

SOME ASPECTS OF “CROSS-BORDER MAPPING” - SPATIAL TYPOLOGY, GEODATA AND GEONAMES

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For more than 15 years scientists of the Leibniz Institute of Ecological and Regional Development Dresden Germany (IOER) have been conducting interdisciplinary research in the field of sustainable spatial development. The scientific projects focus on regional development such as planning of infrastructure and nature protection. A significant number of projects is not limited to problem areas within Saxony or Germany but focuses on comparable regions in Europe. Regardless what spatial patterns these study areas present, the problems concerning geoanalysis and mapping prove to be identical. They comprise the management of heterogeneous geodata and the handling of multilinguality/multiscriptuality and the dealing with different forms of geonames. These issues have to be obeyed even in projects where geoanalyses is rather a sideline. This paper will only sketch the known issues and key experiences concerning cross-border mapping [Witschas 2005]. Some new aspects such as spatial typology of transboundary geoanalyses will broaden the topic. The intention is also to raise awareness among the practical or potential “cross-border mappers” especially in the eastern European countries and to encourage comments and cooperation in this field.

SPATIAL TYPES OF TRANSBOUNDARY GEOANALYSES

The expanding European Union and the advancing cooperation mainly between member states call for transboundary projects, geospatial comparisons and development concepts. The transboundary study areas can match different spatial types. Reviewing the array of IOER cross-border research projects of the past years the following spatial typology can be proposed:

1. **EDGE** – focussing basically on one territory the functional relations of the research subject require the inspection of a zone adjacent to the administrative borders of the study area (see fig. 1).

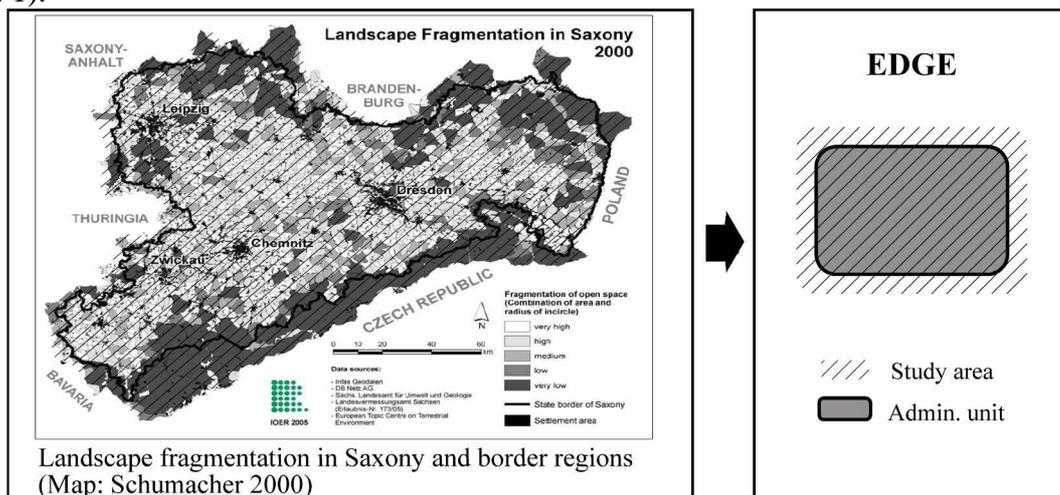


Figure 1: Example for spatial type EDGE (Witschas 2007)

Example: Landscape fragmentation in Saxony.

Unfragmented natural areas have a specific importance for nature protection. Large areas often exist especially in the (cross-) border zones [Walz, Schumacher 2005]. Thus, the appropriate natural borders designate the study area better than political frontiers. In result, the study area includes the territory of Saxony extended by a small edge of additional spaces.

2. **PORTIONS** – the study area covers adjoining parts of territories connected/separated by a borderline. Focus of the investigation is this cross-border area constituted by its internal structures and relationships (see fig. 2).

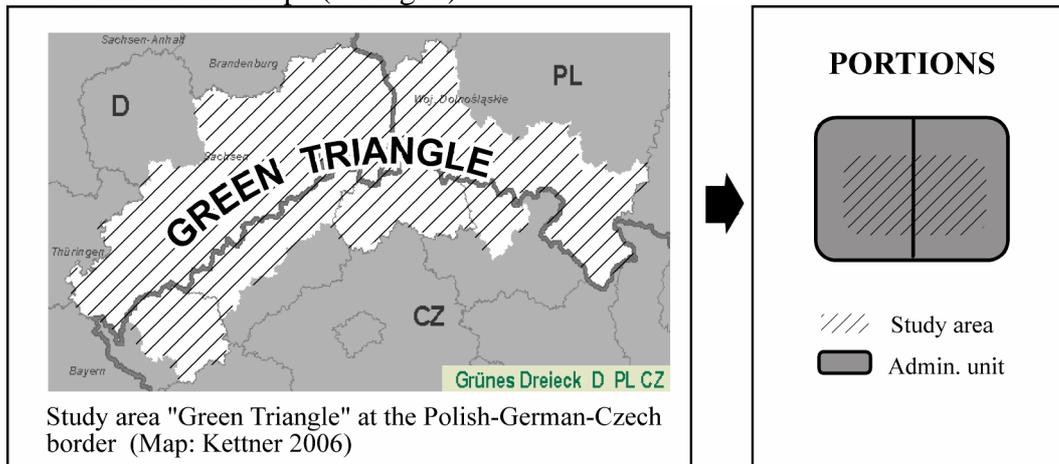


Figure 2: Example for spatial type PORTIONS (Witschas 2007)

Example: The so called "Black Triangle" (meanwhile changed into "Green Triangle") is a region in the south of East Germany, southwest of Poland and northern Bohemia notorious for the enormous environmental damages caused by the coal mining industry in the last decades of the 20th century. An IOER research project [P228] aims to compare the situation of the region in 1990 (start of the political changes in East Europe) with the up-to-date status. The intention is to evaluate the particular progresses and to specify the potentials and short-comings of the applied planning instruments in the three parts of the region. The geoanalysis requires the implication of information describing all spatial and thematical sectors of this geographical body.

3. **SEPARATE** – the disperse study areas have similar characteristics, a common border is non existent or out of primary interest, the different territorial affiliations of the study areas cause the heterogeneity of all applicable information (see fig. 3).

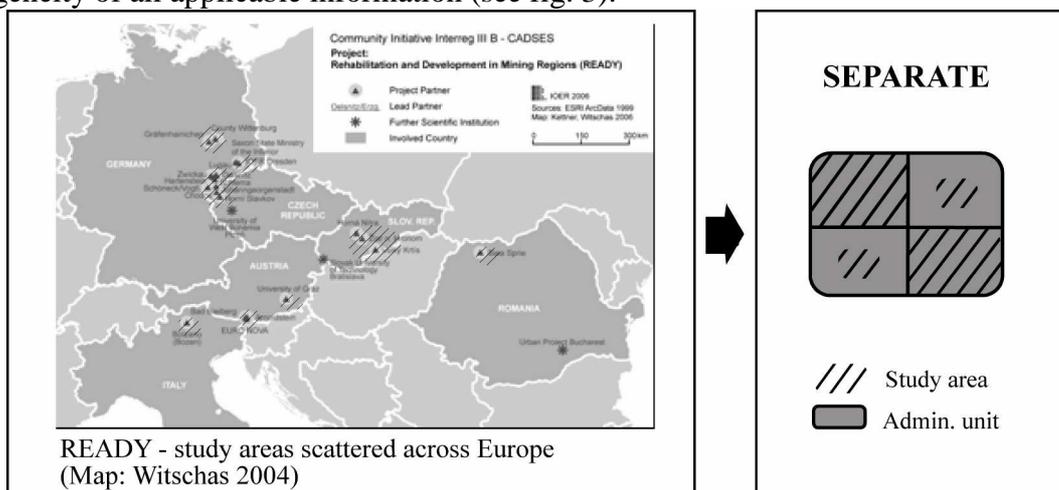


Figure 3: Example for spatial type SEPARATE (Witschas 2007)

Example: READY - Rehabilitation and Development of Mining Regions. The end of mining has dramatic consequences on the affected regions such as environmental damages, economic, social and infrastructural decline [Wirth 2006]. The INTERREG III B project READY connects regional players, public authorities and scientists coping with the local conditions, developing approaches and achieving advantages in former mining regions in several European countries. The relevant spatial and thematic information

describing the specific situations in the affected regions should allow (direct) comparisons.

4. **CONGLOMERATE (/Europe)** – study area is one geographical construct formed by contiguous spatial components. The investigations focus on spatial patterns or distributions within this agglomeration which is considered more or less homogeneous. The effect of the borders causing the diversity of the involved territories and the resulting heterogeneity of the applied (geo-) information is usually hidden (see fig. 4).

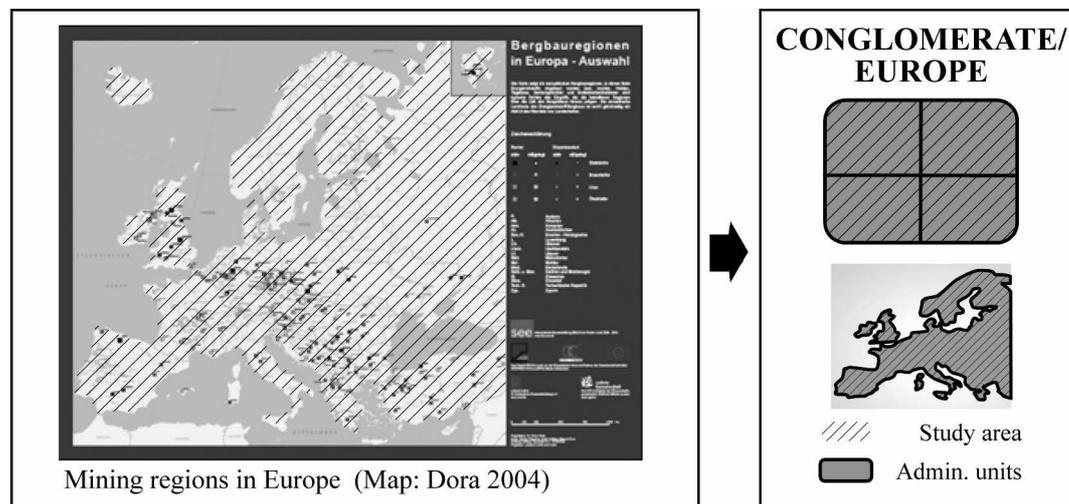


Figure 4: Example for spatial type CONGLOMERATE (Witschas 2007)

Example: REKULA is another INTERREG III B project of the European Union coping with the post-mining restructuring of disturbed cultural landscapes [REKULA 2006]. The activities of connected actors from affected European regions included the effort to generate a comprehensive documentation on mining regions in Europe. The necessary research and mapping had to recover all European countries (which includes considerations of the different extents of “Europe” which regard geographical or political or other organisational principles). Information collecting and processing had to overcome all barriers caused by lingual/scriptual, technical und organisational heterogeneity throughout Europe [Witschas, Kettner 2006].

OTHER ASPECTS OF “CROSS-BORDER MAPPING”

Regardless the diversity of these spatial patterns geo-analysis and mapping require the coping with identical difficulties. The problems result from the diversity of geodata, geonames and languages/scripts. The map maker / GIS worker is obliged to find proper and area-wide geoinformation and to visualise a generally graphical and lingual harmonised map content. Thus, all necessary steps of the transboundary mapping workflow are subject to specific conditions. Since geoinformation builds the base of the geoanalysis, geodata aspects (see. fig 5) influence success and efficiency of the workflow decisively.

GEODATA

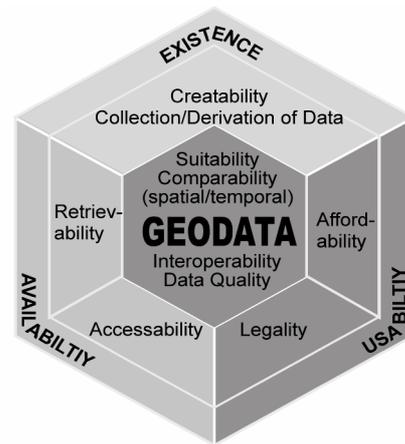


Figure 5:
Relevant aspects of geodata in the mapping workflow
(Witschas 2007)

The creation of a (transboundary) map requires the combination of various geoinformation which is qualified to model the research subject significantly.

Geoanalysts can benefit from a wide range of existent geoinformation. This comprises more than the basic spatial data (presenting relief, surface waters, settlements, traffic infrastructure, and borders) offered by national and federal survey offices. Diverse institutions raise specific thematic geodata such as common statistical data or special environmental information (see fig. 6). In some cases it is necessary to create own data sets by means of own data collection or derivation from existing data.

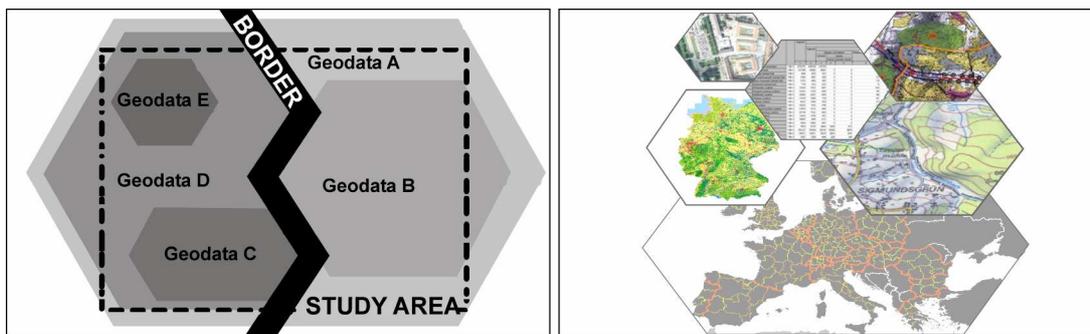


Figure 6:
Cross-border mapping often demands the combination of supranational, national and regional/local geodata: spatial patchwork of geoinformation (“zonal fragmentation” [Laurini 1998]) in combination with “layer fragmentation/thematic partitioning” [Laurini 1998] (Layout: Witschas 2007)

The search for relevant geodata is nowadays usually web-based. Using simple search engines, geo-portals or just deploying web services – language problems have to be considered. The search terms (incl. synonyms) have to be translated correctly and the delivered (meta-) information has to be understood subsequently.

Geodata availability also depends on the opportunities to obtain them. Map makers look forward to immediate geodata download or geodata access. Initiatives such as OGC (Open Geospatial Consortium), INSPIRE and NSDI (National Spatial Data Infrastructures) will enhance these opportunities. However, still numerous organisational, technical and judicial obstacles have to be overcome [Luzet 2003].

However, even existent and available geodata may not be applied into the geoanalysis. The usability of geodata is another precondition which can be constrained by cost (affordability) and copyright restrictions (legality). Effort, time and cost to get or to pay “licenses for use” or “licenses for publishing” can hamper or even avoid the usage of certain geodata.

The final decision about the implication of the geodata set into the geo-modelling resp. mapping workflow depends on the intrinsic geodata characteristics. This data quality is constituted by several parameters such as spatial, temporal and thematic accuracy/resolution, correctness,

completeness, and consistency. It is inevitable to scrutinise these parameters to assess the data suitability. In transboundary geoanalyses this includes the evaluation of the comparability of data sets which should correlate spatially and /or temporarily.

Transboundary geoanalyses have to accomplish complex activities to compile the necessary geodata. Especially the variation of technical and geodetical specification of the geodata requires procedures of homogenisation. This type of data integration is realised by means of import interfaces and modules which assure geodetical transformation and re-projection. Further steps might improve geometrical adjustment of the geodata.

The harmonisation of geoinformation content is a wide field of considerations and activities reflected in numerous publications and projects (amongst others [Laurini 1998], GiMoDig [Afflerbach 2004] or EuroGeographics). These efforts on national or supranational level do not solve all the harmonisation problems in an actual transboundary map-making project. Thus, it is helpful to know about the sophisticated approaches of integrating schematic, semantic and syntactic data models (especially when working with large/fundamental data sets [Laurini 1998]). Beyond that, attribute data can be adjusted to each other by an appropriate application of various logical and mathematical operations.

GEONAMES

Lingual heterogeneity reflects in the issue of geonames which are generally important for both orientation and communication with maps. A number of aspects affect the usage of geonames forms in the mapping workflow (see fig. 7).

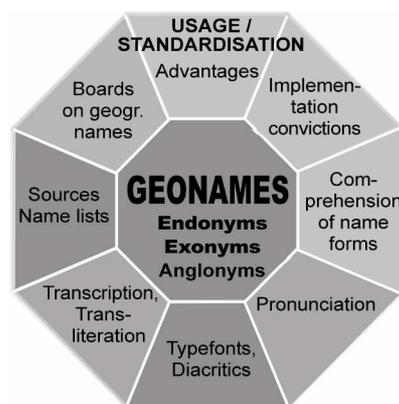


Figure 7:
Aspects concerning the usage of
forms of geographical names in maps
(Witschas 2007)

Many geographical objects have different names in different languages. They are results of history when explorers/military conquerors were unaware of original geonames or simply ignored them. They can also ease lingual challenges such as pronunciation skills or abilities. Another reason may be the extension of the geographical objects e.g. rivers, mountains maritime bodies covering various lingual areas e.g. Donau – Duna – Dunaj – Dunav – Dunarea. The local name for an object inside the language area is called endonym. Names for the same entity in other languages called exonyms [Kadmon 2000]. Standardisation of geographical names is for the sake of international communication, logistic, planning, disaster management etc. International boards dealing with this matter recommend the preferred usage of endonyms (e.g. UNGEGN, StAGN). The compliance with this convention has some consequences for the map making process. Reliable sources have to supply with the correct name forms: topographic maps, so called name lists or authoritative geonames' data bases. The lingual and script-specific characteristics of human languages require the adaptation of transliteration or transcription rules and/or the integration of appropriate type font's resp. diacritics into the workflow. Endonyms in maps can demand pronunciation skills in the further communication process. The attempts to use geonames forms consistently in all project documents (reports, tables etc.) can cause more

difficulties. The derivations of endonyms (example: a resident of Prague may be called a Pragan, but how to name the resident of Praha?). Anglonyms can avoid this problem as well as the trouble with diacritics. Projects with international partners usually benefit from the lingua franca “English” – including the English forms of geonames, anglonyms (see fig. 8.)

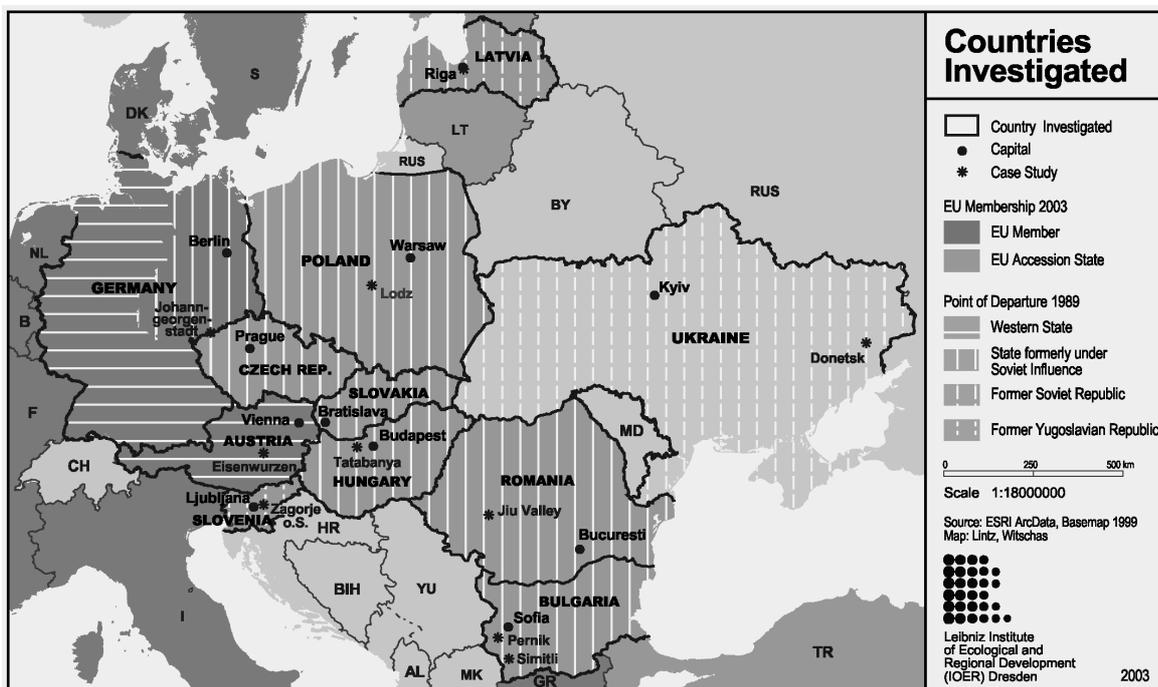


Figure 8: Example for the usage of anglonyms in an international project and the spatial type SEPARATE – the investigated countries displayed in this overview map were further analysed in single chapters with separate maps (Map: Lintz, Witschas 2007 [Finka. Müller, Lintz 2004])

MULTILINGUALITY

Lingual borders often coincide with national frontiers. The resulting language barriers affect cross-border communication in general and the coordination on project level in particular.

The main issues concern human lingual abilities (comprehension, spelling, pronunciation etc.) as well as technical opportunities such as the workflow safe display of diacritics.

Geoanalyses have to cope with language barriers concerning the (meta-)information describing the data set at large (see internet search terms) and the information within the data sets (attributes and geonames). These language-based issues affect search, preparation and analysis of the geodata. The final verification of lexical correctness proves to be the visual modelling in the map legend. Many terms related to spatial objects imply (country-specific) professional or legal definitions. It takes a degree of expertise to find usable equivalents “beyond the border”.

Occasionally no equivalent terms exist, incidentally the heterogeneous geoinformation is impossible to harmonise. In these cases the differences should be revealed clearly in the graphical visualisation of the map content and in the legend arrangement.

CROSS-BORDER MAPS - GENERAL CHARACTERISTICS

Cross-border maps show regions connected or separated by borders which also segregate different structures, systems and competencies [AGEG 2004]. According to the dimensions of the transboundary relations, they present smaller border regions - adjunct or scattered - or greater interregional or transnational spaces.

Most of the information that has to be included in a geospatial cross-border analysis is distinguished by heterogeneity. Diverse homogenisation/harmonisation measures are necessary to produce maps of consistent content.

Transboundary maps have a particular communicative function. The non verbal, graphic map language can transmit information about spatial patterns mainly without the semantic problems of spoken languages. Representing the material and immaterial values of both sides of the border, cross-border maps can strengthen the regional identity of the population.

Cross-border maps can act as indicators for successful transboundary coordination, too. The visualisation of the cross-border issues reveals the grade of professional cooperation and data harmonisation. Contrary, the lack of appropriate cross-border maps and geodata respectively may be one prime reason for missing or low-level transboundary cooperation [Witschas 2004]. In this regard cross-border maps also enforce the cooperation. Considering the two phases of mapping, this can happen in the mapmaking phase (when connecting the geoinformation persons) or in the map use phase: connecting the people addressed.

CONSEQUENCES

The necessary search, acquisition and harmonisation measures require extensive time and effort. Usually language barriers influence the mapping workflow, especially when conducting multilingual researches and designing multilingual maps. Last but not least, the choice of suitable forms of the geographical names affects editorial and technical mapping procedures.

These challenges call for specific “SKILLS” comprising language competencies and particular mapping solutions. Cartographers in charge have to obey “RULES” such as international or national laws, standards or initiatives. They have to apply appropriate “TOOLS”: information technology in general and GIS software and services in particular. And finally, the project management has to consider the issues when planning the project schedule.

Scientists of the IOER became aware of the complexity and the dynamics of cross-border mapping impacts. They initiated a web-portal (see fig. 9) to structure the field, offer basic knowledge and give hints as well as helpful links. Experts and involved professionals are heartily welcome to contribute or comment this endeavour. Fruitful discussions and cooperation can help to improve the opportunities of efficient cross-border mapping.



Figure 9:

www.ioer.de/cbm

A Cross-border Mapping web portal to offer basics, hints and useful links (Kochan, Witschas 2005 – work in progress)

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