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The project VegFrance: towards a national vegetation database for France

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Abstract
The project VegFrance is presently designed in order to elaborate a national vegetation database covering all vegetation types and regions. Launched in January 2012, this project is commonly led by Research Institutions as National Center for Scientific Research (UMS3468, BBEES & UMR 6553 ECOBIO), the Museum National Histoire Naturelle (Service du Patrimoine naturel), Fédération Conservatoires Botaniques Nationaux, the French association for Phytosociology and the Ministry of Ecology. The projected database will integrate three main types of dataset: syntaxa reflecting the national classification, relevés describing the vegetation at the landscape level (i.e. synphytosociological relevés) and analytical relevés or any plots which properly describe vegetation. This project is developed in strong connection with the European Vegetation Survey and with the national project for producing a vegetation map (CarHab).

Key words: database, national vegetation classification, vegetation survey

Introduction

France has a long lasting background in botanic and vegetation surveys. Descriptions of vegetation structure have been produced both recently and in the past, and the covered periods may thus be propitious for global changes effects investigation. The ecological range covered by vegetation surveys in France is also of great interest: vegetation monitoring or survey have been conducted on Mediterranean vegetation as well as regarding tropical forests, from rocky shores to hygrophilous heathlands. A substantial effort has been recently made to develop proper databases, and quite a number have been established in certain regions or for certain vegetation types. However, up to now, there is no dataset covering all vegetation types and all biogeographical areas available and with public access. Nevertheless, the interest for building such a national vegetation database is now largely admitted, thanks to the inspiring high quality experiences by other countries and to the European Vegetation Survey workshops (Delassus *et al*., 2011).

Facing such a statement, it was decided to set up the project VegFrance as an attempt to establish a national database for vegetation. The project intends to gather every on-going efforts made by various institutions and people together.

We indeed consider that France has a chance to fill the gaps in the coming years as present background shows propitious for the setting up of a national database, considering that:

(i) The French Phytosociological Society has been appointed by the Ministère de l'Ecologie to deliver a general typology for French vegetation; then, new datasets as well as the *ad hoc* interpretation framework will soon be available.

(ii) The Ministère de l'Ecologie is currently leading a vast inventory of the national natural heritage and vegetation mapping ("CarHab" project). Setting up a national vegetation dataset will provide secure basis for both aspects of the project.

(iii) The INSIPRE European directive constitutes a secured framework to guarantee dataset accessibility.

The project was launched during a workshop in January 2012 in Rennes, where the main institutions interested in vegetation surveys and vegetation knowledge were represented: Universities, research institutes (e.g. CNRS), the French Phytosociological Society, agriculture-oriented vegetation database managers, the French Ministère for Ecology, Botanical Conservatories. In this workshop, experienced colleagues, promoting database approach within the European Vegetation Survey framework (John Rodwell, Joop Schaminée, Milan Chytrý, Stephen Hennekens, Lubomir Tichý), kindly shared their experience with the French audience as well as French colleagues (Eric Garnier, Sylvain Plantureux, Bernard Amiaud, Arnault Lalanne). Their contribution was extremely helpful to provide guidelines, help identifying pitfalls and opportunities for the development of a French vegetation database.

The main objectives for setting up the VegFrance project

A general agreement was made for developing the VegFrance project with three main targets:

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1. Giving access to the French vegetation classification.
2. Addressing research questions relative to several themes, such as analysis of plant communities, functional ecology, biogeography.
3. Contributing to habitat evaluation and biodiversity management guidelines.

Furthermore, in France the development of a national database will support the project 'CarHab', whose focus is to characterize and map the vegetation over all the territory and document its conservation values.

At the European level, VegFrance will help maintaining a fruitful relation with the SynBioSys Europe project (Schaminée et al, 2007).

Getting organized

A steering committee has been established with representatives from the University of Rennes, the French Phytosociological Society, the National Botanical Conservatoires Federation, the Museum National d'Histoire Naturelle ("Service du Patrimoine Naturel"), the Centre National Recherche Scientifique (CNRS) and the French Ministry for Ecology. This group is in charge of leading the every-day project in order to make concrete progress and take the needed operational decisions.

A consulting committee has also been set up and its first meeting was held in November 2012. The main advices concern coordination among already existing projects (notably the SINP) and the VegFrance, and short-coming work will deal with datasets standards. On the longer term, the consulting committee may constitute a network for encouraging the coordination among already existing vegetation databases and the VegFrance project.

VegFrance database: which datasets and what to describe?

The project VegFrance intends to take care of several types of vegetational data, which can be referred to the following 3 main categories.

National Classification types: habitat typology is based on an on-going study for French classification up to the level of association. This work is entitled 'Prodrome des végétations de France' in its second version (PVF2). Every phytosociological class is described by a synoptic table. Tab. 1 shows an exemple related to the Oxycocco-Sphagnetea class. Every association or syntaxon is described by a 'typical-average relevé'.

All the phytosociological tables that will be produced in the classification project will integrate the VegFrance database using TurboVeg (Hennekens & Schaminée, 2001). To this purpose, *ad hoc* fields will be specified in TurboVeg for depicting the associations and alliances from the French classification.

Vegetation described at the landscape level: the project for habitat mapping ("CarHab") led by the French Ministry for Ecology is based on a phytosociological approach. Each vegetation type is surveyed and described mainly at the level of plant community. However, vegetation design and structure at the landscape level are also taken into account, thanks to a synphytosociological approach. It consists in identifying all the vegetation series present in a given unit defined by its hydrogeomorphology (the so called 'catenal' approach, see Biondi, 2011). Sigmeta are thereafter defined as the combination of syntaxa in the geosigmeta. Such vegetation complexes will provide ad hoc descriptions of the landscape structures.

Such landscape approach for vegetation knowledge will be integrated in the VegFrance database using TurboVeg. Some adaptations of TurboVeg will therefore be made to include synphytosociological tables and syntaxa lists.

Vegetation relevés dataset yield at local scale, from various methods: the VegFrance database is also designed in order to include local vegetation relevés, whatever they are made using the phytosociological method or rather quadrat or lines designs. Such data sets may join the VegFrance database as far as the used method, the sampled area and their localization are provided.

The software TurboVeg will be used for managing the datasets. Some adaptations are planned with the agreement and the help of the authors (Hennekens & Schaminée, 2001) in order to meet some special needs regarding the French habitat typology.

A national database for addressing research questions

As stated by Schaminée *et al*. (2007), computer sciences are improving and presently offer capacities for managing large datasets. This opens new perspectives for vegetation analysis and, more generally, for an improved understanding of ecosystem functioning and the underlying mechanisms.

Large datasets derived from vegetation databases at national or even at multinational level may be extremely useful to:

- produce past and present distribution maps;
- investigate the assemblage rules according to species or community life history or morphological traits;
- study environmental-driven and ecological-driven effects on natural habitats and their composition and diversity characteristics.

Tab. 2 - One example of synphytosociological table built from Bouzillé (2007) for coastal marshlands landscapes. The complete syntaxonomic references are given in Bouzillé (1992).

Exemples de relevés phytosociologiques paysagers (Marais Breton-vendéen)							
	Salt Marshes			Brackish wetlands			
Relevé number	1	2	3	4	5	6	7
Area (ha)	1	5	2	3	3	3	2
Cover %	80	95	100	100	100	90	90
Spartinetum maritimae	4	+	2	.	.	.	.
Puccinellio maritimae-Arthrocnemetum perennis	1	1	1	.	.	.	.
Bostrychio-Halimionetum portulacoidis	2	.	1	.	.	.	.
Salicornietum obscurae	.	+	+	.	.	.	.
Puccinellio maritimae-Arthrocnemetum fruticosi	.	4	.	.	.	.	.
Salsoletum sodae	.	.	+	.	.	.	.
Salicornietum dolichostachyae	.	.	+	.	.	.	.
Atriplici-Betetum maritimae	+	+	1	.	.	.	.
Astero-Suaedetum macrocarpae	.	.	2	.	.	.	.
Beto-Agropyretm pengentis	.	+	.	.	.	.	.
Agropyro-Suaedetum verae	1	2	3	r	r	.	.
Halimiono-Puccinellietum maritimae	.	2	1	.	+	+	+
Salicornnietum ramosissimae	.	+	1	+	r	+	+
Juncetum gerardii	.	.	.	r	r	+	+
Callitricho-Ranunculetum baudotii	.	.	.	+	+	+	+
Chaetomorpho-Ruppietum	.	.	.	1	+	+	+
Festucetum littoralis	.	.	.	r	.	+	1
Atriplici-Chenopodietum chenopodioidis	.	.	.	+	+	.	.
Parapholiso-Hordeetum marini	.	.	.	+	+	r	.
Picrido-Carduetum tenuiflori	.	.	.	+	.	+	+
Solano-Tamaricetum gallicae	.	.	.	r	+	+	+
Scirpetum maritimi compacti	.	.	.	1	3	1	2
Alopecuro-Juncetum gerardii	.	.	.	2	1	1	1
Trifolio squamosi-Oenanthetum silaifoliae	.	.	.	4	2	2	1
Ranunculo-Oenanthetum fistulosae	.	.	.	+	1	1	.
Carici divisae-lolietum perennis	.	.	.	1	2	2	3
Lemenetum gibbae	.	.	.	+	.	+	1
Callitrichetum obtusangulae	.	.	.	+	.	.	+

Perspectives in data analysis, such as data mining processes, are considered as promising for the plant ecology research field. Large datasets such as a national vegetation database may in particular be extremely useful for testing theoretical hypotheses relatively to biodiversity dynamics. They may also contribute to burning questions within the context of global changes and may help to produce predictions regarding biodiversity patterns.

Agenda for the VegFrance project

The first meeting of the consulting committee (22 November 2012) identified a first set of propositions that need to be collectively discussed before the first data collection may be integrated. They deal with taxonomic reference, TurboVeg format and dictionaries. Merging datasets from a variety of recent as well as ancient sources will probably give rise to a number of problems among which - at least - that of double records. For this reason, a unique identification code per relevé is needed in VegFrance. A variety of challenges, notably connected to standards, have to be discussed in strong connection with other projects led at the national level among which the SINPP, which shows clear partial interface with VegFrance.

Regarding the European context, VegFrance will be developed within the EVS framework and has already responded positively to any invitation in this direction. One of the main challenges for developing VegFrance database is relative to authorship guarantee and data use modalities guidelines. This point certainly controls the possibility of merging existing databases into the VegFrance project, and will benefit from the experiences in national vegetation database from other European countries. On this point as others, the VegFrance project will welcome all discussions which may help rolling the stone one step further.

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