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EDITORIAL: CONCEPTS, DEFINITIONS AND EXAMPLES OF APPLICATIONS OF SYMPHYTOSOCIOLOGY AND GEOSYMPHYTOSOCIOLOGY

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Introduction to the Special issue

This special issue dedicated to landscape or dynamic-catenal phytosociology aims to draw up an inventory of this approach which brings together the symphytosociology or phytosociology dynamic and geosymphytosociology or catenal phytosociology.

This interest in clarification of basic concepts by simpler and more pragmatic definitions comes in response to an urgent request from the community of phytosociologists, botanists and other actors of the environment in general. These synthetic definitions are intended primarily for field operators responsible for describing vegetation series, typologies and cartography of geoseries, in particular within the framework of the French National Program for the Mapping of Habitats and Vegetation in France (CarHAB) launched in 2011 by the Ministry in charge of Ecology.

The four articles in this special issue develop the fundamental aspects and applications of this science that can be considered new within geobotanics. A bibliographical synthesis, which explores the mapping methodologies based on approaches to vegetation series in Europe (Chalumeau & Bioret, 2013), facilitated reflection on the background problems and applications of symphytosociology and geosymphytosociology in the field of cartography.

In the first article, concepts and definitions applied to the mapping of vegetation series are presented in the form of a lexicon containing examples illustrated by diagrams representing toposeequences of the different vegetation series (Bioret *et al.*, 2017).

In landscape phytosociology, two levels of analysis can be distinguished:

- The one, serial in the strict sense, whose hierarchical basic unit is the sigmetum, or synassociation. Dynamic or serial phytosociology or symphytosociology focuses on the dynamic relationships that link associations within given spatial units.

- The other, catenal, whose hierarchical base unit is the geosigmetum. Catenal phytosociology or geosymphytosociology studies the catenal or geographic relationships that link the different vegetation series within geomorphological units of variable size.

After the first article on concepts and definitions, a second article (Roux *et al.*, 2017) describes the vegetation at the level of the landscape, with the setting up of databases designed to manage all the series data and vegetation geoseries.

The example of low mountain habitats in the «Chaîne des Puys» (Massif Central, France) is studied with the implementation of a methodology for carrying out vegetation surveys at the landscape scale, synrelevés, in a succession of vegetation of a homogeneous ecological spatial unit (individuals of series). A complementary approach consists in the realization of geosyncules which consist in syntaxa readings distributed over an ecological gradient in a homogeneous geomorphological unit (geoseric individual). The synrelevés and geosynrelevés are stored in the national database VegFrance (Bonis and Bouzillé, 2012). This paper presents the type of data that will be integrated into this database and its structure, as well as application examples. The ambition is to extend the "syntaxon" table to all the syntaxa listed on the French territory of the "Prodrome des Végétations de France" (PVF2, French Society of Phytosociology, www.phytosocio.org).

The third article (Choisnet *et al.*, 2017) is devoted on the basis of the main works of landscape phytosociology (symphytosociology and geosymphytosociology), to specify elements of methods to realize sigmarelevés and geosigmarelevés with the analysis of different concrete cases. These methodological elements follow an inductive approach for the characterization of sigmassociations and geosigmassociations (vegetation series and vegetation geoseries).

The three main types of approach for the description of community complexes and the realization of sigmarelevés and geosigmarelevés are presented through the deductive cartographic approach, which consists in carrying out the maps of the ecological parameters with the maps of the syntaxa in order to reveal the envelopes of the tessellas and their associated potential vegetation. Also, we proceed by the deductive-inductive cartography approach where the geo-sigmarelevés are integrated under GIS according to the preceding deductive approach, and we use layers of maps of ecological cartography and syntaxon maps. Finally, the inductive approach where the methodological basis is the vegetation surveys. Their analysis constitutes the foundation phase allowing the characterization of the typological units.

According to the principles of an inductive approach proposed by Géhu and Rivas-Martínez (1981) to characterize vegetation series and geoseries, through the analysis of concrete cases, this work contributes to clarifying certain elements for the factual study of the plant landscape. Integrative phytosociology is a recent science which principles and concepts are not yet fully stabilized. Nevertheless, a certain consensus exists on the concept of sigmetum, which makes it possible to propose a methodological framework for the realization of sigmarelevés

which represent the methodological basis of the symphytosociology.

Finally, the fourth and last article (Pedrotti, 2017) is dealing with? problems related to the interpretation and mapping of geoseries, especially mountain ranges (Val d'Adige, Italian Central Alps). Geosigmetum is the reference unit of geosymphytosociology, a science of plant landscapes based on the concepts and methods of sigmatistic phytosociology. The term vegetation geoseries has been introduced in the botanical literature quite recently and is used to describe a sequence of vegetation series or permanent communities present sequentially along an ecological gradient in a geomorphologically homogeneous compartment and within the same chorological sector. This may concern a complete altitudinal sequence zonal, extra-zonal and intrazonal vegetation series. The "geoseries individuals" that characterize geoseries can be divided into smaller areas such as the association individuals that characterize the plant association on the basis of orography, hypsometry, and exposure. Individuals of geoseries may vary for the same reasons and according to past or present usage. It can be generally said that the geoseries are complete when they extend from sea level to an altitude of 3000 m (European mountains) and are reduced if they are truncated at the summit when the altitude is lower and that this is not an absolute truth. Geoseries can be mapped in three different ways, a first model with a single map unit comprising all the series represented by a given color, this type of mapping emphasizes significance phytogeographic geoseries; a second model with a card unit divided into subunits corresponding to a single series, each represented by a different color. This type of mapping reveals a predominant significance of the vegetation of the geoseries; and a third model with a card unit divided into units corresponding to the series, using a single color with different tones for each series, this type of mapping emphasizes the plant and phytogeographical significance of the geoseries. Geoseries can be defined as a synthesis map representing catenary vegetation. It makes it possible to subdivide a territory phytogeographically, according to the different geoseries of vegetation.

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