Empowers Re-Use of Public Sector Information", *International Journal of Spatial Data Infrastructures Research,* vol. 9 (2014): 86-106.