Harmonisation of thematic maps in the European Union – setting up different types of environmental analytical maps

VANDA TURCZI[1,2], PHILIPPE QUODVERTE[1] & JESÚS REYES NUÑEZ[2]

1 *CEDETE, University of Orléans, France*
vanda.gvoix@gmail.com

2 *Eötvös Loránd University, Budapest, Hungary*

Map-based communications (Cauvin *et al.*, 2007) have a very important role to play at the present time; they are almost the only tools available for publishing and translating spatial data in a graphical system to interested parties in various public spheres. A map is a good tool for visualising data, and it plays a supporting role in decision making (Quodverte, 2005) and in the understanding of water-related problems. Nevertheless, maps do not always meet the requirements of the different types of users (decision-makers, experts, general public) and they may not be satisfactory for undertaking the relevant spatial analyses. Often the message does not come through correctly because the cartographic rules and visual variables (Bertin, 1967) are improperly used, and the exigencies of those targeted, specific public spheres are not considered when the map is being created.

Water, which along with other critical aspects of the environment is a resource, force and hazard, does not stop at regional and international borders. Despite the fact that Europe has a contiguous surface, the human-made administrative borders define the different cultures, traditions, concepts and working methods of the various jurisdictions; as a consequence of this, the cartographical representations of environmentally-related phenomena also show a great diversity.

Along with various other significant issues, these transborder environmental problems have led to the creation of EU directives, including: the INSPIRE Directive (INfrastructure for SPatial InfoRmation in Europe), which aims to establish an infrastructure for spatial information in Europe (INSPIRE Directive, 2007); the Water Framework Directive (WFD), which requires the achievement of good underground and surface water quality standards in the EU by 2015 (http://ec.europa.eu/environment/water/water-framework/); and the Flood Directive (FD), which has the primary purpose of providing a framework for the Community on flood-hazard assessment and management (http://ec.europa.eu/environment/water/flood_risk/). These Directives require co-operation between countries, and they also encompass mapping obligations for the European Commission. This work embraces the process of harmonisation, which is a difficult but essential task for the emergence of European governance.

The result of this research project should be a multilevel map key which meets the needs of decision-makers, scientists and the general public, for both internet, and paper-based maps, which will be applied as a minimum to France and Hungary, and it will include an investigation into new innovations in hydrographical representation.

The INSPIRE Directive tries to solve the problem of heterogeneity of spatial data with the obligation of common standards; homogeneous data infrastructure is a pre-condition of harmonised representation. It has to take a long time to put the obligations of INSPIRE into practice, because the models and standards of data vary across the member states, and it is not an easy task to change this. Until today, harmonisation of representations has proceeded on a national level, as done in the cases of France and Hungary (the two case studies presented here). Maps in the frame of the WFD were created on the basis of a common legend key, but harmonisation on an international level is far from being solved (Fig. 1).

A study (Turczi, 2009) has been conducted on the obligations of the cartographical aspects of the flood directive (preliminary flood risk assessment) in the middle Loire and Cher river basins in France. The purpose of this study was to test the flood directive before its implementation and to make suggestions on the representation (Fig. 2). This study also proved how harmonisation is difficult to achieve. The availability of data is the main problem, along with the absence of

coordination with other basins, and the INSPIRE standards were not considered at all. This is the reason why the key prepared here will be a suggestion, because international coordination is necessary to solve this problem.

Beyond harmonisation, the other main problem is the visualisation of the data and the perception of the maps by different public spheres. The maps produced in the frame of WFD cannot transmit the same message with the same method of representation to three different audiences. The solution of this problem requires a general analysis of the actual maps, which includes a categorisation by the sector towards which the map is aimed. Most of the cases show that, typically, these maps of river basin management plans aim towards the scientists. The aim of integrating innovations and adapting the presentation to the requirements of decision-makers and the general public, whilst not excluding the experts, is the focus of a cartographical analysis which is taken through the cartographical rules (including visual variables) laid down by Jacques Bertin.

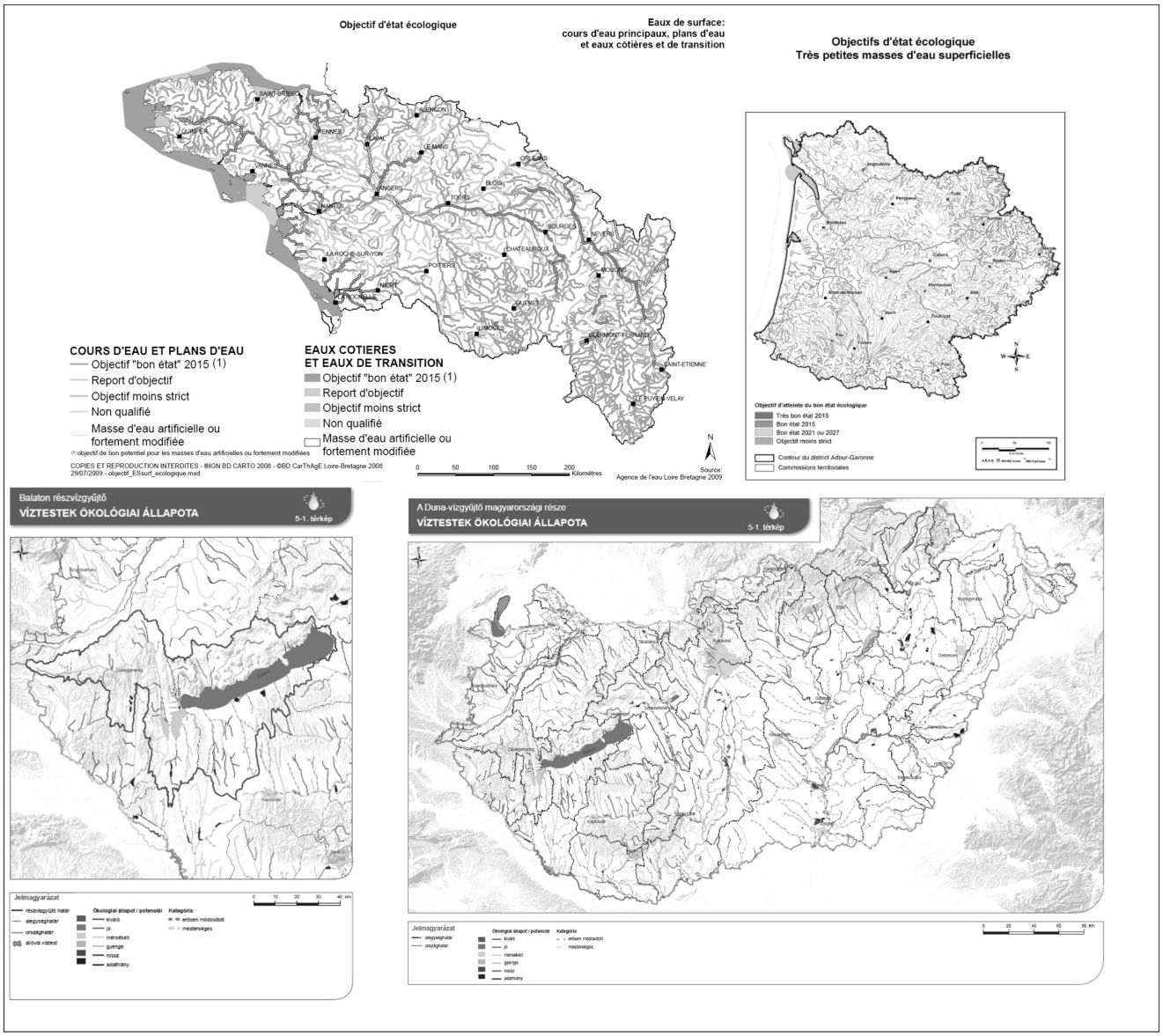

Fig. 1 Maps (France, Hungary) from the River Basin Management Plans (RBMP). Source: SDAGE Loire-Bretagne (2009), http://www.eau-loire-bretagne.fr/sdage_et_sage/sdage_2010_2015#sdage_120. SDAGE Adour-Garrone, http://www.eau-adour-garonne.fr/page.asp?page=3272. RBMP Hungary http://www.vizeink.hu/?module=doklista&f=13http://vizeink.hu/?module=ovgt.

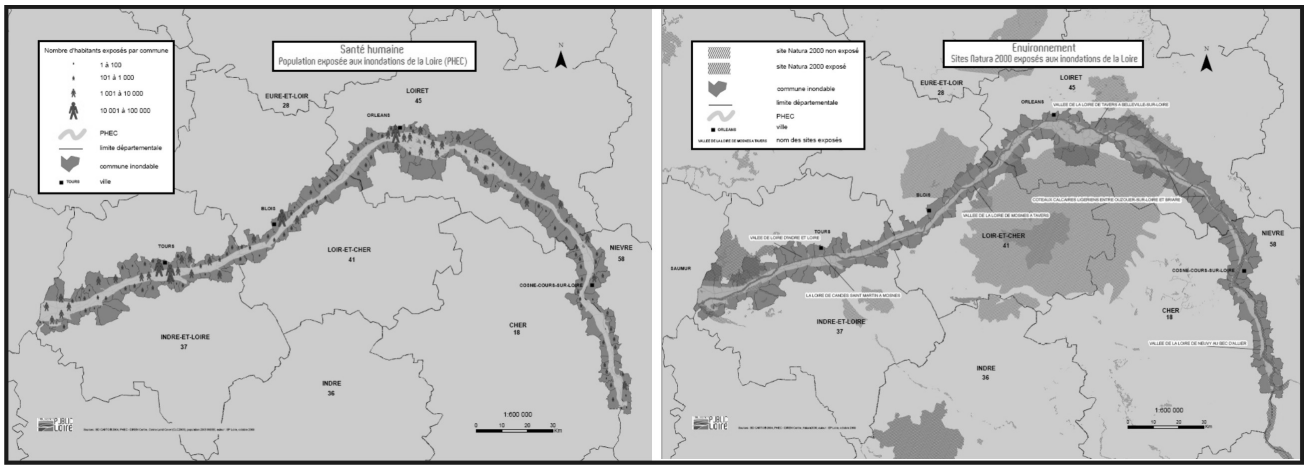

Fig. 2 Map results of the testing of preliminary flood risk assessment in the Loire basin. Source: 7 Turczi (2009) (own source).

According to Bertin, there are six traditional visual variables: shape, size, orientation, pattern, colour and value (Bertin, 1967). These visual variables form a graphical system, and they are associated with other variables. For example, the colour can have transparency, saturation, shade, hue, etc. With the development of the computer environment, other variables (Cauvin *et al.*, 2008) were introduced, including time, movement interactivity, zoom and sound. Research was conducted on mapping innovations to inspire ideas on the creation of new perception in the frame of the WFD or FD. With the help of these cartographical tools new visual effects can be carried out. This will be tested at different scales, on digital and paper-based environments.

The objective of this work is to overcome communication barriers to help resolve the pressing international environmental problems mentioned above.

The maps in Fig. 1 represent the ecological status and objectives of France and Hungary. Their representation is harmonised on a national level, but not on an international level.

The two maps in Fig. 2 represent the estimated population and Natura 2000 zones at possible risk.

REFERENCES

Bertin, J. (1967) Sémiologie graphique, Les diagrammes – Les réseaux, Les cartes, 4th edn., 60–61. Gauthier-Villars**,** EHESS, 2005, Paris, France.

Cauvin, C., Escobar, F. & Serradj, A. (2007) *Cartographie Thématique 2 – des transformations incontournables*, 16–17. Lavoisier, Paris, France.

Cauvin, C., Escobar, F. & Serradj, A. (2008) *Cartographie Thématique 5 – des voies nouvelles à explorer*, 47–56, 78–82, 113–120. Lavoisier, Paris, France.

Flood Directive website (2007) Available at http://ec.europa.eu/environment/water/flood_risk/.

INSPIRE Directive (2007) In: *Official Journal of European Union,* Available from http://inspire.jrc.ec.europa.eu/.

Quodverte, P. (2005) La sémiologie graphique et la conception de cartes thématiques dans les SIG: nouvelles méthodes, nouvelles images. In: *Colloque International Géomatique et Applications - Apports des SIG au Monde de la Recherche* (Université d'Orléans 13 et 14 mars 2003), 183.

Turczi, V. (2009) Essai de mise en œuvre cartographique de la directive "inundation" dans le bassin de la Loire. Rapport de stage. Etablissement Public Loire-Université d'Orléans CEDETE (unpublished).

Water Framework Directive website (2000) Available at http://ec.europa.eu/environment/water/water-framework/.