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Towards the Hellenic National Vegetation Database: VegHellas

P. Dimopoulos[1], I. Tsiripidis[2], E. Bergmeier[3], G. Fotiadis[4], K. Theodoropoulos[5], T. Raus[6], M. Panitsa[1], A. S. Kallimanis[1], K. V. Sýkora[7], L. Mucina[8]

[1]Department of Environmental and Natural Resources Management, University of Western Greece, Agrinio, Greece
[2]School of Biology, Aristotle University of Thessaloniki, Thessaloniki, Greece
[3]Albrecht von Haller Institute of Plant Sciences, Georg-August University of Göttingen, Göttingen, Germany
[4]Department of Forestry and Management of Natural Environment, Technological Education Institute of Lamia, Karpenisi, Greece
[5]School of Forestry and Natural Environment, Aristotle University of Thessaloniki, Thessaloniki, Greece
[6]Botanischer Garten und Botanisches Museum, Freie Universität Berlin, Berlin, Germany
[7]Department of Environmental Sciences, Nature Conservation and Plant Ecology Group, Wageningen University, Wageningen, The Netherlands
[8]Department of Environment and Agriculture, Curtin Institute for Biodiversity and Climate, Curtin University, GPO Box U1987, Perth, WA 6845, Australia

Abstract
Recently a new initiative was launched aimed at building a central database to hold all so far published and unpublished relevés available in Greece – the Hellenic National Vegetation Database (VegHellas). All literature sources, widely dispersed and often poorly accessible, containing vegetation relevés from Greece have been compiled and stored in a bibliographical database. To date this database houses more than 200 references. Between 1944 and 2011, more than 30,000 phytosociological relevés were made in Greece, and these are stored either as hard copies or electronically. Currently, data on more than 22,000 vegetation plots, entered in the TURBOVEG database system are georeferenced to a certain level of precision (e.g. mountain range, mountain peak, specific locality, island, phytogeographical region, grid cell 10 x 10 km etc.). Plant nomenclatural problems, such as the use of different synonyms for the same taxon by different researchers in different years will be solved using the standardized Hellenic Vascular Plant Checklist (HVPC), currently close to completion. This checklist will offer a scientific basis for consistent nomenclatural reference. A database with chorological, life-form and other plant-trait information for each taxon, will also be linked to the vegetation-plot records. This will allow using VegHellas not only as a tool for the formulation of a national system of vegetation classification, but also in multiple applications in ecological, biogeographical and applied environmental research. The preparation of a syntaxonomic overview of the vegetation of Greece is currently in progress. Following the basic principles of the checklist of high-rank syntaxa of the European vegetation, the Hellenic syntaxa checklist will be produced down to the syntaxonomic level of alliance to serve as a precursor of a full syntaxonomic checklist including all associations.

Key words: Hellas, relevés, syntaxonomic overview, vascular plant checklist, vegetation-plot database

Introduction

Biodiversity research has identified two large gaps in our knowledge, known as the 'Linnean' and 'Wallacean' shortfalls (Brown & Lomolino, 1998; Lomolino, 2004). The 'Linnean' shortfall refers to the fact that most species on Earth are still not formally described. The 'Wallacean' shortfall, on the other hand, refers to the fact that, for most known species, geographical distributions are poorly recorded and contain many gaps. These inadequacies seem to amplify along a gradient from higher to lower latitudes and in biodiversity hotspots. In Greece, one of the southern European mega-diverse (Bohn *et al*., 2000-2003; Strid, 1997) and endemic-richest (Georgiou & Delipetrou, 2010) countries, both Linnean and Wallacean shortfalls are obvious. In an effort to summarize and standardize present knowledge on Greek plant taxonomy and distribution of plants, the Hellenic Vascular Plant Checklist is nearing completion and is expected to be published in 2013. However, large gaps still remain on species distribution as many species have been recorded only in one or few localities, on their habitat preferences as well as on their associations with other plant species. To address this problem, a database has been designed and built to include all vegetation plot data (relevés) ever made in Greece.

In 1992 the European Union issued the Directive 92/43/EEC for the Conservation of Natural Habitats and of Wild Fauna and Flora, known as the "Habitat Directive". Its implementation led to the establishment of the Natura 2000 Network of Protected Areas. For the accomplishment of the Directive there was a need to identify the biodiversity hotspots of Greece in order to select the network of conservation sites. To this end, and with the aim to map the vegetation and habitat types within the Natura 2000 sites, a large coordinated effort by the Greek scientific community led to sam-

Corresponding author: Panayotis Dimopoulos. *Department of Environmental and Natural Resources Management, University of Western Greece, Agrinio, Greece; e-mail: pdimopul@uwg.gr*

pling thousands of plots within a couple of years. This huge effort established plant sociological research as a main issue in conservation biology and led to the training of a considerable number of scientists in this field.

More than 200 scientific studies were produced based on these data so far. However, much of the original relevé information is inaccessible to the wider research community as they have either not been published or exist only in "grey literature" format, written in Greek (e.g. diploma, master and PhD theses, proceedings of local conferences, project reports etc.). Most of the studies based on these data were focused on the description of vegetation and its classification to syntaxa. Then, motivated by the need for selection of Natura 2000 reserves, much effort focused on understanding the spatial patterns of biodiversity. Recently, this focus has shifted more towards hypothesis-driven research addressing the patterns and drivers of plant diversity. A new research trend is biodiversity monitoring and identifying changes in the vegetation and flora of the Hellenic protected areas. For this purpose baseline data and permanent plots for repetitive observation are needed, placing a national database incorporating all existing national, regional and local vegetation-plot observations into the focus of our attention.

During the last two decades, mainly on the initiative of the European Vegetation Survey (EVS) - a working group of the International Association for Vegetation Science (IAVS) - many national and regional vegetation projects have been carried out followed by the establishment of vegetation databases in many European countries (Schaminée *et al*., 2009). This progress was highly assisted and fostered by the introduction and widespread adoption of the database program TURBOVEG (Hennekens & Schaminée, 2001). The European Vegetation Archive (EVA), a recent initiative of the EVS, is aimed at joining the existing national and regional databases and establishing and maintaining an integrated pan-European vegetation information system.

In many European countries, national vegetation databases have been established, by either official bodies such as conservation agencies, research foundations or even non-governmental and volunteer organizations. In countries with long phytosociological and nature-conservation traditions, such as France, Netherlands, Spain, Czech Republic, Switzerland, Germany, hundreds of thousands of vegetation plots have been sampled in the last century. Several databases are available via internet, while many remain off line. So far most of the vegetation data information on European vegetation relates to woodlands and forests, however grasslands were also well studied. Other vegetation types are comparatively poorly represented in the databases. The Global Index of Vegetation Plot Databases lists 184 databases with 2.838,550 vegetation plots (Dengler *et al*., 2011; http://www.givd.info/list_databases.html). Of those, only 5 databases contain more than 100,000 plots (in descending order: The Netherlands, USA, France, Spain, Germany), with 32 databases containing more than 10,000 plots each; 61 databases contain less than 1,000 plots. The European Vegetation Archive (EVA) is expected to become the largest vegetation-plot database in the world containing more than one third of all vegetation-plot data registered in GIVD (Dengler *et al*., 2012).

Seven vegetation databases (regional and national) from Greece have already been registered in GIVD, of which four originated from published and unpublished relevés of Erwin Bergmeier (EU-GR-001: KRITI, with 6,500 relevés from all vegetation types of Crete; EU-GR-002: Greek Woodland Vegetation with 3,500 relevés; EU-GR-003: Vegetation Database *Isoeto-Nano-Juncetea* in Greece and the Aegean Region with 300 relevés; EU-GR-004: Segetal Weed Vegetation Database of Greece with 200 relevés). Three other databases are managed by some of the co-authors of this article, namely Panayotis Dimopoulos, Ioannis Tsiripidis, Erwin Bergmeier and Georgios Fotiadis (EU-GR-005: Hellenic Natura 2000 Vegetation Database (HelNatVeg) with 13,862 relevés; EU-GR-006: Hellenic Woodland Database with 4,571 relevés; EU-GR-007: Hellenic Beech Forests Database (HellBeech-DB) with 1,404 relevés). A large, unpublished database on the vegetation of Ionian Islands is owned by L. Mucina (about 800 plots).

In this framework, we are building the Hellenic Vegetation Database VegHellas that will consist of all the published and unpublished relevés available in Greece with the total number expected to be more than 35,000 vegetation-plot records (of which ca. 30,000 published and ca. 5,000 unpublished relevés). These are approximate numbers, as the database development is still in progress. The relevés made during the Natura 2000 mapping project are included in the published 30,000 relevés. However until present there have been no conditions/rules set by the Hellenic Ministry of the Environment under which these relevés could be accessible to researchers and usable for research purposes.

VegHellas is being built using the TURBOVEG software and will include relevés from all vegetation and habitat types occurring in Greece. Besides the phytosociological data, we aim to include also additional information per taxon, such as traits (e.g. life-form and growth-form, flowering period, dispersal mode etc.), chorology (e.g. endemic status, native, alien), habitat preferences and the like. Finally, we aim to produce a detailed and consistent national vegetation classification with an updated syntaxonomic scheme of the Hellenic vegetation following the basic principles of the European Vegetation Checklist, under development by

Mucina and colleagues and expected in 2013, addressing the following basic aims: (a) creation of a general syntaxonomic framework to be used in nature conservation management planning, and (b) identification of the existing gaps and research priorities to describe and interpret the variability of vegetation in Hellas.

The National Vegetation Database

Data availability, geographic distribution, statistics

The first descriptive vegetation account for the Greek territory dates back to 1880 (Heldreich, 1880). Vegetation sampling does not have a long tradition in Greece; it started in 1937, when Economopoulos (1937) used the forest site-types method of Cajander in order to define the forest types in the Pertouli area (Central Greece) on the basis of understory composition (Dimopoulos & Georgiadis, 1995). Phytosociological research in Greece has a history of approximately 70 years, with the first relevés collected in 1944 when Erich Oberdorfer conducted studies in North East and North Central Greece (Oberdorfer 1952, 1954). Most of the phytosociological relevés were collected by European researchers, while the contribution of the Greek scientific community was limited until the 1980s when a new generation of Greek vegetation scientists started to actively work in the field. Until the mid-1990s less than 7,000 vegetation plots had been sampled and published (Babalonas *et al*., 1995; Dimopoulos & Georgiadis, 1995; Papastergiadou, 1995). The first attempt to build a Greek national vegetation plot database was made 16 years ago by a group of scientists from the Universities of Thessaloniki and Patras (Dimopoulos & Georgiadis, 1995); however that project has never been completed, until we started the current initiative.

For the period 1880-2000 the total number of descriptive vegetation publications is 91 (Dimopoulos *et al*., 2011, based on the Flora Hellenica bibliography compiled by Strid, 2006). All available phytosociological studies including relevés (publications, PhD and MSc theses, expert reports) have been collected and stored in a bibliographical database. The relevés were derived from almost 200 different published and unpublished sources (Dimopoulos *et al*., 2011). Most relevés are currently available from mountainous regions of northern, central and southern Greece and from the South Aegean. Other island floristic regions (Ionian Islands, Kiklades, North Aegean, East Aegean and West Aegean) as well as the Peloponnese and the Pindus regions are still poorly sampled or the unpublished data are poorly accessible (Fig. 1).

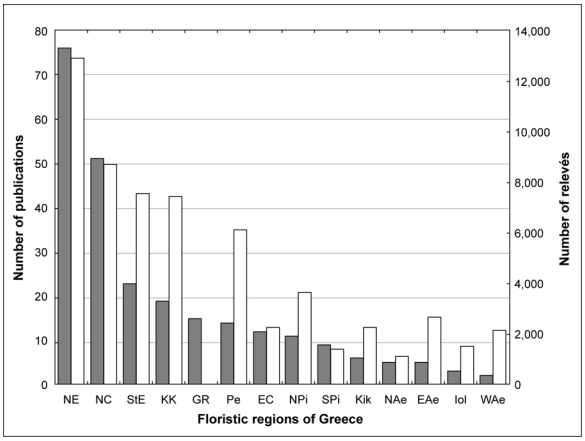

Fig. 1 - Total number of phytosociological publications (grey bars) and total number of relevés sampled (white bars) in the different floristic regions of Greece, as well as for more than one floristic regions (GR) for the period 1952-2011(Floristic regions according to Strid & Tan, 1997).

Until the 1990s, the number of published relevés sampled in Greece was rather low (ca. 5,000), but the figures increased rapidly in the decade 1990-2000 (Fig. 2). In this period the first habitat mapping project based on Braun-Blanquet's approach was carried out within the Hellenic Natura 2000 protected sites. This large coordinated effort, by the Greek scientific community in collaboration with foreign scientists, led to the sampling of more than 13,500 non-overlapping plots. Since then, approximately another 9,000 plots were added (Fig. 2).

The phytosociological spectrum of the data currently available in VegHellas is summarized in Tab. 1, where the total number of relevés is given per physiognomic-ecological group and corresponding phytosociological class (nomenclature according to the mentioned forthcoming European Vegetation Checklist). Additionally, the spatial distribution of relevés per class and floristic region is given, as well as the number of orders and alliances per class currently available. The best documented classes are those assigned to mediterranean and temperate woodland and scrub vegetation (particularly *Quercetea ilicis, Quercetea pubescentis* and *Carpino-Fagetea*), coastal vegetation (*Ammophiletea, Crithmo-Staticetea, Salicornietea fruticosae, Juncetea maritimi*), phrygana (*Cisto-Micromerietea julianae*) and reed-bed vegetation, accounting for more than 25,000 relevés of VegHellas (Tab. 1).

Taxonomic-nomenclatural issues

In many cases different names have been recorded for the same species in relevés collected by different researchers in different time periods (e.g. *Thymus capitatus, Coridothymus capitatus, Thymbra capitata*). In VegHellas this issue will be resolved with the standardized Hellenic Vascular Plant Checklist (HVPC) currently being compiled and expected to be published in March 2013. HVPC will serve as the scientific basis for a documented, common and consistent nomenclatural reference identifying the different taxon names as belonging to the same taxon. The standardized HVPC includes the current valid name and recent synonyms

Tab. 1 - Number of relevés per vegetation type, phytosociological class and floristic region. Vegetation types according to Mucina (1997). Floristic regions according to Strid & Tan (1997). Orders, Alliances: number of orders, number of alliances per vegetation type and phytosociological class.

Vegetation types, Class	Orders	Alliances	EAe	EC	IoI	Kik	KK	NAe	NC	NE	NPi	Pe	SPi	StE	WAe	Total
Aquatic vegetation	6	13	9	14	1	6	24	-	204	210	369	7	9	23	1	877
Charetea	1	1	3	1	-	-	3	-	3	-	-	-	-	-	-	10
Lemnetea	1	1	1	8	-	1	-	-	17	40	38	-	-	5	-	110
Potametea	2	9	4	5	-	3	19	-	184	165	331	3	9	17	-	740
Ruppietea maritimae	1	1	1	-	1	2	2	-	-	-	-	4	-	1	1	12
Zosteretea	1	1	-	-	-	-	-	-	-	5	-	-	-	-	-	5
Vegetation of fresh-water marshes and fens	10	14	30	66	72	30	189	29	172	215	341	91	54	372	57	1718
Crypsidetea aculeatae	1	1	-	-	4	-	-	-	-	12	-	-	-	13	-	29
Isoeto-Nano-Juncetea	2	4	21	22	28	14	101	17	9	52	13	-	-	13	40	330
Littorelletea	1	1	-	-	-	-	-	-	-	12	7	-	-	-	-	19
Phragmito-Magno-Caricetea	4	6	9	44	40	16	88	12	156	139	308	91	48	336	17	1304
Scheuchzerio-Caricetea fuscae	2	2	-	-	-	-	-	-	7	-	13	-	6	10	-	36
Coastal vegetation	13	23	407	125	229	282	796	176	200	766	-	415	91	362	227	4076
Ammophiletea	2	5	96	35	75	66	361	63	42	231	-	233	12	34	76	1324
Cakiletea maritimae	2	2	44	12	21	8	68	23	7	92	-	58	17	30	5	385
Crithmo-Staticetea	1	2	133	7	27	127	253	5	-	6	-	42	2	18	96	716
Festuco-Puccinellietea	1	1	3	9	-	5	-	-	3	102	-	-	-	7	-	129
Juncetea maritimi	2	3	67	27	39	32	26	43	29	109	-	38	17	54	38	519
Saginetea maritimae	2	4	30	3	-	16	58	4	-	2	-	-	-	15	-	128
Salicornietea fruticosae	2	3	31	22	50	28	26	34	90	166	-	31	31	176	12	697
Thero-Salicornietea	1	3	3	10	17		4	4	29	58	-	13	12	28		178
Chasmophytic vegetation	8	15	64	24	17	61	305	20	158	68	125	375	75	320	55	1667
Adiantetea	1	1	-	-	-	-	44	-	-	-	-	1	-	2	-	47
Asplenietea trichomanis	6	11	63	24	17	58	152	20	136	68	71	307	50	249	40	1255
Thlaspietea rotundifolii	1	3	1	-	-	3	109	-	22	-	54	67	25	69	15	365
Arctic and alpine vegetation	3	5	-	9	-	-	-	-	159	14	87	96	23	233	-	621
Juncetea trifidi	2	3	-	9	-	-	-	-	130	4	76	96	23	183	-	521
Mulgedio-Aconitetea	1	2	-	-	-	-	-	-	29	10	11	-	-	50	-	100
Synanthropic vegetation	8	9	-	23	25	-	108	-	135	250	59	62	13	81	7	763
Artemisietea vulgaris	2	2	-	-	12	-	-	-	9	5	17	7	-	9	-	59
Bidentetea	1	2	-	-	-	-	-	-	-	26	1	-	-	6	-	33
Epilobietea angustifolii	1	1	-	21		-	-	-	87	59	12	-	11	13	-	203
Galio-Urticetea	3	3	-	-	-	-	-	-	19	-	27	-	-	37	-	83
Polygono-Poetea annuae	1	1	-	-	-	-	-	-	-	-	-	-	2		-	2
Stellarietea mediae	7	11	-	2	13	-	108	-	20	160	2	55	-	16	7	383
Temperate heathlands and grasslands	13	16	12	66	19	11	252	27	322	417	80	4	9	245	92	1556
Festuco-Brometea	4	5	5	4	-	6	120	9	105	247	17	-	-	37	49	599
Koelerio-Corynephoretea	2	2	2	12	-	-	-	10	119	30	-	-	-	-	-	173
Molinio-Arrhenatheretea	6	8	5	50	19	5	132	8	98	140	61	4	9	208	43	782
Montio-Cardaminetea	1	1	-	-	-	-	-	-	-	-	2	-	-	-	-	2
Temperate and boreal woodlands and scrub	10	23	37	501	32	17	76	96	2472	3289	614	641	208	802	155	8940
Erico-Pinetea	1	5	2	10	-	-	-	10	310	92	77	-	10	21	-	532
Quercetea pubescentis	2	4	13	208	22	2	24	67	852	1600	280	548	87	584	65	4352
Querco-Fagetea	2	4	-	180	-	2	-	-	1003	1237	217	-	49	10	11	2709
Rhamno-Prunetea	2	4		12	3	-	-	-	123	-	-	-	-	2	-	140
Salicetea purpureae	2	4	22	91	7	13	52	19	180	277	22	93	62	185	79	1102
Vaccinio-Piceetea	1	2	-	-	-	-	-	-	4	83	18	-	-	-	-	105
Oromediterranean grasslands and scrub	2	7	26	24	2	-	340	8	204	461	116	360	45	349	14	1949
Daphno-Festucetea	2	7	26	24	2	-	340	8	204	461	116	360	45	349	14	1949
Mediterranean vegetation	14	27	747	278	359	705	1560	207	336	759	36	1003	169	1011	464	7634
Cisto-Micromerietea julianae	2	5	309	127	124	330	542	63	20	131	-	253	20	254	141	2314
Helianthemetea guttati	4	5	22	9	-	73	54	7	53	10	-	3	-	5	23	259
Nerio-Tamaricetea	1	3	17	22	8	21	71	2	24	42	20	31	24	39	10	331
Quercetea ilicis	3	10	395	120	216	228	823	135	190	576	16	716	125	713	290	4543
Stipo-Trachynietea distachyae	1	1	-	-	7	-	7	-	-	-	-	-	-	-	-	14
Thero-Brachypodietea ramosi	3	3	4	-	4	53	63	-	49	-	-	-	-	-	-	173
Semideserts	1	2	2	-	-	14	68	-	-	-	-	-	-	-	-	84
Pegano harmalae-Salsoletea vermiculatae	1	2	2	-	-	14	68	-	-	-	-	-	-	-	-	84

of the plant taxa recorded in Greece. Currently, this flora checklist contains approximately 7,000 taxa (species + subspecies). A consortium of experts (Dimopoulos, Raus, Bergmeier, Constantinidis, Iatrou, Kokkini, Strid, Tzanoudakis), under the auspice of the Hellenic Botanical Society (HBS) and the Botanic Garden and Botanical Museum (BGBM) of the Free University Berlin, currently works on producing this standardized vascular plant checklist expected in 2013. One of the important spin-offs of the HVPS will be the production of a new standardized TURBOVEG species list to be incorporated into VegHellas.

Syntaxonomic issues: The Hellenic vegetation checklist

A nation-wide overview of the Hellenic vegetation syntaxa is still missing. No real syntaxonomic overview exists so far for any part of Greece. The contribution by Horvat *et al.* (1974) is still considered the syntaxonomic standard, however this survey is outdated by numerous studies on specific areas or vegetation types since (see Dimopoulos *et al.*, 1997; Bergmeier

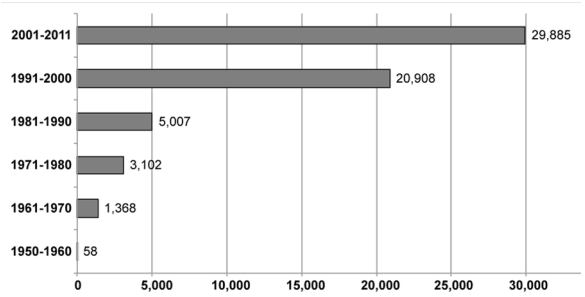

Fig. 2 - Cumulative number of published vegetation plots sampled in Greece (axis x) per decade (axis y).

& Dimopoulos, 2001, 2008; Sýkora *et al*., 2003, Tsiripidis *et al*., 2007). Currently we attempt to provide an overview of all the vegetation types and corresponding syntaxa occurring in Greece on the basis of relevé documentation. This first synthesis is restricted to the high-rank syntaxa down to the level of alliance; the first results were presented at the 20th EVS Workshop in Rome (Dimopoulos *et al*., 2011). The current syntaxonomic scheme is a successive approximation, consisting of a compilation of all published associations and communities assigned to high-rank syntaxa (alliance, order, class). We followed the nomenclature adopted in the forthcoming European Vegetation Checklist. The syntaxonomic scheme consists of 47 classes and has been derived top-down by integrating validly published orders and alliances. However, the available relevés have not been directly classified at a national scale. The formulation of a consistent classification system would become possible after the completion of VegHellas database.

Vegetation database structure

The two basic entities that will be stored in the database are the vegetation plots and the species (Fig. 3).

The first publications that include vegetation data have been listed. Priority was given to publications presenting relevé tables. Then this list was converted to a rather small database reporting the syntaxa published in each publication. This way we succeeded in acquiring a general overview of the vegetation research made so far in Greece in terms of its temporal, spatial and ecological (e.g. vegetation type) patterns. At the same time, a vegetation database was created in TURBOVEG, adding also data non-digitized before. For each new relevé two versions will be preserved, including (a) the original one as published in its original source, and (b) an updated one after the correction of species taxonomy and nomenclature. The preservation of both the original and updated versions of relevés and their mutual link is considered important, because it will allow to revise anytime the nomenclature and to keep it consistent with recent taxonomical revisions. Furthermore any taxonomic or nomenclatural revision will be marked in order to be detectable and reversible. The relevés from personal databases should be also checked and linked with their original versions. This taxonomic review will start after the entry of a large portion of new data.

All the header data (e.g. altitude, size of plot, aspect, inclination, cover and height of vegetation layers, soil properties and geological substrate) reported in original publication sources will be stored in TURBOVEG. An effort has already been initiated to link a given geographical locality to each relevé. This task is simple when the bibliographical source provides geographical coordinates or a map of relevés. In case of older publications where only a verbal description of the location is given, approximate geographical coordinates

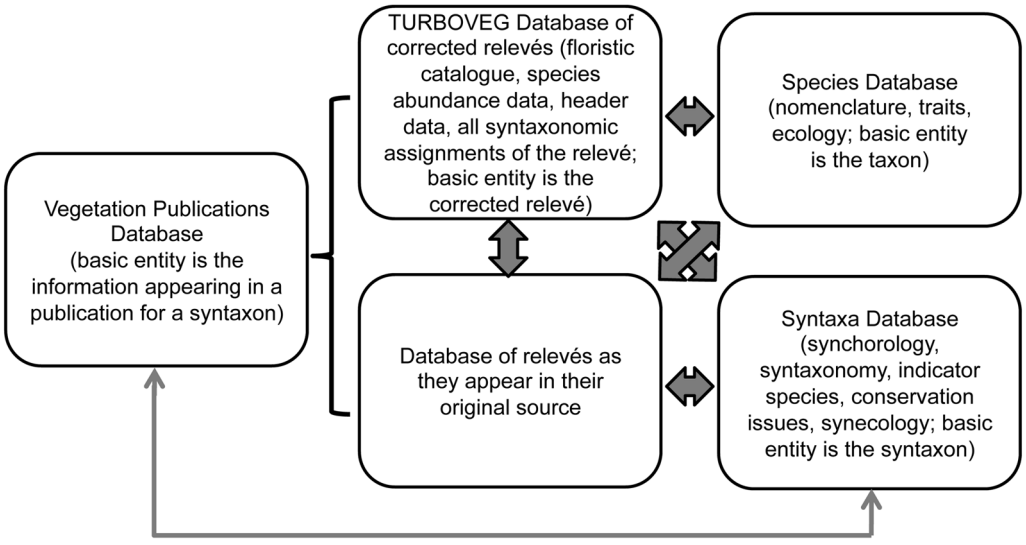

Fig. 3 - Simplified entity relationship diagram of the structure planned for the Hellenic vegetation database VegHellas.

will be created and attributed to the relevés. However, there are cases where neither coordinates nor descriptions of the locality are given. In these cases we will try to find the best fitting position of the relevés based on a grid of 10 X 10 km cell size, adding information about mountain, prefecture, and floristic region. The grid used for monitoring purposes according to the EU Habitat Directive will be applied (see Evans & Arvela, 2011). In addition, all syntaxa to which each relevé has been allocated in former published revisions will be reported.

Finally, a third database has been created in TURBOVEG (using also other software tools) including information about plant taxa (e.g. plant traits, ecological preferences, habitat types, synonyms). Regarding the plant traits we have started to collect data on "soft" traits (see Hodgson *et al.*, 1999) – those which are easy to score from plant descriptions or are easily observed in the field or on herbarium specimens. Information from existing plant traits databases (e.g. Klotz *et al.*, 2002; Kleyer *et al.*, 2008; Katge *et al.*, 2011) concerning taxa occurring also in Greece will also be added.

In the near future we are planning to build a fourth database, featuring the syntaxa already identified in Greece. This database will contain geographical, as well as ecological information on each syntaxon (e.g. synchorology, syntaxonomy, indicator species, conservation issues, synecology) and would assist the scheduled syntaxonomical revisions.

Future perspectives

Until today, approximately two thirds of the relevés sampled in Greece have been entered in our electronic database. There is an ongoing effort to enter the remaining plots. We plan to complete the digitization process by the end of 2013. In parallel, based on the collected literature, we are conducting a syntaxonomic overview of the Hellenic vegetation at the high rank level (alliance, order and class). This is also advancing and it will be completed by 2014. This overview will also allow us to define the correspondence between Hellenic syntaxa and the Annex I habitat types of the Directive 92/43/EEC, which are the conservation focus at the EU scale.

The literature review will recapitulate the existing knowledge on the vegetation of Greece and its higher rank classification. A drawback of this approach is that most previous studies classified vegetation syntaxa based on local or at best regional scale dataset, an approach that might misrepresent locally rare but nationally important vegetation types. Therefore, besides the literature review of all published vegetation studies, the availability of the original relevés will allow the reclassification of all data at national scale by means of numerical methods. This effort will start with the vegetation types that are well represented in the database, as well as with the more representative vegetation types at national scale, e.g. conifer and evergreen forests, rocks, screes and grasslands above the timberline. For the less well studied vegetation types, efforts will be taken to enrich the database with new field data.

Greece is lacking long term monitoring data. However, large scale biodiversity monitoring is a prerequisite for successful nature conservation planning and management, as well as a legal obligation of the country according to Article 17 of the Habitats Directive. The collection of all past relevé empirical data could be used as a basis for defining the biodiversity baseline against which future research is needed for improving monitoring and nature management planning and implementation. Thus, VegHellas could serve as the foundation for building a long-term monitoring tool for detecting changes in floristic composition and structure. Immediate implementation is expected to start in short term with the re-sampling of habitat types within the Natura 2000 Sites of Community Importance of Greece, in the framework of two national scale projects on "surveillance and conservation status assessment of habitat types in Greece" and the consequent "habitat types mapping".

Published studies suffer from two sources of bias. Firstly, researchers study vegetation based on their interests and project funding and not based on a true representation of what is available in the real world. Secondly, when examining a limited area, rare vegetation types might simply not be detected. These biases might lead to the over- or under-representation of specific classes and regions. The compilation of all data will allow the detection of gaps in our knowledge and coverage of Greek vegetation and suggest ways for correcting past over- or under-estimation of specific vegetation types.

Finally, there is an ongoing effort to resolve nomenclatural issues, a problem that plagues the utilization of older datasets, where species names may differ from the currently accepted ones, or prevents the comparison between different regions that use different nomenclatures (older or less frequently updated). As a step towards resolving such issues, we will rely on the Hellenic Vascular Plants Checklist. Furthermore, we aim for the harmonization of the Hellenic species checklist with the European Standardized Checklist (EuroSL) of plant taxa. This will allow the use of our datasets not only for national scale studies but also for European scale comparisons and generalizations.

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