

## Czech EPBR Meeting

### World Biodiversity and the European Taxonomy

Strategies in taxonomy: research in a changing world

### National review for Croatia

by prof. dr. Toni Nikolić

Department of Botany, Division of Biology, Faculty of Science, University of Zagreb

Address: Marulićev trg 9a, HR-10000 Zagreb, Croatia

Phone: (+385 1) 489 8064; Fax: (+385 1) 489 8093; Mail: [toni@botanic.hr](mailto:toni@botanic.hr); <http://www.botanic.hr>

#### National reviews guidelines

The aim of national reports and e-conference is to bring together potential users of taxonomy in Europe. The EPBR meeting under the Czech Presidency is designed to investigate what the users of taxonomic information see as the main issues that taxonomists should focus on. Encouraging taxonomy users to participate actively in the e-conference and the meeting itself might also help to strengthen the policy bit of the science-policy interface.

The following headings will be used to structure the work of the EPBR in the e-conference and during the meeting.

#### ***1-Taxonomic Information: Strategy and Methods***

##### **Inventory and Identification: "What is it, and how does it fit among its relatives?"**

- 1.1 Does your country use taxonomy-based tools for biodiversity assessments and policy making? What are these tools?

For biodiversity assessments and policy making there is a taxonomy-based tool in usage. Background for particular types of legislation is several taxonomy products, as well as for biodiversity assessments. National taxonomic standards, mostly accordingly with international ones, as nomenclatural issues, species mapping standards, species valorisation according to specific issues (i.e. endangered, allochthonous status, invasiveness etc.) are usual in use.

- 1.2 Does your country have a national checklists? When were they last revised and updated? Is there any national assessment of which taxa in particular lack taxonomic information? Did you submit a response to the GTI questionnaire on these issues?

The main groups of organism are covered completely with national check lists, i.e. vascular flora, some groups of invertebrates, fishes (fresh-water and marine), amphibians, reptiles, birds and mammals. These lists are updated regularly as a part of scientific activities of responsible institutions (mostly universities, museums and institutes) or individuals. Less well done listing is related to:

- the group of organisms that are not covered completely, i.e. listing is done for particular subgroups in taxonomic sense (families, orders, ...) but not all. For example kingdom Mycota, fresh-water algae, marina algae, with main gaps in invertebrates.
- the group of organisms that are covered but not recently. For example, Antocerotophyta, Marchantiophyta and Bryophyta are listed 50 years ago without updating because complete lack of bryologist in country
- the group of organisms are not covered et all because there are no taxonomist deal with particular group of organisms (i.e. mostly some groups of invertebrates)

There is no official national assessment, but generally involved scientists and main stakeholders know about problems and gaps. Official report to the GTI contains this information.

1.3 Describe 1-2 flagship projects related to bullet points below and suggest some recommendations useful for meeting as a result from these projects: Please outline any national taxonomy-based monitoring or surveys designed to establish the distribution, status and trends of any taxonomic group.

**National taxonomy-based monitoring or surveys designed to establish the distribution, status and trends of any taxonomic group.**

The area of occupancy and estimation of number of individuals of threatened (CR) and narrow endemic species *Degenia velebitica* (Degen) Hayek (Velebit, Croatia) were done. The area of occupancy was defined on all known localities by defining the edges of areal by using the GPS devices and elaboration by GIS tools. Abundance (density) was estimated according to the full counting of individual plants on 38 standard plots each with surface of 25 m<sup>2</sup>, and with approximation to the total area of occupancy. The results shows that taxon appear on total area of 4.8 ha with the estimated 37000 individuals. Locality Tomišina draga (Velika Kapela) with two sub-localities have the biggest acreage (44600 m<sup>2</sup>) and the greatest estimated number of individuals (24175), but the lowest density (0,53/m<sup>2</sup>). Several small and spatially close localities on South Velebit (placed in Krivi kuk and Krug) occupy total area of 2790 m<sup>2</sup>, and these localities are second according to the total estimated number of individuals (6891), but with very high density (<4,36/m<sup>2</sup>). Locality on Middle Velebit (Prikinuto brdo) is the least in area and in estimated number of individuals, but with utmost density (5,33/m<sup>2</sup>). On locality Plana (locus classicus.) the species recorded in literature was not found, so the premise is that *degenia* is extinct from this site. Trend to gorse with natural potential vegetation were detected on all localities. Results should serve as a background for tracking population trends and should serve as the background for conservation action plans developing.

1.4 Is there any coordinated effort in your country regarding bar-coding for identification or the assessment of biodiversity?

No, there are no such efforts.

1.5 Are you aware of any major efforts (or projects) in your country to integrate morphological and molecular taxonomy?

Yes, they are. There are several scientific projects inside the broad field of taxonomy that integrate morphological and molecular taxonomy. These projects are financed mostly by the Ministry of Science, Education and Sport, main national investor in scientific research.

## **2-Taxonomy as a basis for ecological research and sustainable management of the biodiversity**

### **Ecological functions and services: “What does it do, and what does it interact with?”**

*How does taxonomic research contribute to better understanding of the functions and attributes of species, and to the management of biodiversity?*

2.1 Do you know projects involving taxonomists in the understanding of ecological functioning, or the assessment of ecosystem services?

No, I don't know for such projects. There are projects that contribute with more or less related and useful results.

2.2 What is the contribution of taxonomy in your country to the management of biological invasions?

From taxonomists come the initiative for working on invasive species issues, starting with preliminary check-list of invasive alien species and proposals for standards in terminology and criteria. For vascular plants special database module was developed. Taxonomist is involved in monitoring of several most dangerous invasive taxa, and for some coordinated activities results from cooperation with state administration and other funders.

Compare:

Boršić, I.; Milović, M.; Dujmović, I.; Bogdanović, S.; Cigić, P.; Rešetnik, I.; Nikolić, T.; Mitić, B. (2008): Preliminary check-list of invasive alien plant species (IAS) in Croatia. Nat. Croat. Vol. 17, No.2:55-71.

Mitić, B.; Boršić, I.; Dujmović, I.; Bogdanović, S.; Milović, M.; Cigić, P.; Rešetnik, I.; Nikolić, T. (2008): Alien flora of Croatia: proposals for standards in terminology, criteria and related database. Nat. Croat. Vol. 17, No.2:73-90.

2.3 What is the contribution of taxonomy in your country to efforts to understand the status and trends of key functional groups such as pollinators?

The contributions are very small and sporadic.

### **Taxonomy, biodiversity and its conservation: “How to manage it in sustainable way?”**

Describe 1-2 flagship projects related to bullet points below and suggest some recommendations useful for meeting as a result from these projects:

2.4 Are there also non-professional organisations recording biodiversity data collections (e.g. ornithologists) involved in the decision process of land use planning etc.?

There are a plenty registered NGO-s and only few being capable to give useful data on biodiversity. Generally, the number of well educated amateurs for data gathering is very low. Because of this fact, the main pressure on data collection recline on professional institutions and generate a bottle-neck. Involvement in decision processes depend on few facts. When ever exist legal obligation to conduct public discussion on land use planning, the NGO-s chiefly react.

Good example is related to the activity of BIUS – NGO organisation of the students of biology in Zagreb. The management of several protected area (National Parks, Parks of Nature) lease the BIUS for inventory and mapping because offer enough good service on much economically affordable manner. I. e. the new established Park of Nature “Lastovo archipelago” use the BIUS for gathering biodiversity baseline data necessarily for spatial valorisation and management plan, but also associated groups of students from different faculties to develop visual identity (Study of Design), economic vision platform (Faculty of Economy), forest management practice in protected area (Faculty of Forestry), even to test robotic submarine for mapping under the sea habitats (Faculty of electronic and Computing).

2.5 Are there some indicators (or red-list species) monitoring Natura 2000 sites for delimitation and management of nature reserves used in your country?

Main indicators in country are red-list species and species and habitats listed for national territory in Bern convention and Habitat Directive. Vast efforts in building red list in last decade result with excellent series of red books covering dragon flays, fungi, freshwater and marine fishes, mammals, plants and birds. Red listing still going on to cover groups Plecoptera, Lichenes, Carabidae, Anthozoa, etc. All these data and palette of other kind of data were used for spatial valorisation of country. The results are presented and concentrated in National Ecological Network (NEN) and legislation prescribes the rules for land uses and conservation for NEN area. NEN is main background for NATURA 2000 development during Croatian EU approaching process. As a pilot several monitoring projects start with implementation.

2.6 Which taxonomy-related research (standardized taxonomic metadata, delivery of checklist building tools, building expertise network) in developmental non-European biodiversity-rich countries is supported by policy-makers from your country based on your national expertise and experience?

The main policy-makers in Croatia that support taxonomy-related research are:

1. Ministry of Culture, covering nature conservation with Board for Nature Conservation (responsible for protected area and natural history museums)
2. Ministry of Science, Education and Sport funding scientific researches including taxonomy related
3. State Institute for Nature Protection responsible for National Ecological Network, data gathering, NATURA 2000 implementation, etc.
4. Ministry on Environmental Protection and Physical Planning
5. Fund for Energetic Efficiency and Environment Protection support also taxonomy related activities

These institutions (stand-alone or in synergy with other) support different kind of taxonomy-related researches, directly or more often indirectly:

1. supporting upgrading and maintenance of biological collections
2. building up the check lists and distribution mapping
3. building up metadata developing
4. data basing and GIS support in biodiversity data management
5. direct investigation in the filed of taxonomy, systematic and phylogeny for particular groups of organisms

6. adoption of available methodologies and development of the new one
7. education related to taxonomy
8. etc.

2.7 Is there a National Needs Assessment of GTI in your country? If yes, what are your specific needs, e.g. for conservation, protected areas, CITES/customs, dealing with invasive species etc?

No, and this fact is presented in only Report on Implementation of GTI Work Programme in Croatia (2004). The needs are known but never organised and adopted as an official state document.

### **3- Taxonomy, potential users and capacity building of experts**

#### **Open access to information: "How to find out about it?"**

*How does taxonomic information get from where it resides to where it is needed elsewhere in the world?*

- *Bioinformatics*

3.1 To what extent is taxonomic research in your country contributing to international biodiversity initiatives and projects (e.g. GTI, GBIF, PESI, EOL, Etc...)

As I know there are no particular cooperation with international biodiversity initiatives and projects.

3.2 What is the state of the art in biodiversity informatics in your country? (e.g. e-taxonomy and e-science tools)

Generally, the organised service lack. Beside the well done projects (see below on major digitization efforts), the condition is the low level development i.e. includes on-line check list for some groups, broad overview of museum collections and small amount of information managed by some NGO-s.

In the process is development of National Biodiversity Information System (NBIS), Fauna Croatica Database as a part and GIS support for biodiversity services. Main problems with this initiative are lack of funds and faintly known problems with data authorisation and copyrights.

3.3 Has there been a national assessment of best practices for taxonomic data quality and validation?

No, there are no such assessments.

3.4 Do you have any national guidelines on how to approach the proof of absence?

No, there are no such guidelines.

3.5 What are the taxonomic standards used in the databases (TDWG, Darwin core, COL, PESI, etc...)?

Mostly TDWG

3.6 Could you identify the major digitization efforts for biodiversity data (e.g. collections, observations, species checklists, etc...)?

- Flora Croatica Database, the most advanced product, covering national vascular flora from different aspects: check list, classification, nomenclature, vernacular names, synonyms, authorisation, followed by herbarium management, field observation, bibliography, mapping facilities and integrated GIS, ecological indices, on-line spatial analysis, red data, allochthonous taxa status, economic botany elements, etc. (fully Internet accessible)
- Habitats maps of Croatia in scale 1:100.000 fully Internet accessible
- National Ecological Network in scale 1:100.000 fully Internet accessible
- Land cover maps in scale 1:100.000 fully Internet accessible
- Different capacity infrastructure geographically limited on several protected area as a management tools (LAN)
- Bio speleological database (LAN)
- Database on big carnivores (lynx, wolf and bear) (LAN)

3.1 Is there any effort in your country to make taxonomic information especially identification services easily accessible and useful to practitioners?

Some effort was done, but slack. The main attainments are:

- Guidelines for inventory and mapping, separately for (1) flora, (2) habitats, (3) sea habitats, (4) bats with instruction for recognizing the target species. Available as a hard copies free of charge and internet available for downloads
- Image gallery as a identification tool inside Flora Croatica Data base (internet available for downloads)
- Series "Botanical Library" started. Published two titles up to now, covering flora of continental forests and costal and islands flora on popular manner

### **Capacity building in biodiversity-rich countries and worldwide:**

3.1 Are there any policy initiatives in your country to orient capacity building in taxonomy?

As a proclamation yes but formally no. Inside the National Strategy and Action Plans for Biodiversity and Landscape Conservation there are several broadly defined action plans covering the taxonomy issues, but without performance tools or allocated funds. None of these plans were performed.

The main problems are:

- related to the activities in taxonomy that are not "pure" science (i.e. building up determination keys, e-floras, maintaining data bases, standard floras, mapping activities, etc.). These activities are not cover by main funder Ministry of Science because it is not "pure science". In the same time for other potential funder (see list above) all these activities are "to scientific". Main producer (universities, institutes) are not capable to cover costs for these activities from national resources.

- related to staff in taxonomy. 80% of taxonomist works on universities and institutes where there are forced to publish papers with as high as possible SCI, IF, CC, ..., leaving no space to work on fundamental issues (floras, faunas, atlases, etc. ...)

The results are: no floras, keys, atlases, popular literature, ...

3.1 Are there any sources of finance or policy actions in your country dedicated to applied taxonomy (e.g. identification tools, training for parataxonomists)?

No, there are no particular sources of finances. Some related initiatives are driven by State Institute for Nature Protection regarding education of amateurs to monitor particular species. These initiatives contribute with interesting experience and useful data.