06/06/2023

# Subject │ Minutes of the Special Meeting on Monitoring of COST Action CA18221: “PEsticide RIsk AssessMent for Amphibians and Reptiles”

1. **Welcome to participants**

The participants (**Annex 1**) were welcomed by the Local Organiser, Marion Junghans.

1. **Overview of PERIAMAR objectives and meeting purpose**

The Action chair, Manuel Ortiz, presented the objectives of the COST Action CA18221, emphasizing the fifth Research Coordination Objective (To design a protocol for post-registration monitoring of pesticide risks to herpetofauna) established in the Action’s Memorandum of Understanding. The Action chair explained that this meeting was organized to bring together different views of biological and chemical monitoring relative to pesticides and herpetofauna. In principle, the meeting should serve to generate a document describing the possibilities of running post-registration monitoring of pesticide impacts on amphibians and reptiles.

1. **Activities related to monitoring programs for amphibians and reptiles and integration of landscape parameters in monitoring**

Katja Poboljšaj, from the Centre for Cartography of Fauna and Flora of Slovenia, presented the work “Amphibian monitoring in Slovenia” explaining how relevant species for monitoring were chosen and describing the monitoring protocol. The role of volunteers and citizen science was also stressed.

Thijs Schippers, from RAVON, presented the work “Amphibian monitoring programs in the Netherlands”. The scheme includes three different programs: a first one focused on monitoring occupancy to study trends in distribution, which is mostly implemented by volunteers; a second one carried out within Natura 2000 areas that includes the characterization of habitat and pond structure parameters; and a third one focused on agri-environmental schemes that is conducted mostly by professionals and that pursues the monitoring of effectiveness of those schemes to improve biodiversity.

Marion Junghans mentioned that there is an intensive programme of chemical monitoring in Dutch waters, and that it could be explored the overlap of that programme with the herpetofaunal monitoring programmes presented by Thijs Shcippers.

Daniel Villero, from CREAF - Ecological and Forestry Applications Research Centre in Spain, presented the work “An overview of the EuropaBON project”. EuropaBON is a consortium for observing biodiversity trends in Europe, using as baseline EU-wide monitoring methods and systems of surveillance of species and habitats. The work on two types of variables, the essential biodiversity variables and the essential ecosystem services variables.

Benedikt Schmidt, from Fauna Karch & University of Zurich, presented the work “How to monitor amphibian populations and how to explain patterns and trends”. Amphibian monitoring is the easy part, once its objective is defined, but pesticide effect determination is challenging because no good PPP data are available and because causality is hard to show. Three sequential questions are proposed: 1) Why monitoring? It is important to define what is acceptable as pesticide damage e.g. individual suffering, population decline… 2) What to monitor? Sensitivity analyses of population models may determine important parameters, but population dynamics (even for the same species) not always depend on the same parameters. Habitat may condition which parameters are more and less important for population dynamics. 3) How to monitor? This will be defined after the previous two questions have been answered. The Swiss examples proofs that connectivity is important to explain species presence.

A discussion comes up on the need of pesticide data, which are needed to be linked to monitoring. It is agreed that fate modelling could replace the lack of that kind of data.

1. **Activities related to elucidating the role of PPP on population responses. Examples with other environmental stressors and taxa**

Francesco Ficetola, from the University of Milan, presented the work “Broad-scale data to ascertain negative impacts of invasive species on amphibians”. They worked on determining the role by invasive crayfish on amphibians, for which they had to use a protocol to distinguish impacts associated with the stressor under observation (i.e. crayfish) and other stressors. They suggested a deductive approach consisting on proposing key drivers, elaborating alternative hypotheses and selecting the best model on the basis of statistical testing. Problems associated with spatial autocorrelation of amphibians and environmental parameters are addressed. It is stated that abundance is a much more sensitive parameter than occupancy.

Tobias Roth, from Hintermann & Weber AG in Switzerland, presented the work “Negative effects of nitrogen deposition on Swiss butterﬂies”. The measure diversity at two scales: within the habitat and at landscape level, using different biodiversity groups for each one. The compared biodiversity monitoring results with nitrogen deposition, mapped by GIS models, finding some correlations. The study was used to show that critical nitrogen loads (allowed by legislation) should be lowered. The concept of critical loads consists of ranges that can vary from one to another habitat. It was discussed whether this could be applied to pesticide uses, especially to monitor multiple stressor effects. Pesticides have the problem of the variety of products, but also of how this variety changes over time, which makes it difficult to link with standard monitoring procedures.

Philippe Berny, from VetAgro Sup in France, presented the work “Monitoring of PPP impact in terrestrial vertebrates: knowledge gained and limitations of the existing systems”. Some of the previous or ongoing experiences in this context (WIIS, SAGIR…) used opportunistic surveillance of dead animals, combining necropsy and toxicological analysis. These procedures are limited by the influence of detectability, which in herps is probably too high, and have the problem of which sample must be used (whole body, organs…, assuming we can choose). Alternatively, active sampling based on non-invasive methods can be applied, although it is also affected by detectability problems. The future seems to go through testing the viability of new methods like biomarkers or environmental DNA.

1. **Activities related to applicability of biological and chemical monitoring to risk assessment**

Aaldrik Tiktak, from the Planbureau voor de Leefomgeving in the Netherlands, presented the work “The EFSA Statement on Groundwater Monitoring”. He focused on some of the statement sections, such as Specific Protection Goals and EXposure Assessment Goals, Principles of the tiered approach, Vulnerability assessment for site selection and in context setting, and Study design of target monitoring studies. Much of the work is spent in site selection, which will be mitigated using monitoring networks.

Marion Junghans, from EAWAG in Switzerland, presented the work “Applications of chemical and biological monitoring to environmental risk assessment”. The ongoing programmes in the Netherlands and Switzerland were described. Also, chemical monitoring is being complemented with on-site experiments with amphipods to test water quality.

1. **Activities related to using monitoring to calibrate or validate ecological models**

Oliver Jakoby, from RIFCON in Germany, presented the work “Using monitoring to calibrate or validate ecological models”. The necessity of documenting data and making them easily accessible was stressed. Monitoring is often not initially designed to inform modelling, but adding a few relevant variables collected during monitoring could increase usability for modelling; in this context, communication between modellers and monitoring performers is important. Data are needed for calibration and validation. Monitoring can provide valuable data at different stages in the modelling process.

1. **Discussion**

We need an environmental risk assessment (ERA) for amphibians and reptiles, but have no tools to perform a full tiered, conventional approach. Monitoring supposes going directly to high tier while relying on the existing few data for the first tiers in order to save resources and minimize experimentation. If the solution for a proper ERA for herps is moving away from current system of showing the absence of undesired effect towards a system that is protective for populations, we should propose a system-based approach, one of which pillars is monitoring. This approach should serve to implement risk management options when necessary. The system-based approach should be implemented through the identification of critical areas (target monitoring, see below) and perform monitoring to determine population-level effects. When a risk is identified, possibly associated with PPP (in general, not a single substance), it may serve, for instance, to implement risk mitigation measures.

The question about who should assume the monitoring is discussed. There are doubts about openness of companies to assume monitoring schemes that will cover factors other than their products. The monitoring should be assumed by authorities, as it involves considering more than one product.

In general, the objective of current monitoring programmes is not targeted. Large-scale data can be used in the same way as done, for instance, for the nitrogen deposition study (relating monitoring results with e.g. historical agricultural activities or estimated pesticide use data). A similar approach is associating amphibian or reptile population indicators with a pesticide use index, based on crop land use from GIS analyses (e.g. done in Switzerland with invertebrates). This approach can also be used to identify target sites where to monitor populations.

To put these procedures into practice, a proof-of-concept approach is proposed, for which at least to examples are planned: combining amphibian monitoring and pesticide monitoring in the Netherland, and combining amphibian monitoring with pesticide use index in Switzerland.

This proof-of-concept will anticipate the elaboration of the monitoring document that was initially proposed as objective for this meeting.

1. **Closing**

The contribution of all participants is acknowledged. The participants thank Marion Junghans and EAWAG for hosting the meeting.

## LIST OF ANNEXES

**Annex 1 – Attendance List**

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