GUIDANCE FOR DEFINING PROJECT OBJECTIVES

Questions to consider:

- Is the main aim of your project to improve the physical processes of the river or increase the biological diversity of your section(s)?
- If your focus is to increase river forms and processes, what will be the benefit for the ecology (specific fauna and flora and, where appropriate, part(s) of life cycle(s))?
- If your focus is to increase ecological (habitat) diversity for a range of fauna and/or flora, which parts of the life cycle are you aiming to restore for and what physical river features are you expecting to develop to support this?
- Are your objectives:
    - Clear (Specific)?
    - Quantifiable (Measurable)?
    - Achievable, Realistic and Time-bound?

Developing Interrelated Objectives

An initial assessment of hydrology, sediment and water quality may indicate that implementing physical river restoration techniques will not, on its own, provide ecological gain. In such cases, it may be preferable to rectify these aspects first.

Where these other factors are not limiting, it is essential to recognise the interrelationship between ecological and hydro-morphological processes. A restoration project is often considered either in terms of restoration of natural forms and processes or improving biodiversity. Usually river restoration starts with the premise that natural process change is necessary to achieve a specific habitat function. In some cases restoring morphological diversity and dynamism is the focus, on other occasions it is specifically to address a lost habitat; in such cases, it may be necessary to restore a particular physical feature.

Figure 1 illustrates these linkages and enables the project manager to think about what a project is setting out to achieve either from a natural process or biodiversity perspective. It ensures that both aspects are considered as part of the objective setting evaluation. The two examples associated with Figure 1 demonstrate how an objective can begin to be defined that links the ecological and hydro-morphological elements together.

This process is designed to help the project manager think about the key aspects of the river restoration project and what it is setting out to achieve and to recognise the inherent complexity.

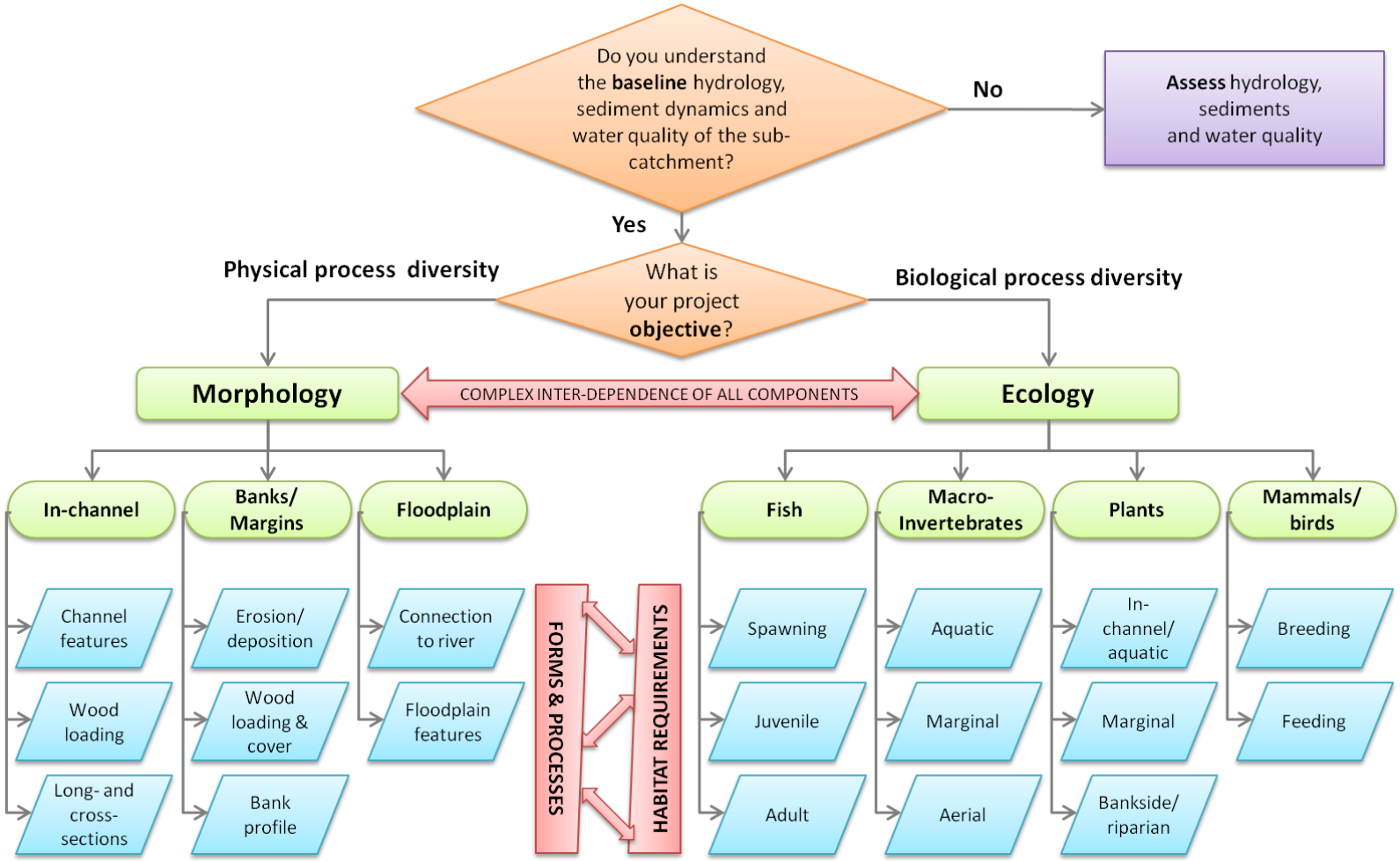
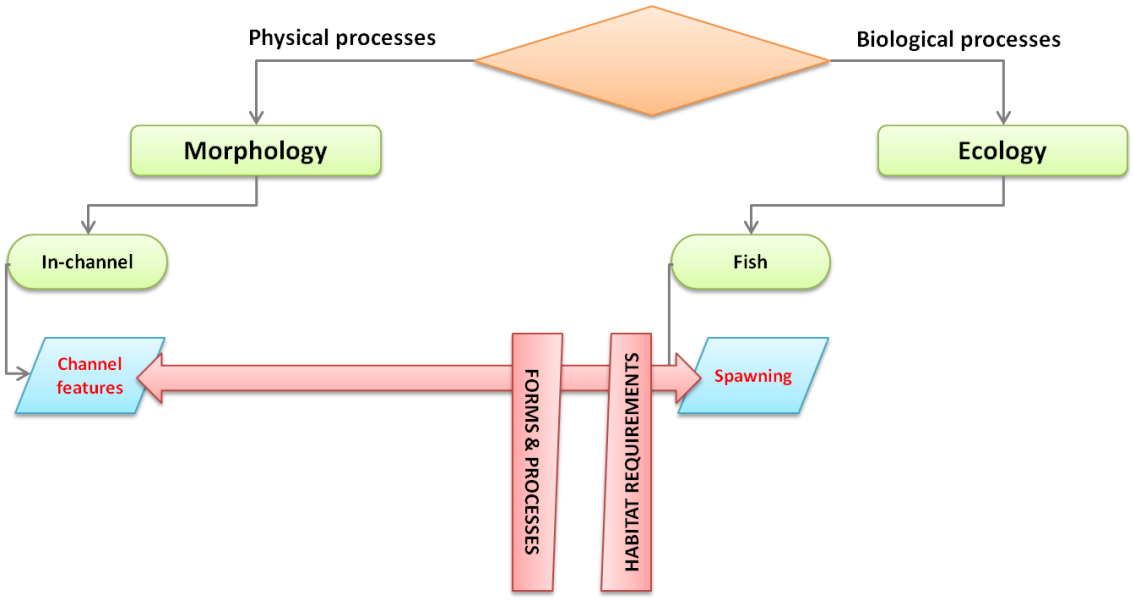


Figure 1 Objective Setting Decision Flow Chart (see examples below)

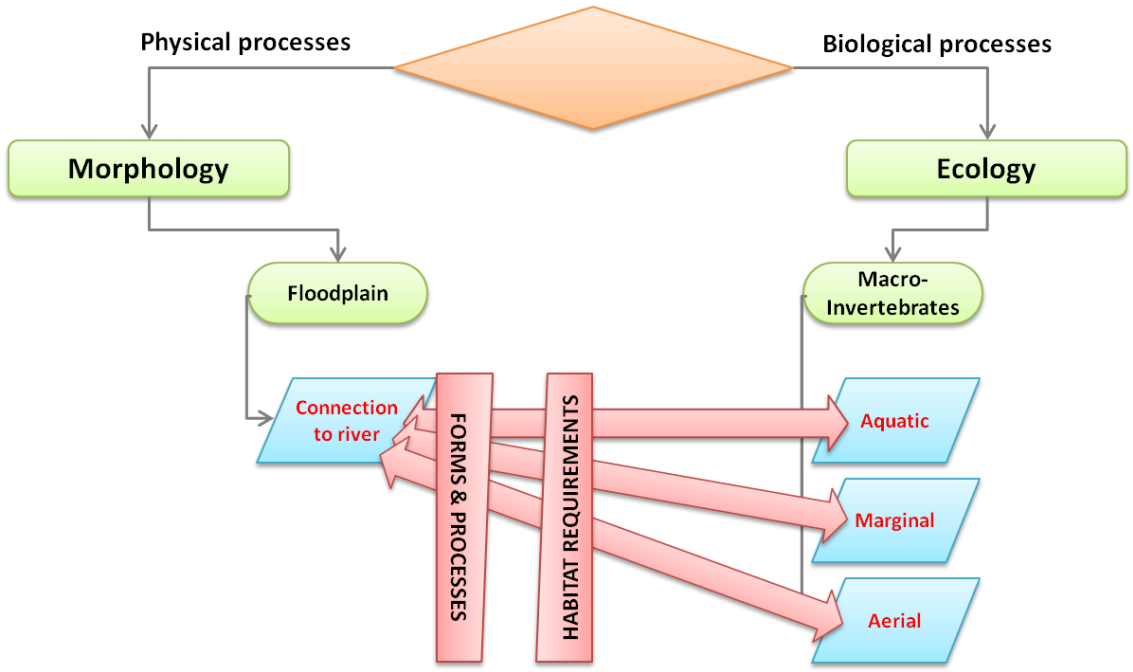
Example 1:

Aim: Increase salmonid spawning and egg survival by introducing gravels and narrowing the river to increase flow velocity variability.



Example 2:

Aim: Restore floodplain connectivity to increase habitat for all invertebrate life stages and types.



Project Objective Setting

Stage 1 – Define the Aim

Firstly determine the overall aim of the project. For example:

Restore floodplain dynamics by reconnecting to the river;
Increase in-channel habitat heterogeneity (range and diversity);
Increase salmonid spawning opportunities upstream of a weir.

You now know what you wish to achieve, but this does not define how you are going to do this or how to measure success.

Stage 2 – Specific Project Targets

This requires the overall aim to be defined as specific targets.

Aim: Restore floodplain dynamics by reconnecting to the river

- Cut a new meandering river at a new bed level to encourage a more natural floodplain connectivity flow regime.
- Plant up the floodplain.
- Ensure flood risk to any properties is not negatively affected.

Aim: Increase in-channel habitat heterogeneity

- Increase habitat diversity for macro-invertebrates by improving flow variability.
- Create refuge areas for fish.
- Encourage development of classic chalk stream habitat.

Aim: Increase salmonid spawning opportunities upstream of a weir

- Remove weir structure to restore fish passage to upstream gravel beds.
- Narrow the river to maintain clean gravels in weir location.

You can now identify your key aim(s) and specific targets in terms of river restoration techniques

Stage 3 – Set SMART Objectives

Having identified aims and targets, SMART objectives can be set as shown in the examples below. By adopting this approach questions can be asked at this point in terms of how achievable it might be to:

a) Measure the outcomes of the project

b) Define what is realistic both in terms of project size and available time/resources.

A, R & T: Determining what is *Achievable* and *Realistic* on your site, and over what *Timeframe*

The examples 1-3 below identify ***Specific*** and ***Measurable*** aspects of project objectives, but the '***A, R*** & ***T***' of the SMART process should all influence these, and apply more generically.

A What can be achieved should be determined from a review of evidence of success on other, preferably similar, sites to the one in question.

Seek advice, similar examples and perhaps develop some concept of 'reference conditions' for what you are trying to achieve, either from literature or a nearby reach within your catchment which has had minimal human intervention.

R Consider carefully your available resources (money, people, and time) and factor in longer-term post-project management which may be necessary (requirements for this will be identified through the monitoring process).

Any major concerns of stakeholders which cannot be resolved may substantially limit what is possible.

T Not only do you have to consider the duration of the project works in order to allocate your resources, but the timing may be critical.

Seasonality is a major consideration for aspects such as site access (stability of ground for supporting heavy plant); hydrology (bed and banks may not be accessible in high flows); ecological disturbance (e.g., a whole cohort of Salmon may be lost by digging up the bed during/just after the spawning season or bird nesting disturbed where floodplain work is to be completed) and establishment of vegetation.

Note*:* The following examples are designed to help with the SMART process and do not cover every option, since targets and objectives MUST be site specific.

Example 1: Restoring a floodplain

Case: Opportunity to recreate meanders on a 2 km reach through open farmland in a lowland clay catchment, to increase connectivity with the floodplain. Floodplain can then be planted with new trees which, in time, should contribute woody debris to the channel and improve biodiversity. Properties nearby must first be flood proofed.

Main targets:

- Cut a new meandering river at a new bed level to encourage a more natural floodplain connectivity flow regime.
- Plant up the floodplain.
- Ensure flood risk to any properties are not negatively affected.
- Increase habitat diversity.

SMART objectives:

- Cut new meandering channel for target reach, to **increase** *channel length* by an **appropriate** *% of the original*, **increasing** *sinuosity*.
- Design new **bed level to increase** *frequency of out-of-bank flows*.
- Plant up **riparian zone** to increase *area of* **native** *woody vegetation cover*, **established after five years**.
- Create **wet woodland in the floodplain** by planting with **native species found naturally in the catchment**, **increasing** *area of woody vegetation coverage*, whilst maintaining **open areas, after five years**.
- Create **flood bunds** around **at-risk** properties, **set-back** as far as possible from the river, to maintain **at least current** *protection standards*.
- Increase **macro-invertebrate** *diversity* by increasing **channel and floodplain** *morphological variability* **within three years** (e.g., **riffles, pools, glides, permanently and seasonally wet floodplain areas**).
- Increase *abundance* **and** *number of species* of **over-wintering wildfowl over two seasons**.

Specific

Measurable

Time-Bound

Example 2: Increasing in-channel habitat

Case: Opportunity to increase in-channel habitat in a lowland chalk catchment. There is space to create some backwater habitat, but for most of the river, current agricultural land use means that options are confined to in-channel habitat enhancement options. Creating a mosaic of habitats for fish, macro-invertebrate, macrophytes and marginal vegetation are all equally important.

Main targets:

- Create refuge areas for fish.
- Encourage development of classic chalk stream habitat.

SMART objectives:

- Excavate **two backwaters** of **greater than 2m *depth***, totaling **at least 50 m²** **in *area***.
- **Increase *variability*** in channel ***width and depth*** by **reducing *cross-sectional area* locally** in **at least eight** locations, using **appropriate techniques such as brushwood mattresses, after two growing seasons.**
- **Increase** the ***area of river bed*** **covered by Ranunculus** spp. **within two years of completion.**

Specific

Measurable

Time-Bound

Example 3: Weir removal

Case: A 2m high weir, which is an obstacle to salmonid fish, is beginning to degrade in a flashy, high energy catchment with gravel-bedded channels. There is an opportunity to remove this weir. The amount and possible impact of extensive fine and gravel sediment accumulation behind the weir will need to be investigated. It is anticipated that additional work will be needed to narrow the channel where the weir pool is currently.

Main targets:

- Remove weir structure to restore fish passage to upstream gravel beds.
- Narrow the river to maintain clean gravels in weir location.

SMART objectives:

Specific

- Increase total number of Brown Trout *spawning* on upstream gravels within two seasons.
- Increase the *total number* of fish *(abundance)* passing through the reach in November.
- Reduce *channel width* by 30% for 60 m upstream of weir location using locally-sourced, tethered wood (as a result of the project; i.e. following groundworks completion).

Measurable

Time-Bound