

## **Deliverable 8.1: Scratchpads modules engaging citizen scientists**

### **COMBER: Citizens' Network for the Observation of Marine BiodivERsity**

#### *A. The need for a citizen scientists approach in marine biodiversity:*

Most of the biodiversity information and data are collected in the framework of research and monitoring projects, which span over short time periods. The results of this tendency are the development of series of datasets that are predominately discontinuous or unevenly spread, geographically, temporally or ecologically. The latter is the main trend in biodiversity data and information collection from the marine environment in which the costs are many times higher than in the terrestrial one due to the diverse and expensive floating means as well as the specific sampling gears and methods used. If the decreasing trend in the population of the professional taxonomists is to be added to the above trend, then, only the development and mobilization of citizen scientist networks seems to offer a sound and sustainable solution to the continuation of the biodiversity data and information process.

Although several international projects which are targeted at continuous data collection from specific habitats have been launched in the last couple of decades, such as the NaGISA project (National Geography in Shore Areas; <http://www.nagisa.coml.org/>), the implementation of citizen science in the marine environment currently faces two difficulties: (a) only the tidal zone can be approached by all citizens, and (b) the maximal depth safely reachable by recreational SCUBA divers is limited to 40 m. In the latter case, expensive diving equipment and certified training are required.

#### *B. Basic concept and design of the COMBER (Scratchpads) modules:*

The COMBER (Citizens' Network for the Observation of Marine BiodivERsity; <http://www.comber.hcmr.gr>) pilot project attempts to address the above need by engaging the broader community in marine biodiversity research data and information collection, in the course of the ViBRANT (Virtual Biodiversity Research and Access Network for Taxonomy, EU funded) project. This pilot project taps into a suite of developments aimed at supporting virtual research communities in biodiversity science.

COMBER aims at engaging citizen scientists, that is, all persons interested in the coastal marine biodiversity and willing to participate to an observation network. It is currently operating in the Cretan Sea and Southern Aegean (Greece) with the potential to expand to the whole Mediterranean basin or any other European region. The basic characteristics of this pilot project are:

- (a) a web site which has been developed and functions as the main communication and promotion vehicle of the network, offering data-entry tools for collecting information which, at

a later stage, are channeled to large data aggregators (e.g. GBIF) and publication media (e.g. PENSOFIT);

- (b) a well-defined scientific hypothesis which has been formulated to be tested with the collected data;
- (c) a focus on fish species;
- (d) a suite of tools, such as a waterproof identification guide, on-the-spot professional introductory lectures, underwater training, and demonstration of web site usage as well as data entry which are used to facilitate in vivo identifications by participating divers;
- (e) collaboration with two commercial diving centres in order to ensure operational safety and to explore the market development potential for the sustainable continuation of the initiative after the end of the project;
- (f) exploration of new services and tools to enhance the SCUBA diving and snorkeling services which are targeted towards the tourism industry.

COMBER uses Drupal (<http://www.drupal.org>), a free and open source Content Management System (CMS) as a software to perform all underlying functionality of the system. This allows full interoperability with Scratchpads and ViBRANT platform which are based on the same software. Many elements of the site, such as user management, profile creation, image galleries and discussion fora, have been created using built-in features or readily available Drupal modules.

### C. Functioning of the modules and their operation in the citizen science network:

The web site has a simple and flexible structure. On the front page the user is prompted to log in, in order to make use of the special features and options of the site. Users can also log into the site with their Facebook account, a valuable feature to massively facilitate the registration process on the site. On the front page, information on various aspects of the COMBER project, such as a brief message on the concept and operation of the project, is also published. The top menu provides additional information on the project's, such as: (a) news, (b) answers to the potential “*what*”, “*where*”, “*how*” and “*why*” type of questions, (c) ways in which the user can participate to the project, (d) photos of the most common fish species in the Mediterranean coastal habitats, (e) links with the activities of other projects and initiatives, (f) a forum page, where the user finds discussions on several topics. As soon as the user logs into the web page a new menu on the left side of the web page opens. This menu offers options for the user: (a) to see and edit its profile (“*My profile*”); (b) to have an overview and an “*edit*” option to his/her dives (“*My dives*”); (c) a form to submit information on a new (recent) dive, not yet registered on the COMBER's system (“*Submit a new observation*”); (d) to provide information on his/her experience (“*Comment your experience*”); however this information is supposed to be submitted only once but if the user has to add some new information on his experience he/she can do so through an “*edit*” option; (e) to have an overview of the top contributors along with their

accreditation (number of stars, see below) automatically provided by the COMBER system (“*Top contributors*”).

Therefore, registered users can continue to contribute data after participation in the seminars, use the diving log to keep track of their dives and species observations, upload photos of fish species and discuss various topics in the discussion fora. A competitive element is introduced by a five-star ranking system indicating the activity level of the user: the more dives with fish observations are contributed to the system, the higher the user ranks in a “Top contributors” list, thus providing a playful incentive to contribute (see relevant paragraph below).

#### D. Future plans:

GBIF (Global Biodiversity Information Facility) has initiated a community driven project called the ‘Nodes Portal Toolkit’ that should enable communities to deploy, maintain, and extend biodiversity data portals. The project should provide an easy way for communities to start web based biodiversity data information systems with a link to the GBIF infrastructure. The GBIF Nodes Portal Toolkit will be Drupal-based, as this will allow for the integration of already existing modules. This informatics platform will also allow community development of new modules with extended functionalities for web-based biodiversity data information systems. The first version of the Nodes Portal Toolkit will be built around Scratchpads, linking well with developments in ViBRANT platform. A second version will have extended functionalities, such as a tool for displaying geographical distribution maps of species, similar to what is currently displayed in the OBIS data portal. We expect COMBER to become in the coming years fully integrated with the developments in ViBRANT and the GBIF Nodes Portal Toolkit, offering interested parties a ready-made installation file allowing them to set up and deploy their own citizen-science portals without prior technical knowledge.

On the other side, the next step after data cleaning is their use (and re-use) in testing the scientific hypotheses. This is still open to discussions within the ViBRANT consortium. However, the aim of the pilot project is to examine whether the data collected by the divers are suitable for biodiversity monitoring needs. Recent biodiversity measures, based on species relatedness such as the taxonomic distinctness, provide the concept to formulate and test the scientific hypothesis.