

Deliverable D.T3.4.1.

Eco-AlpsWater

Innovative Ecological Assessment and Water Management Strategy
for the Protection of Ecosystem Services in Alpine Lakes and Rivers

Priority 3: Liveable Alpine Space. SO3.2 - Enhance the protection, the
conservation and the ecological connectivity of Alpine Space

Project Eco-AlpsWater

Work Package WPT3

Activity A.T3.4

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From proposal:

The new results in key waterb. will integrate the traditional WFD monitoring approaches, providing knowledge elements for the review and updating of River basin management plans. By involving government PPs and Observers, the enhanced taxonomic inventories and risk associated species (waterborne pathogens, toxic cyanobacteria, cyanotoxins, invasive sp.) will strengthen the manag. options, allowing better and conscious preservation of the economic value of water resources and human well-being.

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Government PPs, with feedback from Observers, will provide concrete guidelines to improve River basin management plans (e.g. indications to reduce impact of toxigenic species; preservation of drinking water supplies, bathing waters, biodiversity...).

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Set of indications and measures to improve basin management plans.

The EU Member States should provide river basin management plans (RBMP) about all executed activities every six years to report amongst others about status of waterbodies and the success of measures. The required activities and methodology are precisely described in the WFD but not in the RBMP. Particularly the RBMPs describe the execution of the WFD and the success for example in coming closer to the targets. In RBMP there are descriptions of the amount of waterbodies in high, good or worse status and which or how many measures are planned to improve the status. On the other side, the methodology to detect biological elements is described in separate papers/instructions or websites and in the technical reports of the intercalibration activities. Therefore, it is meaningful to discuss the links of the Eco-AlpsWater metabarcoding methodology to the requirements of the WFD and to the assessment methods of the Member States, here the five EU-countries and in addition the Switzerland approach (WPO). All of these assessments require taxa inventory lists, which have to be compiled by specific sampling and detection methods to which the metabarcoding approach by the project Eco-AlpsWater can contribute significantly.

Concerning the sampling methods, the metabarcoding approaches by the project Eco-AlpsWater were kept as similar as possible to the WFD methods, so sampling can be done in parallel, or as in case of fish can drastically reduce the sampling effort. The easy and cost-effective eDNA sampling is very useful in large-scale surveys, and to follow up the effect of measures to improve the ecological status with short-time repetition and high spatial resolution, which is not feasible with traditional methods.

The future prospects for implementation of the EAW innovative monitoring approaches into RBMP are:

- Combination of traditional and eDNA approaches allows biodiversity assessment at an unprecedented level.
- Cost efficient eDNA approaches are perfectly suited for large-scale, continuously repeated monitoring, providing the ability to detect changes in the ecosystem at an early stage and to react accordingly.
- Development of eDNA metrics, especially for questions exceeding WFD/WPO, e.g. climate change or control of effects of measures to improve the status.

For bio-components, which are not covered at all so far with national traditional methods (e.g. phytobenthos without diatoms) there is a high potential to use the metabarcoding approach since taxa coverage is already high enough that an eDNA bases metric can be developed.

In perspectives, new metrics provided by innovative eDNA methods can be used also to complement indicators for the study of ecosystem functions and services. However, this is an open and exciting field of research, that can rely on the use of all the biodiversity dimensions, which traditional methods cannot determine. To exemplify, this includes the determination of organisms difficult or impossible

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to determine by isolation and culturing methods, or organisms requiring absolutely exaggerated analysis times compared to the rapid results required by metabarcoding biomonitoring (such as bacteria, pico-cyanobacteria, small micro-eukaryotes).

To fulfil the requirements of the WFD/WPO a biological monitoring is based on the assessment of taxa inventories in freshwaters. They are not only elementary in WFD/WPO, but also of great use for other topics in ecosystem analysis and water management.

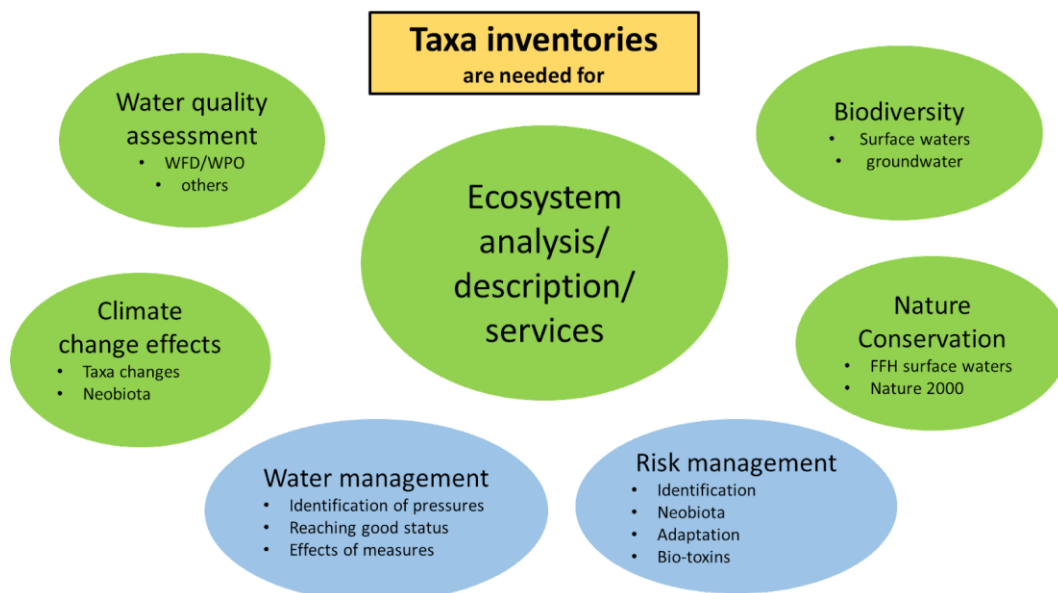


Fig. x: Scheme illustrating the relevance of various topics part of river basin management plans

The results of the EAW project contribute to a decisive improvement in future monitoring of biological quality elements (BQE). Traditional monitoring methods have known limitations, such as

- +) Difficulties in determination of indicator taxa.
- +) Difficulties in finding hidden and rare taxa.
- +) Selectivity of traditional methods regarding certain taxa.
- +) bottleneck of rare classical taxonomic expertise of relevant BQE taxa

The EAW methods are already able to overcome some of these limitations and offer the possibility to answer additional, previously unaddressed, questions. Especially the taxa determination as the main normative element of the required "composition" will be supported and improved considerably using the EAW HTS methods.