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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

TECHNICAL BRIEF

Urban rivers

Tools to drive rehabilitation of urban rivers

The WRC has successfully introduced tools to determine enforcement driven rehabilitation objectives on urban river reaches.

Background

Rivers flowing through urban settings are increasingly under pressure, with many requiring rehabilitation. The enforcement driven rehabilitation of rivers, especially urban rivers, is overlooked and under-resourced.

The Suikerbosrand River, which flows through parts of Gauteng.

This project focused on enforced rehabilitation e.g. by directive, compliance notice, or court order. The research aimed to develop tools to assist officials with enforcement-driven rehabilitation.

Initiative-driven restoration projects tend to comply with environmental authorising requirements prior to initiation. However, cases of illegal or non-compliant activities requiring rehabilitation works tend to 'slip through the cracks'. Within the compliance and enforcement procedures relating to rehabilitation of riparian areas, there is little guidance and legislative requirements to determine the impacts of transgressions on the riparian environment.

Previous research observed that there appears to be reluctance among environmental authorities to give compliance advice to the regulated community for fear of being held liable for inappropriate advice. Subsequently, enforcement reporting is only quantitative, meaning that only the number of enforcement cases is reported, and no qualitative measurement of the improved state of environment as a result of enforcement interventions is reported.

Therefore, enforcement processes tend to be focused on 'legal box ticking' rather than the appropriate rehabilitation of degraded ecological functions as a result of non-compliant activities.

The need for enforced rehabilitation

Given the dynamic nature of urban rivers, as well as the plethora of activities that could degrade riparian environments and the need to identify the impacts on the receiving ecosystems and riverine functions, guidance is required both by relevant enforcement officials and transgressors.

Before setting out rehabilitation processes and activities, it is necessary to understand the different types of rehabilitation objectives, rehabilitation drivers, and the applicable scale to which they apply in order to ensure the appropriate process is followed. The desired state following rehabilitation will be captured in the goal of the rehabilitation plan, and it sets out the intention for carrying out the rehabilitation activities.

Each objective deviates from the pristine state, and when setting the objectives for rehabilitation a clear understanding of 'how far from' the pristine state the rehabilitated river reach will result needs to be clarified to avoid confusion or misrepresentation.

These objectives are defined as:
Restoration: This involves the process of returning an ecosystem as closely as possible to pre-disturbance conditions and functions.
Rehabilitation: Rehabilitation can be considered as a series of actions which make the landscape useful again after a disturbance, and usually involves the recovery of some ecosystem functions and processes in a degraded habitat.
Remediation: This terms is appropriate in cases where it is not possible to rehabilitate due to a river system being irretrievably degraded or where a system has been fundamentally altered in character. The aim of remediation is to improve the ecological condition of the river, while not aiming for an endpoint which resembles its original condition.

River functions – measuring function impact

Rehabilitation should not merely focus on 'fixing' ecosystems, but also on the services derived from the river system and its ecosystems. Ecosystem functions include the biological, geochemical, and physical processes and components that take place or occur within an ecosystem.

These services are typically grouped according to the flows of products or services provided by the ecosystem. These groups of 'flows' or functions are:

- Production functions – The ecosystem's ability to produces resources such as water supply, fish, hydropower, and so on.
- Regulation functions – The ecosystem's ability and/or capacity to regulate environmental processes such as carbon storage, flood attenuation, nutrient cycling, sediment trapping, etc.
- Carrier functions – The capacity of ecosystems to provide space for various processes to occur, such as navigation and transport, energy generation, recreation, and cultivation/
- Habitat functions – The ability and capacity of ecosystems to provide habitat, refuge, nurseries, diversity, food for species and ecosystems.
- Information/cultural functions – Ecosystems' contribution to human well-being i.e. through sense of experience, religious practice, tourism, recreation and aesthetics.

There are many existing tools, processes and methodologies to assess ecosystem and river health, however, these focus specifically on species or ecosystem health rather than the broader aspect of river functions. The scope of this research looked at the impacts of non-compliant activities to river functions.

Tools developed

In response to operational constraints and in an effort to support setting of appropriate rehabilitation objectives in enforcement driven rehabilitation, this research developed several first order tools.

Legislation search tool

A database of environmental legislation related to rivers. The database can be searched against a specific section of legislation or using a search word.

Site assessment form

After reviewing existing methodologies and processes for river visual assessments for strengths and weaknesses, a field assessment form was compiled. When officials conduct site inspections, they complete the form as part of their site report.

Dashboard tool

Based on the complete site assessment form, the selected answers are linked to indicators of basic riverine function. The dashboard tool automatically calculates the impact of the contravening activity on the riverine environment and provides a graph illustrating the negative impact per riverine function. Based on this, the official can then better inform the perpetrator as to what ecosystem functions the specialist studies and rehabilitation plan need to address.

The request for a rehabilitation plan should include three aspects:

- The functions to be rehabilitated and any necessary specialist studies;
- Environmental management plan/programme;
- Monitoring programme.

Conclusions

With the operational problems identified hindering enforcement driven rehabilitation, this research set out to develop an initial set of tools to assist environmental enforcement officials to determine the appropriate rehabilitation objectives in their administrative notices. This was done to ensure that rehabilitation activities target impacts to the urban riverine functions and do not simply legalise a contravention.

In developing these tools, existing assessment methodologies were considered, however, many focused on river health rather than river function; whereas river function is more holistic and appropriate for the context.

The process of developing the tools was an interactive and evolutionary one. Workshops with the target audiences were held during the development stages in order to ensure that the tools were tailored to the officials' requirements. This also ensured buy-in and support for the utilisation of the tools.

Further reading:

To order the reports*, Tools to determine enforcement driven rehabilitation objectives on urban river reaches* (**Report No. TT 593/14**) and the *guideline document* (**Report No. TT 594/14**) contact Publications at Tel: (012) 330-0340, Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.