# Biodiversity Monitoring Configurator

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## Protected Areas (PAs): Different ecosystems, different challenges

Around 17% of the earth's surface is under protection. However, this has not halted the pressing biodiversity crisis. Biodiversity is also reflected in different requirements of habitats, communities and species in order to provide adequate protection. PA management involves the formulation of targets to keep the respective PA in a good condition or even improve its condition for the hosted species and habitats.



## Effective and adaptive Protected Area management – But How?

Biodiversity monitoring enables keeping track of status and trends of biodiversity - a prerequisite for effective PA management. This allows adaption of management strategies and effective tracking of focal habitats and species. Common issues facing PAs, however, are limited resources and a lack of experts. New technologies can help to improve existing monitoring programs, provide comparable results, cover large areas, and can be more cost-efficient. However, a high number of tools and methods for biodiversity monitoring - especially the great number of new emerging tools - makes the identification of an adequate monitoring program challenging.



## Biodiversity Monitoring Configurator

Goal of the configurator is to classify available tools, techniques and methods relevant for biodiversity monitoring in terrestrial PAs to get a good overview about available methods and technologies. We identify the biodiversity-relevant focus that a tool can be used for and its position within a logical workflow. In a further step, this classification will result in an interactive Monitoring Configurator, which should guide a PA manager towards an adaptive and effective biodiversity monitoring program (Box 1).

### Box 1: Example Biodiversity Monitoring Configurator

**FFH-Habitat-type saw-sedge reed**

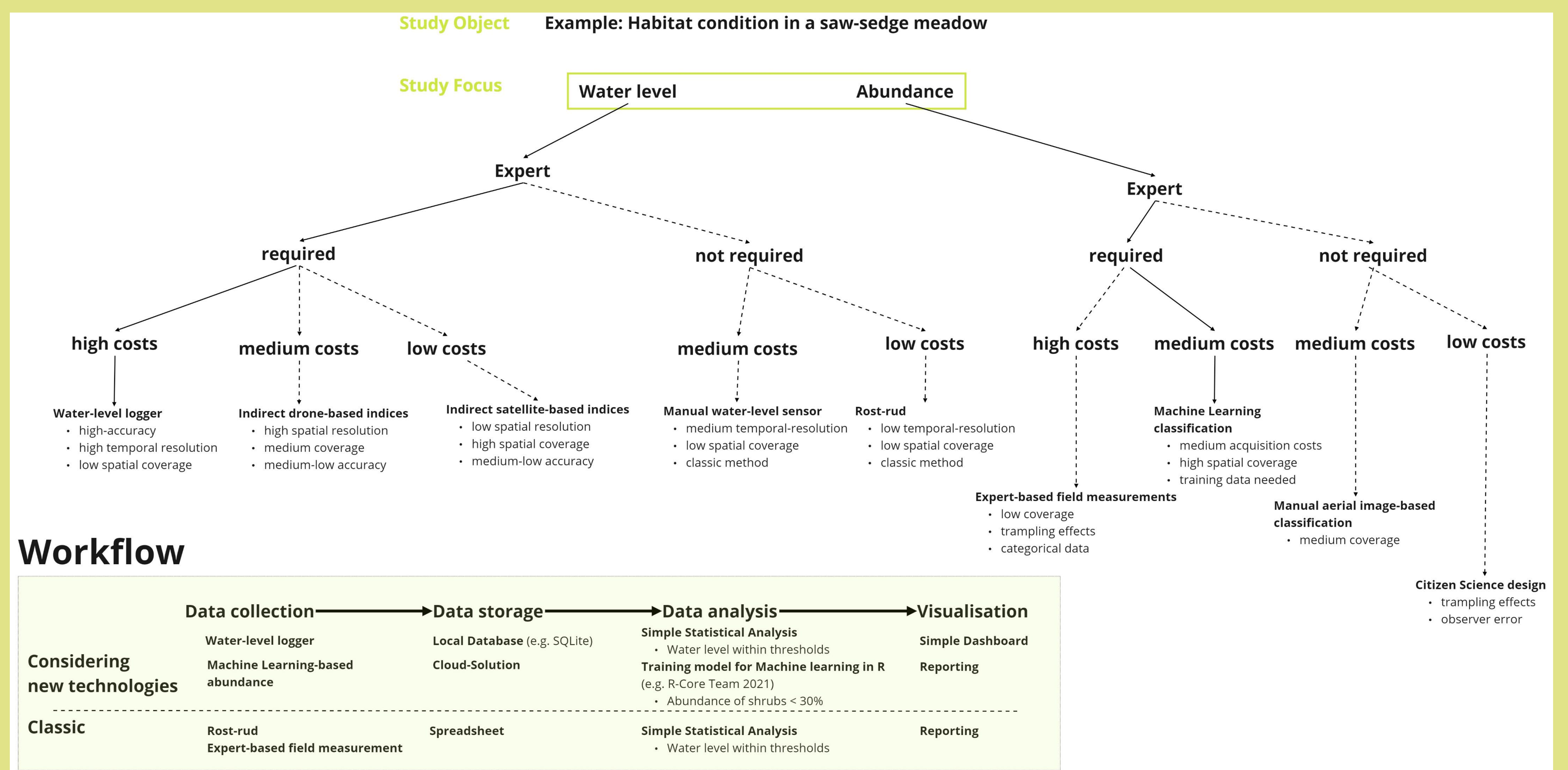**Management Requirements:**
- Groundwater-level monitoring in a saw-sedge meadow
- Abundance of shrubs below 30%

**Prerequisites:**
- What are the management requirements (obligations/law, site-specific characteristics, existing data, monitoring type)?
- What is the purpose of the monitoring (goals)?
- What is the monitoring target (indicator, focal species, habitats, etc.)?
- Where and when should the monitoring happen?
- Who are the stakeholders?
- Available infrastructure (e.g. mobile connections, electricity, etc.)?
- Available resources (personal and financial resources)?

**Objectives:**
- Provide the most applicable biodiversity monitoring tools for a PA
- Arrange tools and methods in a logical workflow
- Keyword based search (e.g. low cost, experimental, classic)



Study Object — Example: Habitat condition in a saw-sedge meadow

Study Focus — Water level / Abundance

**Workflow**

| | Data collection | Data storage | Data analysis | Visualisation |
|---|---|---|---|---|
| **Considering new technologies** | Water-level logger / Machine Learning-based abundance | Local Database (e.g. SQLite) / Cloud-Solution | Simple Statistical Analysis · Water level within thresholds / Training model for Machine learning in R (e.g. R-Core Team 2021) · Abundance of shrubs < 30% | Simple Dashboard / Reporting |
| **Classic** | Rost-rud / Expert-based field measurement | Spreadsheet | Simple Statistical Analysis · Water level within thresholds | Reporting |

**Abstract**
Protected area (PA) networks are key for global biodiversity conservation. While the numbers of PAs are increasing, their effectiveness in halting ongoing biodiversity losses has been limited. A fundamental approach to guide decision-making in PAs is to conduct monitoring to inform adaptive management. Alongside traditional field collection methods, new and emerging biodiversity monitoring technologies are becoming widely used as tools for decision-making. The increasing numbers of currently available methods and techniques makes it difficult for non-experts to stay up-to-date and prepared to design and implement adequate biodiversity monitoring systems in PAs. Nevertheless, such effort is highly needed as innovative technologies provide new ways to make monitoring more efficient in space and time (Dalton et al. 2021). For this reason, we currently design a monitoring configurator, which identifies appropriate methods, tools and techniques in an appropriate work flow for different monitoring purposes and different types of PAs. Our focus emphasizes free and open-source tools. The backbone of the configurator is a tool catalog, where biodiversity monitoring tools are structured in a standardized way. Designed mainly for biodiversity practitioners, the monitoring configurator should support selection of appropriate tools for biodiversity monitoring and improve quality and quantity of biodiversity data sets in PAs.

**References**
Dalton, Daniel T.; Pascher, Kathrin; Berger, Vanessa; Steinbauer, Klaus; Jungmeier, Michael (2021): Novel Technologies and Their Application for Protected Area Management: A Supporting Approach in Biodiversity Monitoring. In : Protected Area Management - Recent Advances: IntechOpen.

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Keep in contact with us!