A quick reference guide to set biodiversity monitoring objectives

NCEA | Natural Capital and Ecosystem Assessment

JNCC

About this guide

This Quick Reference Guide, which summarises JNCC Report 780 (Marion *et al*. 2024), aims to provide step-by-step instructions and best practices for setting objectives that will inform the entire lifecycle of the project, including data collection, analysis, and interpretation. It is designed to be used alongside the worked examples (Annex 1), and the objective setting tool (Annex 3) we've developed by synthesising the report's sections we believe will be most valuable to conservation practitioners and land managers. On its own, this guide serves as a starting point to set monitoring objectives.

What is a well-defined objective?

Biodiversity monitoring is essential for informed conservation decisions, evaluating conservation efforts, and understanding environmental impacts. The success of monitoring depends on setting clear, well-defined objectives to guide data collection, resource allocation, and outcome evaluation. A well-defined objective is concise, unambiguous, and outlines specific goals and desired outcomes. We have adapted the OITT (Outcome-Indicator-Target-Timeframe) framework [link to section in guide] to guide you through the process:

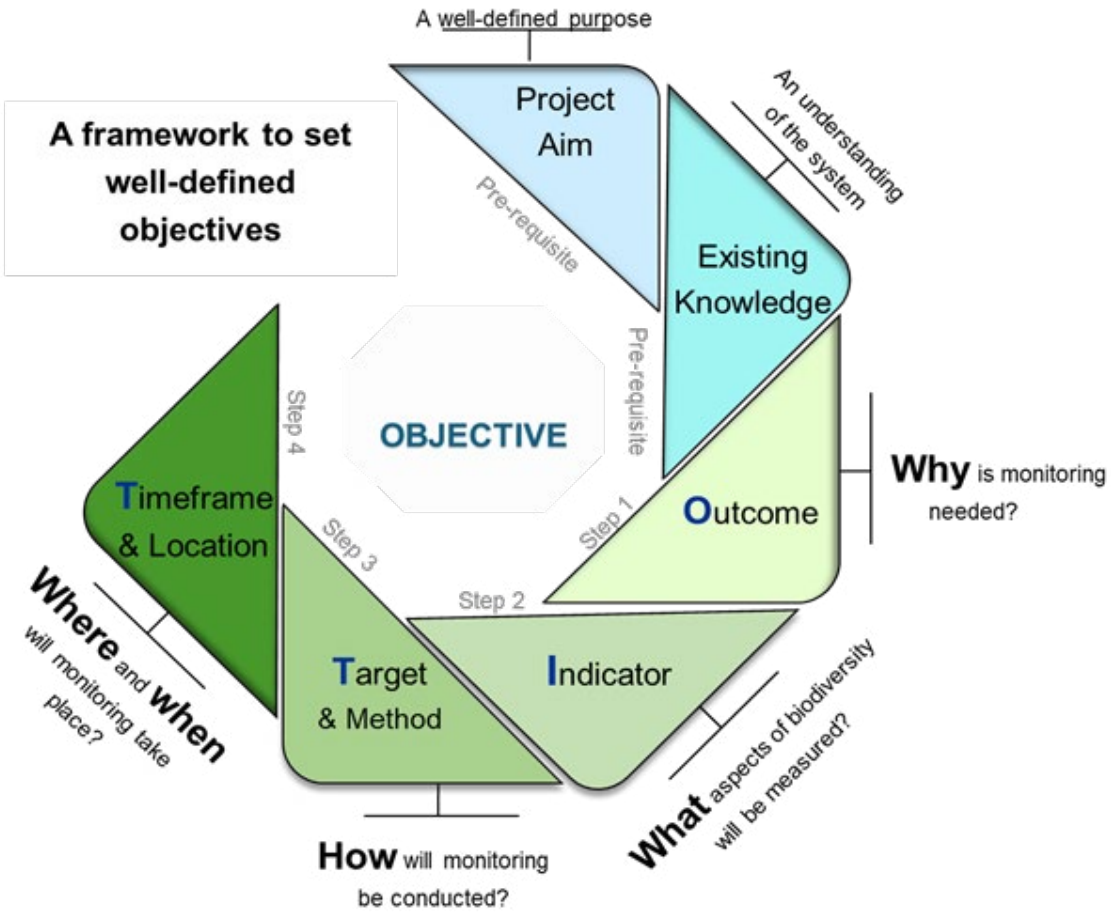


Figure 1: A framework to set well-defined objectives

Steps to define monitoring objectives

Pre-requisites for setting monitoring objectives

- Define project goals: Monitoring can take place for a variety of reasons, but it is often linked to a wider project with a non-monitoring related goal, such as improving biodiversity in a particular area. Clearly understanding this broader goal and ensuring it aligns with organisational priorities will provide a clear rationale and scope when it comes to defining monitoring objectives (see Figure 2).
- Investigate current knowledge: research past projects and current literature to avoid duplication and learn from others.

Figure 2: Example hierarchical structure of goals and monitoring objectives within a hypothetical urban biodiversity program.

Step 1: Why is monitoring needed?

Clearly articulate the reasons behind monitoring – whether it's for baseline data collection, impact assessment of conservation actions, or monitoring long-term environmental changes.

There are many reasons to monitor biodiversity, and this needs to be understood to ensure that the objective is useful. A common purpose is to answer one or multiple of the following questions:

- What is the status of biodiversity in the area?
- What is the impact of an action or intervention on biodiversity?
- How are key environmental variables changing, and what is the cause, direction and magnitude of these changes?
- Where and when are these changes most significant?
- What action/s can be taken to mitigate harmful change and/or encourage positive change?

Step 2: What aspects of biodiversity will be measured?

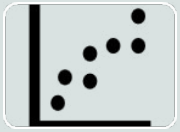
Decide whether to focus on monitoring species or habitats. This decision can be guided by the aim of the project, as well as by weighing up the advantages and disadvantages of each approach. If species, decide whether to monitor single or multiple species.

Species monitoring provides detailed insights into specific taxa, but may miss broader ecosystem complexities, while habitat monitoring offers a more holistic view of ecosystem health and may yield the first results (signals of change) in conservation projects. The choice between species and habitat monitoring also depends on practical factors like budget, expertise, and the metrics you aim to track. Learn more about the pros and cons of each approach (objective setting tool – Annex 3).

Step 3: How will monitoring be conducted?

Choose the method which you intend to monitor your selected aspect/s of biodiversity. This will be informed by the project aims, the ability of the surveyor(s) and the sensitivity of the aspect/s.





Field surveys

Sampling is conducted by restricting surveys to certain locations and by making inferences from these locations to non-surveyed.

Satellite imagery

Suitable for large-scale habitat monitoring, assessing landscape changes, and identifying ecological patterns (e.g. colour photography, laser scanning, multispectral imaging, and radar imaging).

Data Processing

Involves collating information previously collected from various socurces to obtain insights about a system which can be cost-effective monitoring method (e.g. big data, GIS, or modelling).

Step 4: Where and when will monitoring take place?

Specify spatial and temporal scales, considering factors such as land permissions, stakeholder interests, defined boundaries, budget and time constraints, and seasonality of target indicators.

Spatial scale:

- Site-based monitoring: Focuses on specific, well-defined areas; ideal for targeted studies or areas of high conservation interest.
- Landscape scale: Covers larger areas, potentially across multiple jurisdictions; suitable for understanding broader ecological impacts.
- Regional scale: Applies to large sub-national areas; often used for policy-driven monitoring or large-scale conservation programmes.
- Multi-Scale Approaches: Consider integrating data from multiple spatial scales to address ecological processes operating at different levels. JNCC Report 780 (Marion et al. 2024) provides additional information.

Temporal scale:

- Long-term vs short-term: Decide on the duration of your monitoring efforts. Long-term monitoring (>10 years) is crucial for identifying trends and long-term changes, while short-term monitoring (<5 years) might focus on immediate impacts or preliminary data.

Put your knowledge into practice

We have developed a step-by-step objective setting tool (Annex 3) to help you establish your own monitoring objectives, as well as a set of worked examples (Annex 1) to assist you with this process.

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