How to use the urban waterway factsheets

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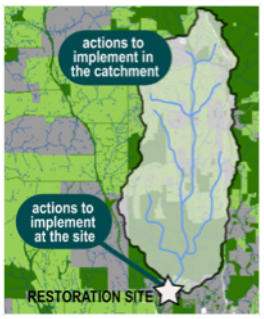
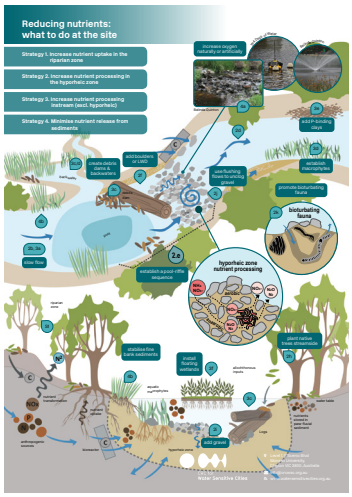
CRC for
Water Sensitive Cities

We have designed these factsheets to guide the repair or design of a living stream site on a flowing urban waterway. The site may be associated with a creek/stream channel, a constructed drain, a lowland river or a living stream built in a new urban development. The factsheets refer to the repair or design of nine different ecological components of flowing waterways: flow, geomorphology, riparian, connectivity (longitudinal, lateral, vertical), water quality (nutrients, physico-chemistry including toxicants) and biota (see next page for a description of components). For most components there are two factsheets: one for what to do at the site scale and the other for what to do at the catchment scale. We encourage practitioners to work at both spatial scales.



The factsheets summarise various actions for improving a given ecosystem component. Many, but not all of the actions are illustrated in the factsheets (see example right), with all actions listed in an adjoining table. How each action may improve the site is briefly discussed in the table, alongside a list of relevant scientific references for further information. Some of the actions may be important for your restoration site, others may not. The factsheets do not provide prescriptive advice about what actions your restoration activity should focus on (i.e. what will improve ecosystem health the most) because countless factors will dictate this. Nevertheless, the tables do provide advice on the likely effectiveness and suitability of any action given environmental factors and urban constraints. However, the information provided is general and we encourage practitioners to consult local scientific experts where possible.



The factsheets direct readers to specific technical guidelines. We also strongly encourage practitioners to seek out any technical guidelines created or adapted for their local environmental setting, before going ahead with any actions.

Prioritising factsheets

We provide a total of 13 factsheets, but which ones should you focus on, given your restoration site? A decision-support tool called RESTORE has been created to aid this process. The tool asks practitioners a range of questions about the environmental and urban setting of their restoration site and identifies the ecosystem components (i.e. factsheets) likely to be most relevant to your site or catchment.

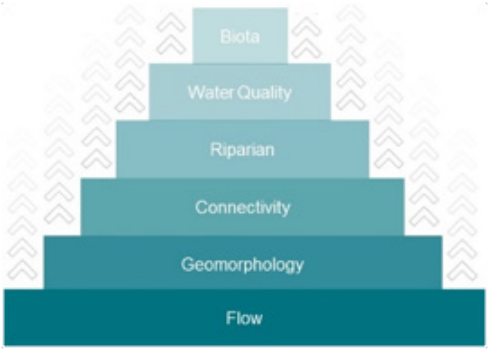
The factsheets can also be used as a standalone product. Where this is done, we encourage practitioners to prioritise the ecosystem components that are most influential – i.e. start with flow and geomorphology and work upwards (see diagram on the next page).

"Urban waterway: a waterway whose ecology and geomorphology is primarily influenced by urbanisation."

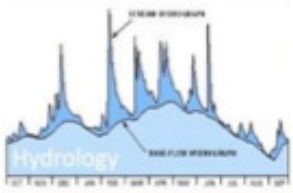
Australian Government
Department of Industry, Innovation and Science
Business Cooperative Research Centres Programme

Ecological components

The factsheets describe nine ecological components. A brief description of each component is provided below. Note: overlap in ecological role or function occurs to some extent among components.



Modified from Harmanet al., 2012

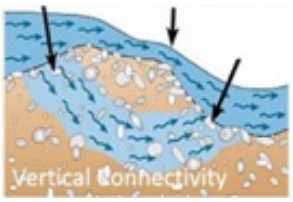


Flow – describes the volume, velocity, frequency of flow pulses, the rate of flow rise and fall, and low-flow conditions within the channel. It affects the depth and permanence of aquatic habitat, physical disturbance in the waterway and influences all of the components presented below.

Geomorphology – describes channel shape (width, depth, sinuosity), bed material and instream features (beds, bars, pools) and sedimentation. It affects the complexity of instream physical habitat, and the depth, velocity and turbidity of instream flows. It also influences lateral and vertical connectivity.

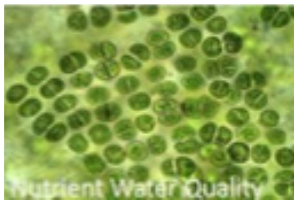
Longitudinal connectivity – describes the connectedness of flow from small headwater streams to large lowland riverine sites. It influences the movement of food along the length of the river, as well as the movement of biota both instream and on riparian land.

Lateral connectivity – describes the connectedness of flow between the main channel of the waterway and riparian land. It influences the velocity of instream flow, energetics, and nutrient and sediment trapping. It also influences riparian health and functionality.

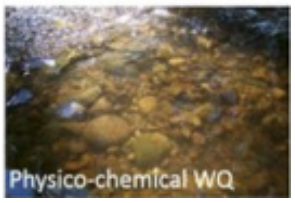


Vertical connectivity – describes the connectedness of surface and subsurface water in the channel. It influences the processing of nutrients and other pollutants, and the depth of water during periods of low flow. It can also influence water temperature and biota.

Riparian – describes the land that runs adjacent to streams and rivers along their length. It influences food inputs to the waterway and water temperature, as well as nutrient filtration, sediment trapping and instream habitat. It also influences longitudinal and lateral connectivity.



Nutrient water quality – describes the amount of nitrogen and phosphorus in the water. These influence the growth of algae and plants instream, as well as the likelihood of algal blooms and oxygen crashes.



Physico-chemical water quality – describes the temperature, oxygen, clarity, pH and conductivity of water. It influences how suitable the water is for different forms of life.

Biota – describes the number and type of species living in the waterway. It indicates the overall health of the waterway and influences its resilience to perturbations. Biota affect how energy created in the waterway is moved up the food web and can influence water quality and nutrient-processing ability.

Note:
These factsheets are generic and outline a range of potential issues and responses in urban waterways within and outside of Australia.

Supporting documents

1. Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.