Sample of map representation of land cover changes in two and three time horizons

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Extended Abstract

Land cover (LC) is considered one of the most dynamic phenomena of landscape. Changes can be expressed by statistics: tables and graphs which demonstrate enlargement or diminishment of individual LC classes. As these changes take place in space, the most appropriate means of their representation is a map which complements the statistics.

Map representation of LC is accomplished in two ways:

- A single map representing changes between two or more time horizons;
- Small multiple maps also representing changes between two or more time horizons.

Animation, which is a process of creating images simulating the movement first of all for temporal changes of objects and their properties, should be also mentioned here. Animation helps cartography to enlighten spatial relationships in landscape and processes taking place in it (Kraak 2014).

Representation of LC changes by small multiple maps is the most frequently used way. Each map represents the state of LC in the corresponding time horizon and the change becomes obvious from comparison of maps.

Representation of changes by means of a single map is not so frequent (see *Figure 1*). The aim of this paper is to show two options of LC change representation in two and three time horizons on a single map applying the CORINE land cover (CLC) data in order to highlight the trends.

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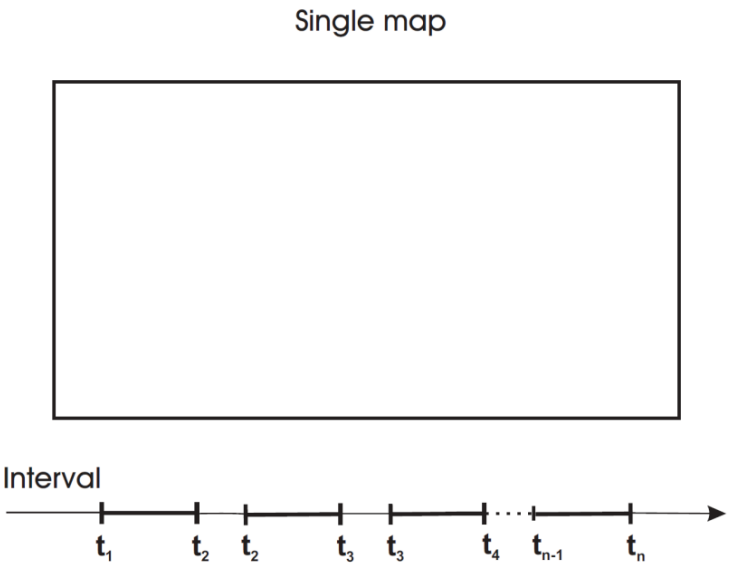

Figure 1. Mapping time intervals in a single map.

The first option demonstrates representation of changes in 1990-2000 and 2000-2006. It is based on comparison of computed mean value of changes (mean LC value in % is a ratio of the area of LC changes standing for the corresponding type of LC change to the area of all 1 × 1 km squares in which changes took place) of a particular LC type with the real value of the given type of change in a particular square. The result is spatial representation of nine possible types of LC changes distinguished by colour: hues of red (enlargement) and hues of blue (decrease) in two time horizons (Feranec et al. 2010). This approach is only suitable for map representation of changes in two time horizons (if used for, e.g., three horizons, the result will be 27 possible types of LC changes). It was used for the map representation of Czechia's and Slovakia's artificial surfaces (1990-2000 and 2000-2006, *Figure 2*) and for the European LC changes (1990-2000 and 2000-2006).

The second way demonstrates representation of LC changes in 1990-2000, 2000-2006 and 2006-2012. It is based on the comparison of sizes of real values (yearly change areas) of the appurtenant LC change type (in ha) in a 3 × 3 km square in three time horizons. The referential value is the LC change in 1990-2000. The result is spatial representation of squares where LC changes:

- enlarged (reaching greater value compared to referential value. They are represented in red);

- diminished (reaching always smaller value compared to referential value. They are represented in blue);

- reached alternating values (enlargement, diminishment and the same value compared to referential value or the change was not identified in the referred time horizon and took place in the following time horizons; such changes are represented in magenta, *Figure 3*).

This type of map representation also makes it possible to represent – illustrate changes in more than three time horizons in a single map contributing to the identification of trends in landscape dynamics.

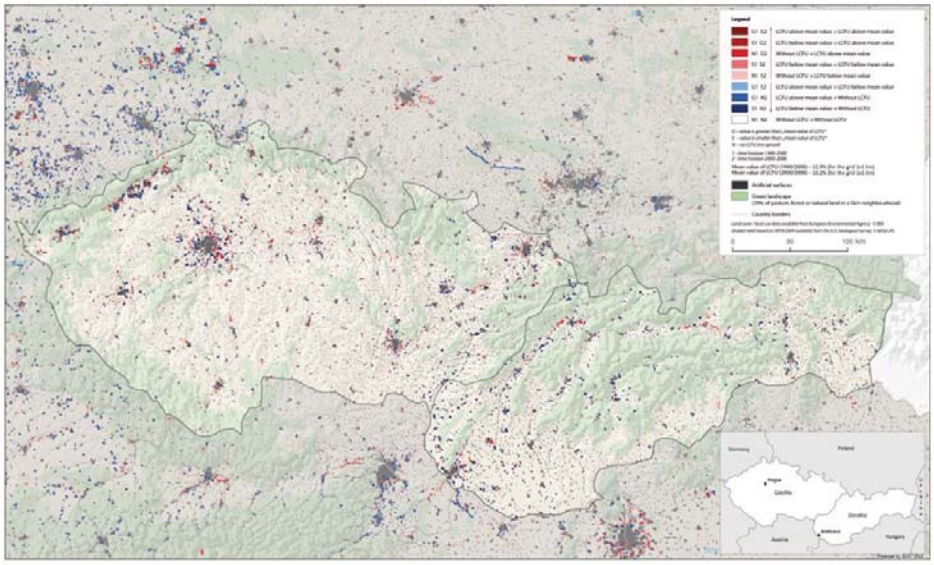

Figure 2. Changes of LCFU in Czechia and Slovakia in 1990-2000-2006 (Feranec & Soukup 2012).

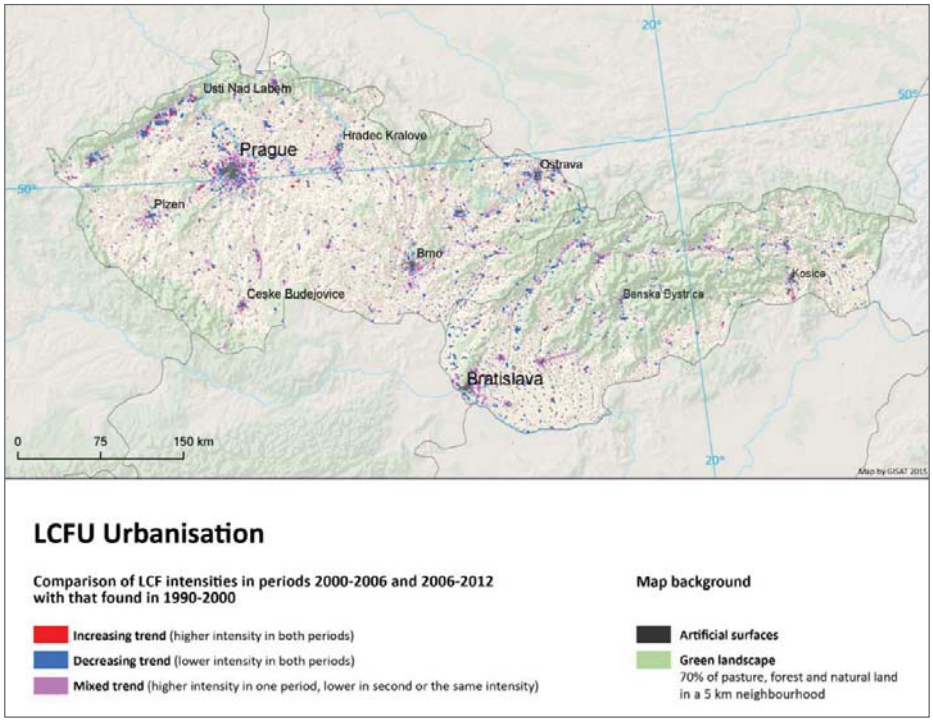

Figure 3. Changes of LCFU in Czechia and Slovakia in 1990-2000, 2000-2006, and 2006-2012.

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