Contacts

Use case 1

Lluís Brotons

CTFC Forest Sciences Centre of Catalonia, CEMFOR - CSIC - CREAF (InForest JRU), Spain

lluis.brotons@ctfc.es

Sergi Herrando

Institut Català d'Ornitologia Oficina Tècnica, Barcelona, Spain

ornitologia@ornitologia.org

Nicolas Titeux

Forest Sciences Centre of Catalonia, Solsona, Spain

nicolas.titeux@ctfc.es

Use case 2

Christos Arvanitidis

Institute for Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Heraklion, Crete, Greece

arvanitidis@hcmr.gr

Nicolas Bailly

Institute for Marine Biology, Biotechnology and Aquaculture, Hellenic Centre for Marine Research, Heraklion, Crete, Greece

nbailly@hcmr.gr

Publication date

05.01.2015

Designed by PENSOFT

Photos: Dirk Schmeller, Wikimedia commons

This trend in body size reduction is also reflected in a recent analysis on the biomass development of small, medium, and large fishes (Figure 6), in which more than two thirds of all fish species of the Mediterranean basin will reduce biomass, if fishing efforts are not reduced. As the body size data shows, body size in catches has undergone a visible reduction since the 1980ties, depending on the species, and this reduction will continue as the projection in figure 6 suggests, if no steps are undertaken to stop overexploitation.

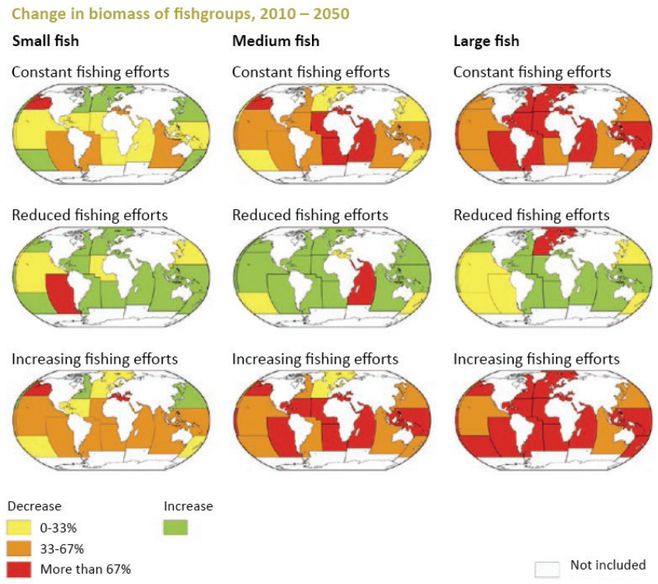


Figure 6. Relative change in biomass of small, medium, and large sized fish species under 3 fishing effort scenarios. From CBD Technical Series No. 78; Source: Wilting et al., submitted.

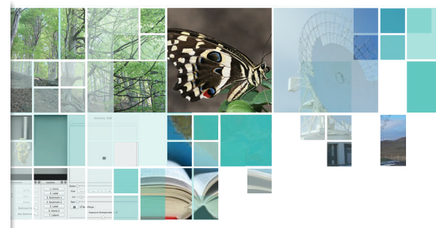
Outlook

Our use cases show that available data does allow documenting important changes in biodiversity. Data may also be combined from different survey methodologies, such as opportunistic and standardized monitoring data. Beyond potentially filling gaps in EBVs that currently lack data, combining different data sources may also improve the precision of biodiversity estimates when compared with a high-quality dataset alone. More data could also be collected via other sources, such as social media. Yet, methodological developments alone cannot solve all problems, and important basic principles of biodiversity data collection and management should be carefully considered. For example, the mean length by species in fishery captures (or landings) would give an even better overview of the exploited species decline. However, these data are difficult to obtain because they are protected by countries for obvious economic strategic value.

EU BON

GROUP ON EARTH OBSERVATIONS

EU BON



POLICY BRIEF 3

Use cases of the EBV concept

As an attempt to fill existing gaps in available biodiversity information and frame the current challenges of biodiversity monitoring, the concept of Essential Biodiversity Variables (EBVs) has been proposed to identify those biodiversity measures required for surveying the most essential components of biodiversity. To date, the suites of proposed EBVs are clustered into 6 EBV classes: Genetic Composition (GC), Species Populations (SP), Species Traits (ST), Community Composition (CC), Ecosystem Structure (ES), and Ecosystem Function (EF). The conceptual EBV framework is still under development and has not yet been translated into direct actions. However, EBVs may provide a critical step forward for revising strategic goals for the coordination of large-scale integrative biodiversity monitoring by helping formalize a unified framework common across the different ecological fields.

In the EU-project EU BON a taskforce with experts covering data management, ecological modelling, biodiversity monitoring and other relevant topics has been created. The work of the EBV taskforce is to develop a series of use cases to elucidate the applicability of the EBV concept to the current biodiversity information structures and to show where improvements are needed to call on the full potential of EBVs as a policy tool.

GROUP ON EARTH OBSERVATIONS

Use case 1

Species Population: Tracking the impact of environmental pressures on biodiversity as a policy tool.

The future of biodiversity and its related ecosystem services depends on how the species and their interactions will react to ongoing environmental pressures. Scientific evidence has shown the dramatic impact that these pressures represent on ecosystems, from species turnover to species extinction. The Goal B of the Strategic Plan for Biodiversity 2011-2020 outlines the need of developing indicators capable of showing how biodiversity is changing as a result of pressures acting on it. Environmental pressures such as climate change or land use change can be tracked using direct measures of the driving forces, such as temperature shift or changes in the extent of a given type of land cover. However, quantifying the magnitude of a driving force in itself represents an indirect approach to its actual impact on biodiversity and usually involves a series of assumptions on how one affects the other.

During recent years scientists have made a step further by using the highly valuable networks of monitoring schemes in Europe (http://eumon.ckff.si/) to develop indicators that track the direct impact of environmental pressures on the studied components of the biodiversity. This approach allows obtaining more targeted indicators linked to the ultimate aim of conserving biodiversity by using data on population trends of species derived from citizen science based projects. The Indicator of the Impact of Climatic Change on European Bird Populations is a powerful approach showing the direct impact of climate change on a yearly basis. More recently, within the context of the EU BON project, researchers have also developed a conceptual and methodological basis to track the impact of land use changes on biodiversity. Using existing networks of biodiversity monitoring, a new generation of indicators are now able to track the direct impact of land uses changes on biodiversity (Figure 1).

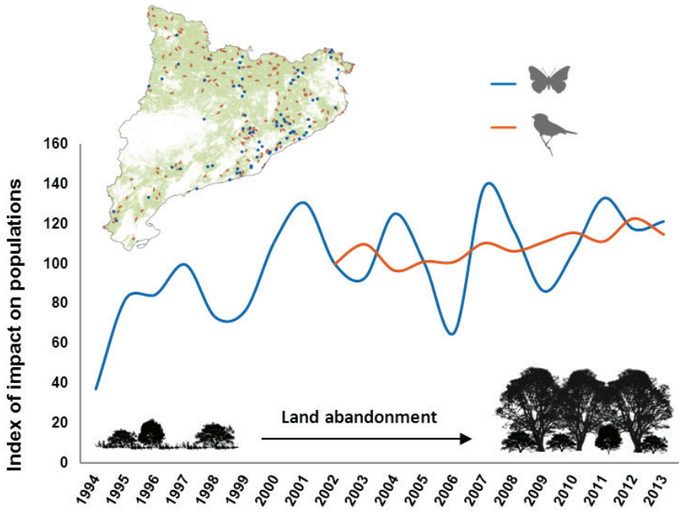


Figure 1. Land abandonment is producing a marked land use shift in Europe, particularly across the Mediterranean countries. This figure shows the Indicator of Impact of Land Abandonment on butterfly and bird populations in Catalonia (NW Mediterranean Basin) based on their ecology and population trends. Source: Catalan Butterfly Monitoring Scheme and Catalan Common Bird Survey, monitoring sites shown in the map (details on these schemes can be found at http://eumon.ckff.si/monitoring/).

Use case 2

Species Traits: A preliminary application for the Mediterranean Sea

In the marine domain, much data are collected on the species body size to estimate the maximal length reached by the oldest individuals, as this measure is a good approximation for many other relevant biological and ecological traits. For example, when fish stocks are under pressure (e.g., overexploited) the length at first maturity decreases. Hence, individuals may reproduce at a younger stage (= a smaller size), which may have far reaching influences on the dynamics of populations. The work done here contributes to the EBV class species traits. It performs a trend analysis of maximal lengths over time (estimated through a modeled parameter named length infinity - L∞). L∞ data are used from FishBase (www.fishbase.org) and SeaLifeBase (www.sealifebase.org) for 25 fish, 5 crustacean and 4 mollusk marine species commercially exploited in the Mediterranean Sea. The data reaches back to the 1950s, and in some species even to the 1920s, which allows a documentation of the change in body size over this period. Such a change contributes to informing the EBV class species traits and could be combined with similar data from other species groups, such as birds and butterflies.

Over the 34 analyzed species, 9 species (26%) show a reduction in L∞ since the mid-20th century, belonging to four fish families dTriglidae (searobins, Fig.2), Mugilidae (grey mullets, Fig.3), Thunnidae (tunas, Fig.4), and Sparidae (seabreams, Fig.5), and one crustacean family Penaeidae (shrimps). After recent studies, it is possible that the decreasing trend for the shrimp species is not only due to exploitation, but also to the presence of invasive species from the Red Sea in its natural habitat.

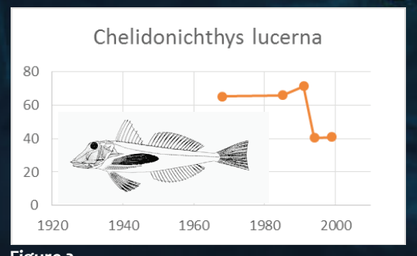


Figure 2

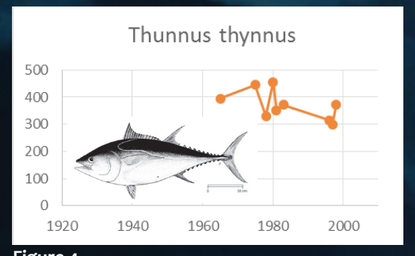


Figure 4

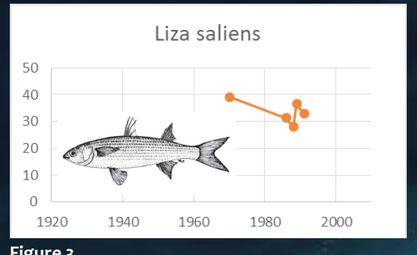


Figure 3

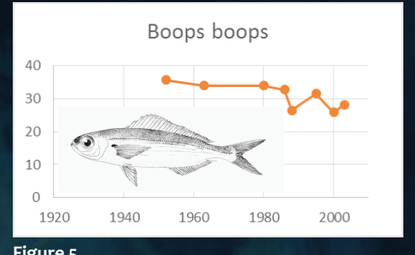


Figure 5

Figures 2-5. Four examples with declining trend of L∞ over years. Y-axis: L∞ (cm); X-axis (years). All drawings: FAO.

EU BON

GROUP ON EARTH OBSERVATIONS