



LifeWatch.be Infrastructure User Meeting - REPORT

Monday 23rd May 2016, Beaufort meeting room, Flanders Marine Institute (VLIZ)

On Monday May 23rd, the second LifeWatch.be Infrastructure User Meeting was organized at the Flanders Marine Institute (VLIZ) in Ostend. During this full-day event, users of the LifeWatch.be infrastructure were given the chance to present their ongoing research and first results. This event was also the perfect networking opportunity for the Belgian LifeWatch partners, researchers, PhD students, LifeWatch Belgium supporters, etc.

During the morning session and the first part of the afternoon, several ongoing individual research projects within the Belgian LifeWatch infrastructure were presented. Since the previous edition (June 2014), several additional research projects started and a lot of progress has been made: while the previous meeting was limited to describing the infrastructure itself and laying out some future plans, during the meeting on Monday all presenters were able to show some (first) results of their research.

The last three presentations of the day were aimed at the more general use of the infrastructure: how the LifeWatch Taxonomic Backbone can be of use to you, which workshops are being organized as a service to the users, and which are the most recent LifeWatch e-infrastructure developments.

ABSTRACTS:

1.

LifeWatch gull tracking: an emerging network

Lens, L.; Müller, W.; Stienen, E.W.M.; Desmet, P.; Deneudt, K.; Hernandez, F.; Bouten, W.
(Terrestrial Ecology (TEREC), Luc.Lens@UGent.be)

Since 2013, the Universities of Ghent and Antwerp are collaborating with INBO and VLIZ to implement a semi-automatic tracking system of movements and behaviour of Flemish and Dutch coastal breeding gulls. For this purpose, a team at the University of Amsterdam (UvA) developed a flexible, state-of-the-art Bird Tracking System (UvA-BiTS) based on solar-powered, light weight GPS trackers with tri-axial accelerometer, two-way data communication, automated data processing and visualization in the Virtual Lab. During this talk, preliminary results will be shown on tagged Lesser Black-Backed Gulls (*Larus fuscus*) breeding in Zeebrugge and Vlissingen (Netherlands), and Herring Gulls (*Larus argentatus*) breeding in Oostende. As metapopulations of both species span coastal colonies in multiple countries, research questions and approaches are currently being scaled up to a European level.

2.

The importance of estuarine and coastal areas for the migration of fish and recovery of populations

Verhelst, P. (*Marine Biology, Ghent University, Pieterjan.Verhelst@UGent.be*)

Estuaries and coastal areas are subject to anthropogenic activities, as the largest harbours and economic activities are located along river banks and close to shore. Known to have a high habitat diversity, estuaries and coastal areas play a key role in the life cycle of many organisms, including diadromous and marine fish. As such, these areas can serve as transport routes, foraging or nursery areas. In order to conserve these areas in a cost-efficient and sustainable way, a better understanding of the ecosystem functions and services is needed. The Western Scheldt estuary and adjacent coastal area of Belgium are an important migration route and resident area for diadromous and marine fish. We selected Atlantic cod (*Gadus morhua*) and European eel (*Anguilla anguilla*) as two economically important indicator species for resp. marine and diadromous fish species, in order to assess the importance of estuarine and coastal areas as a key habitat for these species. The results of this study will be useful for management measures for the conservation and restoration of the eel and cod stocks.

3.

Unraveling the main drivers of zooplankton dynamics in a multistressor environment

Deschutter, Y. (*Marine Biology, Ghent University - Laboratory for Environmental Toxicology, Ghent University, Yana.Deschutter@UGent.be*)

Marine ecosystems are vulnerable to ongoing climatic change and are increasingly experiencing multiple disturbances along with the expanding human population. Chemical stressors in the form of dissolved nutrients and pollutants are one of the biggest consequences of recent human activities in the marine environment. There is still a lack of quantitative data and understanding on how these chemical stressors interact in marine ecosystems and how they combine with climate change. In order to gain a better understanding of the effects of this multistressor environment, we sampled the zooplankton of the Belgian part of the North Sea and its harbors every month for one year. These samples are currently being processed by means of manual stereomicroscope identifications combined with Zooscan analysis. Together with environmental and toxicological data this will provide the necessary elements for an ecological model unraveling the relative effects of different stressors and their interactions within the Belgian part of the North Sea.

4.

Improved technology marks new scientific opportunities

de Blok, R. (*Protistology & Aquatic Ecology, Ghent University, ReinhoudeBlok@UGent.be*)

Phytoplankton is a diverse group of photosynthesizing organisms which are accountable for 50% of the primary production on earth. A subset of these organisms are harmful algal bloom (HAB) forming phytoplankton species. Increasing our knowledge on phytoplankton dynamics, and specifically on factors that are involved in HABs, will provide the opportunity to initiate protective measures to ensure a healthy marine ecosystem. The current project focusses on the implementation of new techniques for automated routine collection and analysis of marine samples, to construct a comprehensive year-round monitoring database of the Belgium Coastal Zone (BCZ). The Cytosense flowcytometer (FCM) can be used to determine the phytoplankton composition in semi-continuously collected samples, using specifically designed software and reference databases. The resulting monitoring data on phytoplankton composition has a high spatial and temporal resolution, and can be used to study long term trends in the BCZ marine ecosystem, but also short term changes in phytoplankton composition and HAB proliferation.

5.

Detection and degradation of environmental DNA (eDNA) in the marine environment: a lab and field approach with plaice

Grosemans, T. (*Laboratory for Environmental Toxicology, Ghent University, Tara.Grosemans@UGent.be*)

Rapid advances in DNA analysis allow the study of biodiversity from environmental samples (e.g. water) and can significantly improve biodiversity monitoring. In this study, a series of 24h experiments were conducted to investigate the eDNA degradation rate and detection limit for plaice (*Pleuronectes platessa*) under controlled conditions. For plaice, eDNA degrades fast, reaching almost non-detectable concentrations in 24h ($p\text{-value}_{\text{exp. degradation model}} = 1.373e^{-06}$, $R^2 = 0.6457$, Coefficient = -16.81680). eDNA degradation rates are counterbalanced by the production of eDNA ($P\text{-value}_{\text{exp. detection model}} = 1.152e^{-05}$, $R^2 = 0.6269$, Coefficient = -18.64113), and these concentrations are almost saturated after 24h. Indicating that eDNA reaches a plateau or lag phase after 24 hours. These results highlight that environmental DNA can only be used to identify recent presence of organisms in the water column and is thus a snapshot of the current environment. Field samples were collected monthly for a whole year at 9 LifeWatch sampling stations located in Belgian coastal waters. To obtain positive field water samples for plaice, water was collected before starting a beam trawl at two different locations. DNA concentrations of the field samples, showed a clear seasonal pattern. With more eDNA production during summer, when juvenile plaice is migrating from the estuary towards the coastal areas. During autumn plaice will migrate towards the deeper North Sea, moving away from the coast line and thus lower eDNA concentrations are measured.

6.

Modeling marine species distributions from public data

Bosch, S. (*Flanders Marine Institute (VLIZ)*, samuel.bosch@vliz.be)

Over the last few years increasing attention has been given to the development of species distribution models (SDM) of marine species. To build reliable presence-only SDMs we need high quality occurrence records, environmental data and good procedures and settings for building the models.

To improve the occurrence records we implemented a quality control system for the OBIS database. Usability of environmental data was improved by creating the R package `sdmpredictors` which allows you to download and use the Bio-ORACLE and MARSPEC datasets from within R. In order to benchmark the different SDM techniques and settings we created a dataset of more than five hundred marine species with their distribution records and environmental data (MarineSPEED) which allowed us to explore issues like predictor selection, the elimination of sampling bias and model evaluation.

7.

Evaluation of PROBA-V satellite capabilities for the monitoring of snow cover extent at global scale and at high solar zenith angles.

Hawotte, F. (*Université catholique de Louvain*, florent.hawotte@uclouvain.be)

Remote sensing provides spatially precise information about snow cover extent at global scale. Thanks to 15 years of data, two types of web services have been developed in link with ecosystem dynamics in Europe and North Africa. On one hand, a set of metrics is used to summarize the time series. On the other hand, near real time statistical outliers detection allows to highlight exceptional climatic events that happened during the last decades. Those web services could be used to detect potential threats on ecosystems. However, until November 2015, available satellites can't provide high spatial resolution images at high solar zenith angles (SZA) which is important for ecosystem dynamics in northern regions. Recently, the maximum SZA of acquisition of PROBA-V has been increased. In this study, we evaluate the capabilities of PROBA-V for mapping snow cover extent at high solar zenith angles.

8.

Biodiversity monitoring using RPAS in Flanders

Vanden Borre, J. (*Research Institute for Nature and Forest (INBO)*, jeroen.vandenborre@inbo.be)

Remote sensing research at INBO focuses at developing practical methodologies to facilitate biodiversity monitoring (especially in the context of Natura 2000), through the use of aerial and satellite image analysis. In 2013, we acquired a Gatewing X100 UAS, a fixed-wing RPAS (Remotely Piloted Aerial System) with RGB and NIR-camera. The system enables self-controlled acquisition of detailed orthophotos and digital surface models (DSM) of Natura 2000 sites and other areas of interest. When flown at 120 m above ground level, the resulting output data typically has a ground sampling distance of ca 4 cm. Processing without ground control points (GCPs) yields internally consistent data, but may require some additional shifting and rotating to fit it in an existing x-y-z coordinate system. The system provides high user-control, but effective data acquisition in Flanders is still limited by weather conditions (clear sky or completely overcast, no separate clouds), and most importantly by legal constraints (airspace safety and privacy).

9.

LifeWatch Taxonomic Backbone: combining taxonomy, biogeography & traits

Vandepitte, L. (*Flanders Marine Institute (VLIZ)*, leen.vandepitte@vliz.be)

The combination of taxonomy, biogeography and traits can help in answering long-standing ecological questions. Through the Taxonomic Backbone, LifeWatch is offering the possibility to easily combine these three building blocks through web services, through the overarching LifeWatch infrastructure or related projects. Through the EMODnet Biology data portal, it is for example already possible to query species distributions, based on traits related to the relative importance of a species to the society: one can e.g. plot and compare the distribution of IUCN Red List species, species listed in the European Habitat Directive or indicator species in the framework of the Marine Strategy Framework Directive (MSFD). Next to services to gain access to different database systems, the Taxonomic Backbone also offers tools to scientists to quality control their own data.

10.

Overview of the recent and future LifeWatch Workshops

Dekeyzer, S. (Flanders Marine Institute (VLIZ), stefanie.dekeyzer@vliz.be)

In the aftermath of the Empowering Biodiversity Research Conference (May 21st 2015, Brussels), five LifeWatch-related workshops were organized: **(1)** GIS and WebGIS Workshop (UcL, INBO, contact: Julien Radoux, julien.radoux@uclouvain.be); **(2)** Species Distribution Modelling Workshop (UcL, ULg, INBO, contact: Jessica Delangre, jdelangre@ulg.ac.be); **(3)** Data Cleaning and Data Publication Workshop (BBPf, INBO, RBINS, RMCA, contact: Dimitri Brosens, dimitri.brosens@inbo.be); **(4)** Data Paper Workshop (BBPf, INBO, Contact: Dimitri Brosens, dimitri.brosens@inbo.be); and **(5)** Data Analysis Workshop (VLIZ, Contact: Klaas Deneudt, klaas.deneudt@vliz.be).

In the future these workshops might be organized again, either on a regular basis or depending on user needs. If you are interested in one or more workshops, please contact the people above.

11.

LifeWatch e-infrastructure developments

Deneudt, K. (Flanders Marine Institute (VLIZ), klaas.deneudt@vliz.be)

LifeWatch is building a distributed infrastructure with a number of common facilities. One major part of these common facilities is the ICT infrastructure. This infrastructure is currently being developed in the framework of the EGI ENGAGE project.

A specific competence center is developing the foundation for the shared LifeWatch ICT infrastructure based on the EGI Fedcloud. This talk presents the current status of these developments and informs the LifeWatch users of the e-infrastructure that will be available in the near future.

Users are invited to describe their requirements for data processing and analysis computational capacity.