EBONE newsletter
May 2009

From the coordinator

EBONE is now one year old. It has been a hectic year in which nearly all work packages have started. The last Work package (WP8) will start in June. As you can read in this newsletter the first results are being produced. We have enforced our relationship with GEO; we have been recognised as an important pilot and we are co-lead.

In the meantime the work is going in good harmony and with lots of enthusiasm. This makes me believe that this project will be effective and lead to good products; the heart of a productive project is a consortium that is engaged, enthusiastic and willing to realise their tasks. Enjoy this newsletter

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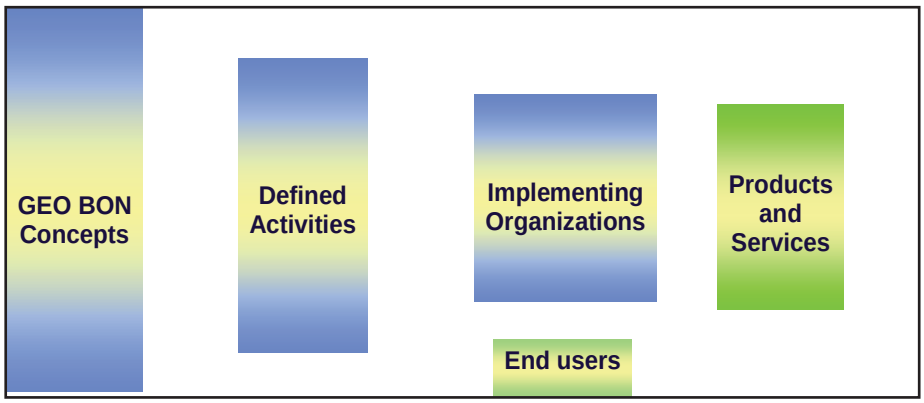
EBONE: GEO Connections

By Rob Jongman

As Florence Beroud, our EC project officer already explained in the first Newsletter, EBONE is the European contribution to GEO (http://www.earthobservations.org). To express the importance of the project the European Commission has proposed that we also should be visible. Since last year I am therefore co-lead of GEO BON, the Community of Practice on Biodiversity monitoring. EBONE acts as a pilot for GEO BON, developing tools and systems for cross border cooperation in biodiversity monitoring. This has been welcomed warmly by the other members in GEO BON and we can give global monitoring a boost. In January a Steering Group meeting has been held in Washington DC. There the governance of GEO BON has been discussed, its relations with other organizations as well as the way forward to realize global coverage. As GEO BON is a voluntary based activity for which countries (and the EC) should provide funding, we can only seek opportunities and try to let the system grow organically, making use of opportunities and initiatives.
The GEO BON steering Committee has decided to take a double road. On the one hand we will stimulate regional Biodiversity Observation Networks such as EBONE. Such initiatives are being undertaken in South-easy Asia at present and a meeting to discuss this will be at the IALE Latin America congress in Brazil next October. On the other hand we want to invite experts on different field to build global thematic working groups on aspects of monitor genes, species, terrestrial habitats, aquatic habitats, the marine environment, ecosystem services and data operability. They combined with regional experiences such as EBONE are meant to develop GEO BON concepts and elaborate this with various organizations into actions, products and services to realize national, continental and global reporting on biodiversity trends. This will in the end allow integration of ecosystems and biodiversity into decision making in a much stronger way.



News from the work packages

WP3

Statistical evaluation of the sampling design of national networks for monitoring of ecological variables at a landscape scale (habitats) in Europe

By Martin Knotters and Dick Brus

Several member states of the European Union developed monitoring programmes to collect information on status and trends in ecological variables at a landscape scale. We inventoried for several promising national networks important sampling theoretical aspects, such as the selection of sampling units (probability sampling or non-probability sampling), the sampling design, the sampling density and frequency, the pattern in space-time (static, dynamic, rotational) and the size and shape of the sampling units. The purpose of this inventory was to get an overview of the choices being made, and how these were motivated. And to a get a preliminary evaluation of the suitability of these national monitoring programmes to become part of the European wide biodiversity monitoring network EBONE.

The Countryside Survey of Great Britain is a probability sample of spatial sampling units, enhancing model-free, valid estimation of stock and change. 1 km2 were selected by two-stage sampling, with systematic sampling in the first stage, and stratified random sampling in the second stage. The first stage has a positive effect on the precision of estimates, however, quantification of the sampling error associated with the first sampling stage is cumbersome, as an unbiased estimator of the sampling variance for systematic random sampling does not exist. A further complication in the statistical inference is the revision of the stratification in 1990.

Similar to the Countryside Survey, NILS of Sweden is a probability sample, which makes design-based inference feasible. Sampling units were selected by stratified systematic sampling. Remarkably, the systematic samples within the strata were not selected independently, i.e. the stratification was applied afterwards. This makes that stratum estimates are not independent and can be correlated, which complicates the estimation of the sampling variance. We would have preferred independent selection of systematic samples within strata, which also increases the flexibility of adapting the sampling density to the strata via the grid-spacing.

In SISPARES of Spain squares of 4x4 km2 were selected by stratified sampling. Strata are geoclimatic classes, and from each of the 209 classes one square was selected. The sample can't be treated as a probability sample, as the random selection was restricted to a small subset of the population of 4x4 km2. This restricted selection seriously complicates quantification of the sampling error.

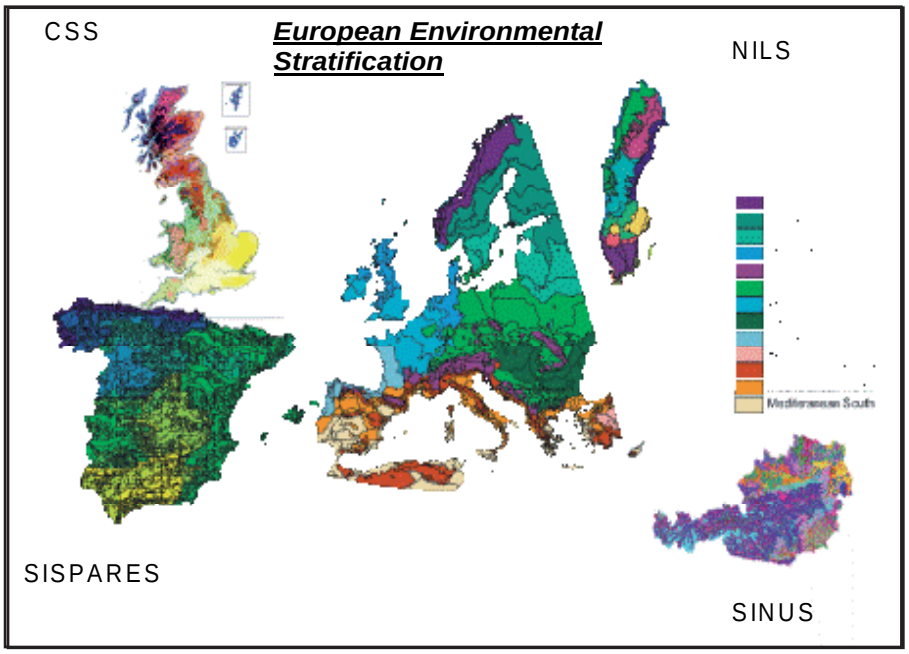
The 1 km2 of SINUS of Austria were selected by two-stage sampling. In the first stage 5x5 km2 were selected by stratified random sampling. In the second stage a 1 km2 were selected by purposive sub-sampling of the randomly selected 5x5 km2 square. This purposive sub-sampling seriously complicates statistical estimation of stock and changes of ecological variables in Austria.

WP3

Correspondence of national stratifications to EnS

By Marta Ortega and Ramon Elena-Rosselló

The statistical correspondence between national stratifications and European Environmental Stratification (EnS) was made to assess the representativeness of current monitoring activities within the EnS and to know the reliability of EnS to represent regional environments inside the tasks of WP 3. Four national monitoring programmes which collect information on ecological changes based on stratified sampling designs were analysed (Fig. 1): Countryside Survey (CSS) in Great Britain, National Inventory of landscapes (NILS) in Sweden, Spanish Rural



Landscape Monitoring Systems (SISPARES) in Spain and Spatial Indices for land-use sustainability (SINUS) in Austria. The analysis of similarity was made by means of kappa statistic and concordance measurements that are able to measure the agreement between two maps.

The CSS and SISPARES monitoring systems are based on stratifications that had high correspondence with EnS. Substantial agreement with EnS was found in both of them, only some disagreements were detected in strata located in the periphery of countries. The SINUS and NILS monitoring systems had lower levels of correspondence with EnS than CSS and SISPARES. Fair agreement was found, in the case of SINUS, caused by the disagreement detected in strata of every periphery and the high resolution of SINUS (1ha). In the case of NILS, fair agreement is mainly caused by the low resolution of stratification (5x5 km2).

WP5

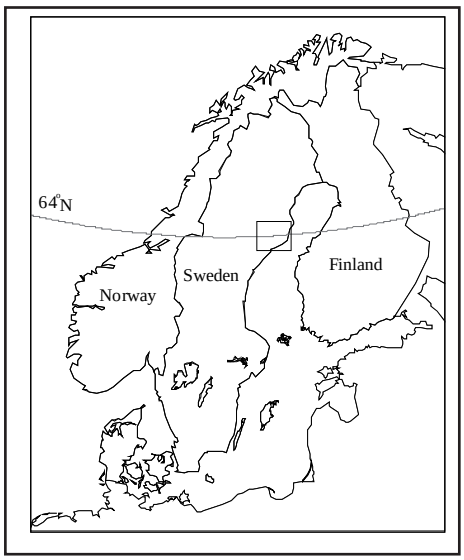
Integrating in situ with Earth Observation data: NILS

By Mats Nilson

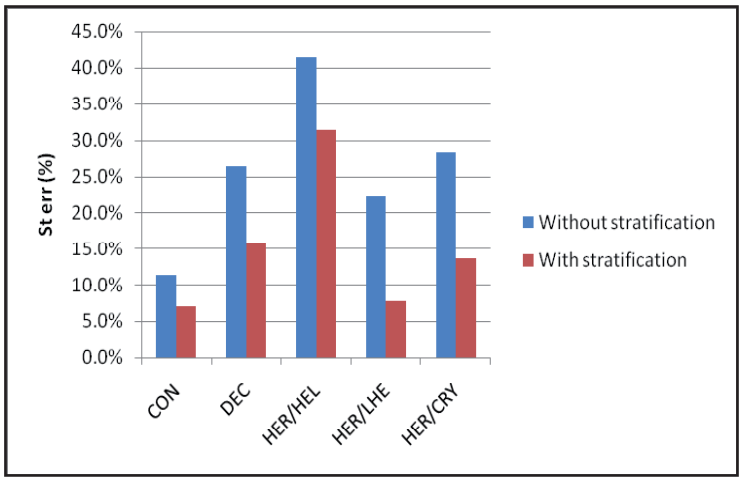
The integration of in situ data and earth observation (EO) data can be achieved using different approaches. One approach that has been tested in EBONE is to post-stratify in situ data using existing land cover maps derived from EO data.

The in situ data used are photo-interpreted landscape elements and biotopes from 9 of the 631 square kilometer quadrats (1x1 km) in the National Inventory of Landscapes in Sweden (NILS; http://nils.slu.se/). The 930,000 ha test area is located in northern Sweden. The mapped landscape elements and biotopes were classified into BioHab General Habitat Categories (GHCs) using conversion criteria developed within EBONE by Anna Allard and Bob Bunce. Five GHCs were selected (Tab. 1) to exemplify how the precision of their area estimates was affected by using post-stratification, as compared to area estimates of the GHCs based on the photo-interpreted quadrats alone.

The stratification was made using the Swedish version of Corine land cover (SMD) which includes more classes and has a higher spatial resolution (1-25 ha minimum mapping unit depending on the class) than the European version of Corine land cover (CLC). SMD consists of 57 classes that were merged into the following 10 strata:



- Urban areas
- Sand, gravel pits, mineral extraction sites, etc
- Arable land, pastures, etc
- Sea, lakes, ponds, etc
- Mires
- Clear-felled areas
- Young forests
- Broad-leaved forests
- Coniferous forests
- Mixed forest



The results show that the standard error was reduced substantially for all GHCs using post-stratification in comparison to the errors obtained without post-stratification. This shows the potential to integrate GHCs derived from NILS by using the SMD land cover map. However, the SMD map is more detailed than CLC and unlike the CLC, the SMD land cover map was produced, to a large extent, by using automatic classification methods. Further work is required to assess whether differences such as these between CLC and SMD would affect post-stratification results. A general conclusion, however, is that post-stratification is an easy and straight forward method that can be used to integrate in situ data and EO data to derive improved area statistics of habitat categories.

WP5 Integrating in situ with Earth Observation data: Countryside Survey, UK

By Dan Morton

The integration of in situ data and earth observation (EO) WP5 of EBONE will explore the integration of Earth Observation (EO) data and EO derived products with in situ observations in order to extend the geographical extent of information available for biodiversity assessment. To be successful this requires a strong relationship between in situ and remotely sensed data. The BiohHab General Habitat Categories (GHC's), which have been adopted by EBONE, are derived from 16 plant life forms (LF's). Life forms describe plant structural characteristics and it is expected that the effects of these structural differences on optical reflectance will be readily detectable.

The strength of a relationship between in situ and EO data can be determined by measuring the overlap of thematic classifications. For example let HA represent the coverage of habitat A in a given field site and SB be coverage of spectral class B. If SB covers 80% of HA the correspondence is 80%. A correspondence matrix is constructed to represent all pair-wise combinations. If we observe a strong correspondence between spectral sub-classes and habitat classifications then we can expect the EO data to provide a reasonable estimate for the distribution of those habitats.

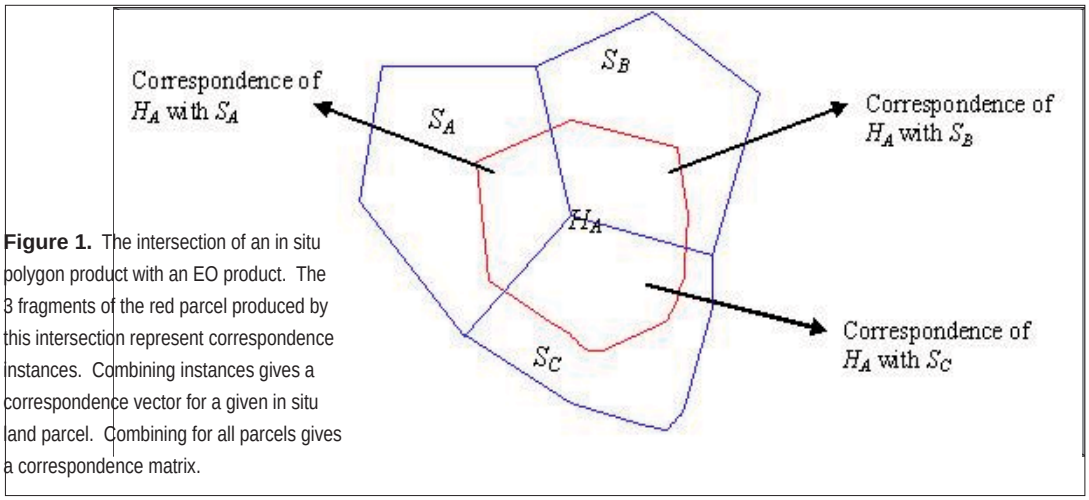


Figure 1. The intersection of an in situ polygon product with an EO product. The 3 fragments of the red parcel produced by this intersection represent correspondence instances. Combining instances gives a correspondence vector for a given in situ land parcel. Combining for all parcels gives a correspondence matrix.

HABITAT CS1998 / LCM2000	Dwarf Shrub Heath	Fen, Marsh, Swamp	Bog	Acid Grassland	Bracken
Bog (shrub)	57	15	87	13	57
Bog (grass/shrub)	31	79	0	20	4
Bog (grass/herb)	3	5	0	8	15
Inland Rock (Semi natural)	0	0	0	3	13
Coniferous Woodland	8	0	13	0	0
Acid Grassland	1	1	0	57	11

Table 1. Correspondence between CS 1998 and LCM2000 for a single 1 km square in the northern Pennines.

Software to compute correspondence matrices has been written by CEH and some preliminary analyses were presented at the EBONE meeting in April at Aix-en-Provence. The software works by intersecting polygon coverages. One coverage represents in situ land parcels derived from field surveys, the other land parcels derived from EO data. Each of the fragments produced by this intersection represents an instance of correspondence at the parcel level; there will be a correspondence vector for each land parcel of the in situ derived data. The schematic below describes this process. Combining these vectors can produce a correspondence matrix for a 1 km square. All 1 km square correspondence matrices within a strata can be combined to produce a strata level correspondence matrix. This hierarchal representation of data will be useful when attempting to understand the precise relationships between EO products and field surveys.

Preliminary analyses were carried out by comparing 1998 field survey data from 11 UK Countryside Survey (CS) field sites with the UK's 2000 land cover map LCM2000. LCM2000 has been derived from satellite images with land cover classes based upon UK Biodiversity Action Plan (BAP) Broad Habitats. CS field sites are mapped according BAP Broad Habitats. Table 1 gives an example of a correspondence matrix for a 1 km CS square from the northern Pennines with LCM2000. There is a strong correspondence between some classes. For instance LCM2000 Bog classes correspond highly with Heath, Fen and Bog in CS1998. Analysis of other CS squares produced similarly strong correspondences. This is reassuring. However some results are not so clear-cut, for example Bracken in this instance, and the significance of these needs consideration. It is worth noting that whilst the correspondences presented here are not based upon BioHab classifications, this does not detract from the illustrative quality of this example. Moreover in most cases there is a straightforward mapping between UK BAP Broad Habitats and BioHab classes, so switching between classification themes would not alter the findings.

Clearly further analyses are required and there are issues beyond those presented here that need exploring. However, demonstrating that strong correlations exist between EO and in situ data emphasises the potential contribution of this approach within EBONE.

The requirements for EO data to be used within EBONE will become apparent as the WP5 progresses. However, it should be bourn in mind that the goal of EBONE is the development of a cost effective system for biodiversity data collection up to at least a pan-European scale. To achieve these objectives a priority for WP5 will be to develop techniques that are optimised for EO data that widely available and not prohibitively expensive; typically this will comprise optical data at pixel resolutions of approximately 20m and greater.

WP9

Habitat mapping in Israel

By Margareta Walczak, Yonat Magal and Linda Olsvig-Whittaker

During the spring field season in Israel, the INPA team conducted BioHab mapping in Mediterranean and desert conditions. The objectives were (1) to test and adjust the methodology in Israeli ecosystems, and (2) to create a basis for testing EBONE assumptions about the connection of BioHab general habitat categories with both satellite images and biodiversity data.

The samples were conducted in and near the Mediterranean Ramat HaNadiv and desert Avdat stations of the Israel LTER system (http://aristo4bgu.bgu.ac.il/maarag/Default.aspx). Preparation included a Hebrew version of the BioHab field manual, and 3 days of training the field staff that would be employed in the field exercise.

Desert posed special challenges to the BioHab system. There is great annual variation in vegetation cover in the desert, and this was a drought year. Hence 95% of the area was barren, which made analysis based on general habitat categories pointless. Most of the biotic differences in the desert were below the sensitivity of the method, and mapping based on physical features alone is not appropriate for monitoring. We propose that the existing BioHab method be limited to areas above 30% vegetation cover, while areas with lower cover should be monitored with a modified methodology.

The BioHab methods worked better in Mediterranean vegetation, but in both cases the mapping took longer than we expected. We only mapped 4 desert and 4 Mediterranean squares, of 1 km2. each. Technical problems included difficult access to sample squares, restricted access in some areas, impenetrable dense spiny vegetation (in the Mediterranean), and unsatisfying quality of available orthophotos. Based on this experience we are suggesting modifications in the system of qualifiers and in the presentation of recording rules.

We are now engaged in the next steps: collecting and analyzing biodiversity data, and linking BioHab mapping results with both biodiversity and remote sensing data. This will be done in collaboration with the Israel LTER staff and research scientists engaged in projects at Ramat HaNadiv, where extensive biodiversity data already exist. We also have a new intern student, David Jobse from Wageningen University. This stage will continue through this summer and will be reported at the annual meeting in Thessaloniki in September.

Presentation of partners: NINA

The Norwegian Institute for Nature Research (NINA) is Norway's leading institution for applied ecological research, with a strong focus on biodiversity conservation and sustainable management of natural resources. NINA is responsible for long-term strategic research and commissioned applied research to facilitate the implementation of international conventions, decision-support systems and management tools. A part of NINA's tasks is also to enhance public awareness and promote conflict resolutions in areas related to biodiversity conservation, land use and sustainable development.

NINA carries out research and consultancy work and advice to management and industry. Particular areas of expertise include biodiversity conservation planning, land-use and nature management – including landscape analysis, harvesting and sustainable use of game and fish stocks, community development and local participation in resource management, and research on conflicts in natural resource management, e. g., large predators vs. domestic animals, wildlife vs. agriculture and outdoor recreational activities vs. forestry, agriculture or urbanisation. NINA is also a key actor in developing Norway's monitoring of biodiversity and is coordinating monitoring programmes on terrestrial biodiversity, freshwater ecosystems, red-listed species, and populations of salmonid fish, ungulates and large carnivores.

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NINA was established by the Ministry of Environment in 1988 and is organised as a private foundation, with its headquarter in Trondheim and research departments in Oslo, Trondheim, Lillehammer and Tromsø. It has a staff of about 160, of which 115 are scientific staff. The total annual turnover is around 20M euro, of which 20% comes as core funding from the Ministry of Environment. The major parts of NINA's project funding come from the Directorate for Nature Management, the Research Council of Norway, EU research programmes, various other government agencies, and public and private companies. NINA is part of the Norwegian Environmental Alliance, including an number of research institute in the area of environmental and sustainable development.

In EBONE, NINA's main interests focus on WPs 5 and 6. For several monitoring sites in the north boreal and low alpine zones in Norway, NINA already has extensive time series of field-based observations of various biodiversity components, as well as EO information at various scales (from Landsat to Lidar, for some sites). We are especially interested in developing our capacity in using EO to extend the coverage of biodiversity-related information, both thematically and spatially. As a possible link between field-based and EO data we will explore how the BioHab approach of General Habitat Categories can be described and used for our established monitoring sites. NINA is also involved in EBONE's WP2, as a follow-up of activities in the FP6 project EUMON on monitoring of species and habitats in Europe.

Presentation of partners: ILE SAS

The Institute of Landscape Ecology of the Slovak Academy of Sciences (ILE SAS) is an interdisciplinary scientific institution for basic and applied research in landcal research, with a strong focus on biodiversity conservation and sustainable management of natural resources.

ILE SAS was established in 1990, as the continuator of the Institute of Experimental Biology and Ecology SAS and Institute of Landscape Biology SAS (since 1965). Institute of Landscape Biology SAS was the first one in former Czechoslovakia which started to deal with the problems of landscape ecology in time when this discipline was not established yet. In the present, the institute is built by 3 departments: Department of ecosystem analyses, Department of landscape-ecological syntheses (both based in Bratislava), and Department of biodiversity of ecosystems and landscape (based in Nitra). ILE SAS is the mother institute of the methodology of landscape ecological planning LANDEP, which was suggested as methodology for integrated approach to management of natural resources in the Agenda 21 (The Summit in Rio de Janeiro, 1992).

The main research topics of ILE SAS are as follows:
- the analyses, syntheses and interpretations of the abiotic, biotic and socio - economic elements of landscape for landscape ecological planning, optimal spatial organization and utilization of the landscape
- ecological issues of agricultural landscapes, ecological networks, maintenance of biodiversity
- the impact of anthropogenic factors on the landscape and EIA methodology
- territorial system of stress factors, structure of the present man - made landscape
- the nature conservation issues and management of protected areas threatened by impact of human activities

ILE SAS has a rich experience in international cooperation. It was a consortium member of the European Topic Centre (ETC) on Nature Protection and Biodiversity (2001-2004) and continues in the ETC on Biological Diversity (2005-2008, 2009-2014). ILE SAS is active both in regional and world networks for long-term ecological research (LTER EUROPE, ILTER), co-ordinates national network of LTER Slovakia and participates in the Network of Excellence ALTER-Net, which was established during the 6th FP and continues as ALTER-Net2. Institute participated or is participating in several projects of 5th, 6th and 7th FP. ILE SAS carried out numerous national or international projects related to the main research topics of the Institute.
The Institute organizes every 3 years international symposium on problems on landscape ecological research. At the 6th International symposium organised by the ILE SAS in Piestany in 1982, the International Association of Landscape Ecology (IALE) was founded. 15th International symposium on Problems of Landscape Ecological research will take place in September 2009 in Bratislava (for more details see section “Forthcoming events”). ILE SAS is the publisher of international scientific journal Ekológia (Bratislava).

Contribution to the EBONE project:
ILE SAS is participating in project as a coordinator of WP10 and is involved in WP0, WP1, WP4, WP5, WP6, WP8 and WP9. The activities, carried out in WP10 are focused on development and implementation of communication strategy, stakeholder involvement and dissemination of project results.



Project meetings

Advisory Board meeting, Amsterdam 16 January

The first Advisory board meeting was held on 16th January 2009. Most Advisory Board members were present. After the introduction of the members of the board a discussion has been held on the EBONE context, its relationship with GEO, its approach and especially its communication with its European and global clients. Especially the communication with the European clients was a point of great attention as this is the crucial link in getting the concept realised. From several sides it was advised to ask for a slot at the next EU Directors Board meeting in Prague to present the approach and to discuss the relationship with the responsible authorities as the clients. This has been done and EBONE will be presented at the meeting in June. Related to this point is the development of a communication strategy. According to the Advisory board an explicit strategy should be developed as a priority. We accepted that and at present the strategy is being finalised. It will then be communicated with the partners and the advisory board members. Communication is more than informing; it creates opportunities to incorporate ideas of stakeholders and to identify the clients and their wishes. Important aspect is also to renew regularly the information on the website.

Highlights from the field computer meeting, Wageningen 2 February

The main conclusions from the field computer workshop were that recording of species data is not the most difficult issue, even though some harmonisation will be necessary. The difficulty will be to standardise the habitat data. As technology is changing rapidly, it is hard to keep track. Apparently several institutes have developed field computers independently. For EBONE an adaptation of the Northern Ireland or Flemish system will be most appropriate.

More powerful field computers have been developed in the UK and Sweden. The developments of the NILS survey will be followed closely. Concerning the use of maps or aerial photographs as basis for field work a general preference was expressed for hybrids as they share advantages of both. EBONE will develop before the end of 2009 a prototype software system for field work that can be made available through the website (except for external software with properties rights)

Project meeting and WP6 kick-off, Aix-en-Provence 15-17 April

The meeting in Aix en Provence was an important point in measuring progress and the state of art in the different work packages. In WP 1 there was some delay, but appointments have been made to catch up with the deliverables. WP2, WP3 and WP4 were well on track and interesting presentations and discussions have been held. Appointments have been made for further meetings procedures for high quality deliverables and deliverable dates. The complex WP5 was discussed extensively, especially on the aspects of linking habitat data to EO data through intercalibration and the importance of post stratification. Several groups have been working on this and it was agreed to generalize the procedures to allow all partners to use the same procedures. The kick off of WP6 took place through a first session on expectations, needs and discussion of the objectives. After that a field excursion has been held during the next day, discussing the complexity of the Mediterranean landscapes with its gradients and changes to abandonment and fire. On Saturday the final appointments have been made for further testing in 2009 and agreement was made on the preparation for field testing in 2010..

Latest news

Vistit to Portugal

Bob Bunce visited Porto in May 2009 with the purpose of testing the EBONE habitat monitoring methodology in Portugal. These are the results:

- It was successful but further experience is needed with the Handbook;
- Qualifiers need to be developed and local ones added;
- Point features and small patches of distinctive species and habitats need to be recorded for later location of targeted vegetation plots; a protocol for this will be added to the EBONE Handbook.
- Procedures for bryophytes, lichens and other taxa can be linked to the sites.
- A preliminary classification with climate data has been constructed and will be developed further for stratification and subsequent selection of squares for SIMBioN; these can later be attributed to the European stratification.
- A workshop will be held in October or November to integrate Portuguese experience with Annex I habitats into the key.

Upcoming meetings

- The WP8 kick-off meeting will be held on the 4-5 of June in Brussels
- The EBONE project will be presented at the EU Nature Directors meeting in Prague on 8 June 2009.
- The next Steering Committee Meeting of GEO BON is in Geneva on 12-13 June 2009.
- On the 7th of July WP7 will have a workshop in Vienna.
- Sander Mücher (Alterra) will defend his PhD thesis on the relation between field observation and earth observation on November 6th 2009 in Wageningen.
- The Israeli partners in the EBONE project will organise a 3-day workshop during 27-29 October 2009. It will be held at the Neve Shalom/Wahat al-Salaam.
- The next EBONE project meeting combined with an advisory board meeting will be in November in Thessaloniki, Greece.

Forthcoming conferences and events

IALE European Congress 70 years of Landscape Ecology in Europe "European Landscapes in Transformation - Challenges for Landscape Ecology and Management".
Date: July 12 – 16
Place: Salzburg, Austria.
Further information: www.iale2009.eu

2nd European Congress of Conservation Biology "Conservation biology and beyond: from science to practice".
Date: September 01 – 05
Place: Prague, Czech Republic
Further information: www.eccb2009.org

"LANDSCAPE – Theory and Practice" - 15th International Symposium on Problems of Landscape Ecological Research
Date: September 29 – October 02
Place: Bratislava, Slovakia
Further information: www.uke.sav.sk

Editorial

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