Lifewatch acoustic receiver network: setup of a PostgreSQL database, web interface and collaborative environment to cope with big data

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Technology does not stand still and it helps researchers to perform high-quality scientific research. Improving technology allows us to gather continuous information on ocean processes, animal behaviour and environmental variables using automated devices. The acoustic receiver network for instance, allows flexible and cost-efficient spatio-temporal tracking of migratory fish species. This network uses acoustic telemetry to gather the data. In the framework of LifeWatch (http://www.lifewatch.be), which was established as part of the European Strategy Forum on Research Infrastructures, the Flanders Marine Institute (VLIZ) and the Research Institute for Nature and Forest (INBO) created this receiver network to support biodiversity research and environmental impact studies. The network currently consists of 88 receivers, covering both the Belgian part of the North Sea, the Western Scheldt Estuary and the river Scheldt. Detailed observations of animal movements and behaviour in relation to the aquatic environment can significantly improve our understanding of ecosystem functioning and dynamics (e.g. migration routes, spatio-temporal habitat use and migratory behaviour). In addition, it provides the scientific basis for fisheries management, species protection, marine spatial planning and environmental impact assessments.

But having a network of devices, each able to capture up to 1.6 million detections, leads to big data. Big data easily goes beyond the limits of normal spreadsheets, requires a lot of RAM memory and requires (too) much calculating power from your personal computer when performing the analyses. Thus, we have to look for alternative solutions to work with this kind of data.

VLIZ hosts a PostgreSQL database able to store all the information. The database is linked to a collaborative environment (R-server) where all analyses of the data can be performed and results can be visualized using the R-shiny application. To facilitate the data-entry for researchers, a web interface was developed in PHP using symphony framework. There are several entry forms to manage metadata on receivers, tags and animals and upload the detections into the database in an automated way.

This database is a first step towards an European animal tracking network. Such a network will: 1) improve the capacity to monitor large scale movements of marine animals, 2) foster cooperation between scientists across borders and 3) foster efficient use of resources and compete for large scale European funding opportunities.

Do you want to know more? Visit us at the LifeWatch Demo boot!

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