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LESSON  
SERIES

September 2014

# ENFORCED REHABILITATION OF URBAN RIVER REACHES

## Tools For Enforcement-driven Rehabilitation



## NOTE

This lesson is compiled from the Water Research Commission  
**Report No: TT593 and TT594**, by Sam Braid.



To obtain the full report, contact:  
Water Research Commission  
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## 1 INTRODUCTION

In South Africa, enforcement driven rehabilitation of rivers, especially urban rivers, is overlooked and under resourced. 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.

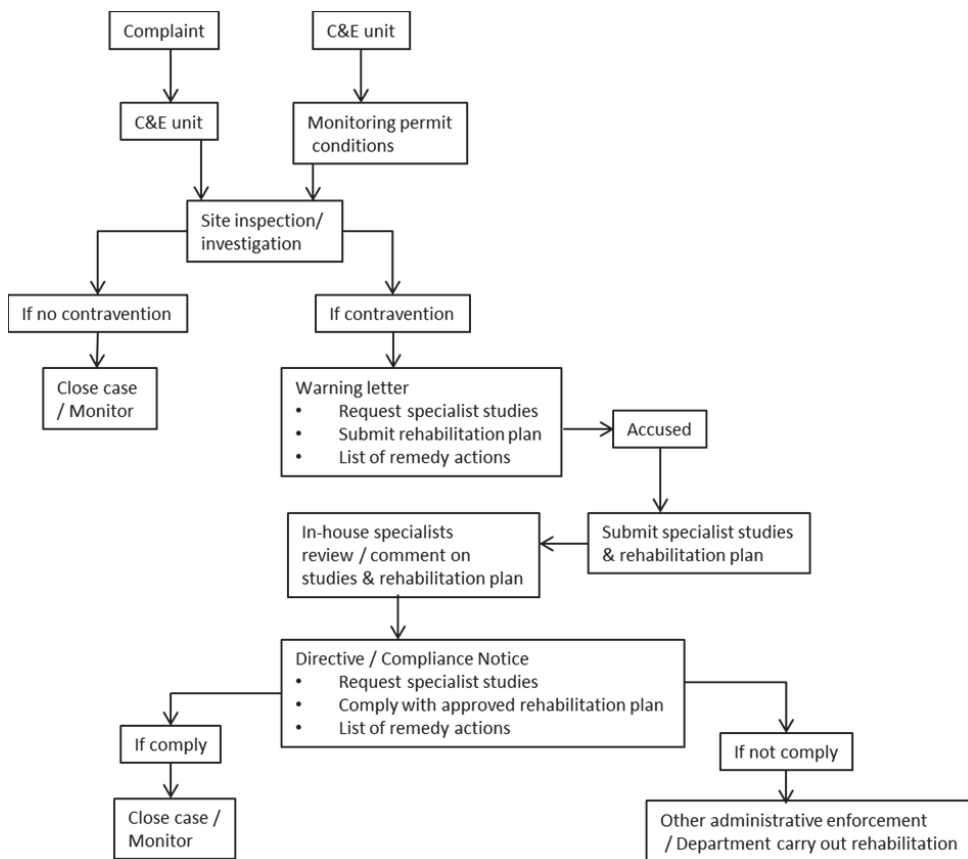
Within the concept of enforcement driven rehabilitation Chapter 3 identified several problem areas. These included the myriad of environmental legislation that officials must operate within, but they are tied to operating within the jurisdiction of their own legislation, e.g. although the National Water Act, Act 36 of 1998 (NWA) overlaps in several areas with the Conservation of Agricultural Resources Act, Act 38 of 1983 (CARA), an official from the Department of Agriculture can only operate within the mandate of the CARA and not within the NWA. Similarly, the guidance provided by the legislation in the formal authorising processes is very prescriptive and detailed, whereas there is no similar guidance in the sections pertaining to enforcement. Further, the administrative and accountability requirements and capacity and capability constraints further hinder the enforcement officials and the enforced rehabilitation process.

### The Enforcement Process

The basic enforcement process as outlined in the Environmental Management Inspectors Training Manual, as it pertains to various statutes is illustrated in Figure 3-1. The process commences with a site inspection either to monitor compliance of permit conditions, or as a result of a complaint received from the public. Should a violation be identified, the routine site inspection is upgraded to an investigation. If there is a contravention then the official issues a written warning notifying the transgressor of the Department's intention to issue an Administrative Notice (Directive or Compliance Notice). This warning notice also includes a set of instructions to remedy the contravention. These instructions may include the request for specialist studies and a requirement to submit a rehabilitation plan. However, these instructions currently do not include any guidance as to the objectives of the rehabilitation plan or remedial activities, or indicators to measure progress or achievement. Upon acceptance of these studies and rehabilitation plan the official will then issue the directive or compliance notice to carry out the rehabilitation plan. Criminal and civil prosecution may be carried out concurrently to the administrative notices, or as a result of non-compliance with the notices.

In compliance with law, the instructions of the directive or compliance notice must be the same as the instructions in the warning notice. Should new information come to light, or any necessary deviations, then the existing warning notice must be withdrawn in writing and a new warning notice with those additional requirements or deviations must be issued. Further, once a contravention has been addressed, the same contravention may not be addressed again, in other words a new offence with new evidence is required. This implies that there is only one opportunity to ensure that the appropriate rehabilitation is carried out.





*The basic enforcement process for issuing Administrative Notices (directives or compliance notices)*

In many cases, the instructions for rehabilitation are commonly issued prior to the detailed studies, resulting in substantive science only being introduced into the enforcement process by the specialist studies, after the warning notice is issued. Where in-house specialists are utilised, they are usually brought into the process too late, or only asked to review rehabilitation plans once the warning notice has already been issued. These in-house specialists are not usually included in drafting the rehabilitation objectives or requirements in the warning notices, as they are located in a separate directorate with different mandates e.g. nature conservation as opposed to compliance and enforcement activities.

In the basic day-to-day enforcement process the official provides limited, if any, guidance as to:

- the impact or the disturbance of ecological functions as a result of the contravening activity;
- objectives that the rehabilitation plan needs to achieve in order to remedy the impacts of the pollution or ecological degradation; or
- indicators to monitor progress or achievement of the rehabilitation.

## 2 WRC Tools for Enforced Rehabilitation

To address the above challenges of the enforcement driven rehabilitation process, a Water Research Commission study (**Report No: TT593**) 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 not simply legalising a contravention. In developing these tools, existing assessment methodologies were considered, however many focused on river health rather than river function, whereas river function was presented as being more holistic and relevant.

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 the tools were tailored to the official's requirements. This also provides buy-in and support for the utilisation of the tools in the future.

The tools developed are:

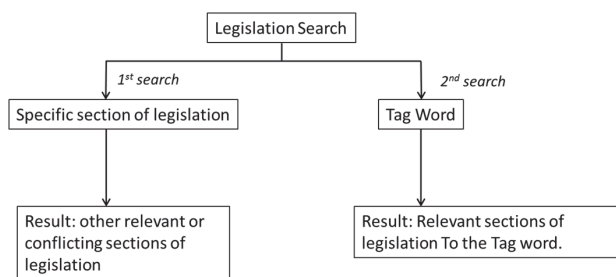
- **Site Assessment Form (SAF)** - an interactive form that the enforcement officials complete when conducting their site assessments. The completed form provides a comparable record of the state of the site on the days of inspection.
- **Dashboard Tool (DT)** - based on the completed Site Assessment Form, the selected answers are linked to indicators of basic riverine function. The DT automatically calculates the impact of the contravening activity on the riverine environment. 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.

### i. Legislation Search Tool (LST)

The South African environmental legislation affecting riverine systems is both complex and overlapping and at times contradictory. As enforcement officials are only mandated to work within the jurisdiction of their allocated legislation, a tool was developed to assist officials in identifying overlaps with other legislation and therefore overlaps in jurisdiction with other institutions.

A review was conducted of all the applicable South African national environmental legislation. The review identified sections of the legislation that were relevant to rehabilitation activities in urban rivers, authorising processes and enforcement mechanisms.

The Legislation Search Tool provides two types of search functions as illustrated in the figure below. The first is where the user is familiar with a particular section of legislation, and the second where the user selects a word to identify what legislation they are looking for.



Legislation search flow diagram

In the first search type – by section of legislation, Figure 4-2, the user selects the particular section of legislation they are familiar with, in the left hand pane Figure 4-3. This is selected from the drop-down menus of the legislation and regulations. Then they scroll through the sections to the appropriate section. The user “clicks” on the appropriate section, and on the right hand pane the other applicable legislation will appear, as shown below.

In the second search type – by tag, the user “clicks” on the Tag search label, then selects the appropriate word from the list of words on the left hand pane. Once selected, the relevant sections of legislation to the selected word will appear in the right hand pan

In both search options the right hand pane can be expanded in size and the user can scroll through the columns. The information presented

includes the particular Act, the section number, the section text, other search word tags that are linked to that particular section, as well as the sphere of government responsible for that particular section of legislation. The search results can be printed.

**Note: A detailed user manual is included in the Guideline Document, available from WRC.**

### Implementation of the LST

Two programmes were developed for this tool. The first programme provides for the capturing and editing of legislation (Legislation Edit). The second programme conducts the search of the database (Legislation Search). The editing programme will be provided to the institution that takes ownership for the programme and will be responsible for the maintenance and updating of the database. This will prevent different edited versions of the database being used by different institutions. The search (Legislation Search) programme will be made available to all users.

Users may be required by the owning organisation to register on a database for the tool. This is in order to collect contact details, when the database is updated, the updated version could be circulated to the existing registered users. There are no licence or operating system requirements to run both of the programmes. The user requires a basic computer. The installation instructions are included in the Guideline Document, available from the Water Research Commission.

**Note:**

The LST database currently only captures the national environmental legislation. However provincial/geographic specific legislation and regulations may also still be applicable as well as municipal by-laws. These were purposefully excluded from the scope of the initial tool development. However further future development of the tool should include this detail as well.

The legislation is regularly being updated, and the listed activities identified in the different statutes, especially the NEMA, are regularly being amended. This will require the continued maintenance of the database to ensure it is kept up-to-date with any amendments in the legislation. At the time of developing the tool, it was recommended to the Department of Environmental Affairs to take ownership of this maintenance. This has not been confirmed to date.

## ii. Site Assessment Form (SAF)

When conducting site inspections, there is a Standard Operating Procedure (SOP) for Environmental Management Inspectors (EMIs). This SOP, however, does not specify what indicators to assess to determine the resultant environmental impact of non-compliant activities but rather serves as a guide as how to record samples, photos, protocols etc. Further as different institutions have differing objectives the information they are inspecting may differ between enforcement officials. In an effort to standardise site assessments that involve urban rivers this research develop a Site Assessment Form (SAF). The SAF provides the uniform collection of information regarding impacts to the river by all enforcement officials. The form will serve as part of the site inspection report and additional notes, photos, etc. can still be attached to the form. As the form is standardised this enables easy comparison of results between the initial inspection and follow-up monitoring inspections. Further should there be a change in officials dealing with the case the original inspection observations are

easily and clearly reported on. This is based on “layman” science, to cater for the current skills of enforcement officials.

### Site Assessment Procedure

When responding to a complaint or compliance inspection, the officials should conduct a site assessment as part of the initial site inspection. This involves completing the Site Assessment Form while inspecting the activities on site. Additional notes (including photos, sample results, etc.) from the site inspection should be attached to the completed Site Assessment Form to compile the site inspection report. A site assessment should be conducted for the specific site, as well as for a site further upstream on the same river in order to provide a reference point.

When back in the office it is important for the officials to check whether the activities in question also fall into the jurisdiction of adjacent legislation and institutions, this can be done by carrying out a search on the Legislation Search Tool. Once the Site Assessment Form is completed electronically, the Dashboard Tool

will indicate the disturbances, by which activities, to the riverine functions on the specific site. Based on the findings of the Site Assessment Form and the result of the Dashboard Tool, the officials can draft the warning letter and request the necessary specialist studies to be carried out to inform the rehabilitation plan.

**Note:**

When considering the criteria and indicators to be included in the SAF aquatic invertebrates was initially considered as well as diatoms, however due to the complexity of assessing the invertebrates and the time and cost in analysing diatoms, it was decided to remove these criteria from the Site Assessment Tool, but that they should rather be available as specialist studies should they be required. The indicators and measures used in the SAF were drawn from existing assessment methodologies and easily observable indications on a site.

The Guideline Document (available from WRC) explains the different indicators and includes pictures to illustrate the difference in measures. These indicators and measures were discussed with various specialists such as water quality specialist, botanist, aquatic ecologist and fluvial geomorphologist, and adjusted appropriately.

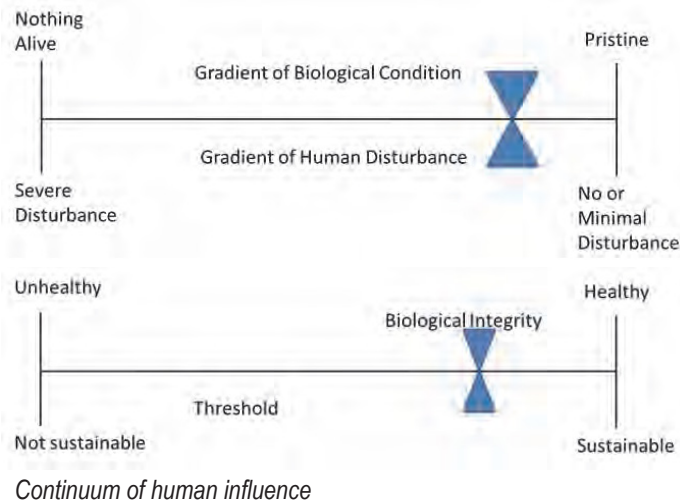
The SAF provides a detailed site assessment report, which can be easily understood by various officials, including those not having seen the site. This is particularly important, where there is staff-turnover, to ensure continuity of the rehabilitation objective.

### iii. Dashboard Tool (DT)

“By measuring biological condition and evaluating the result as a divergence from baseline biological integrity, we can thus focus on the most integrative, biological endpoint.” (Karr, 1999:225) By measuring the ability of the site to provide ecosystem services/functions as a divergence from the baseline, we can focus on the most impacted riverine functions for rehabilitation.

Karr (1999:223) suggests that “at one end of a continuum of human influence on biological condition, severe disturbance eliminates all life; at the other end of the gradient are pristine, or minimally disturbed living systems. A parallel gradient, from integrity towards nothing alive, passes through healthy, or sustainable, conditions or activities. Below a threshold defined by specific criteria, the conditions or activities are no longer healthy or sustainable in terms of supporting living systems.” These changes such as human activities in the watershed alter the river’s biota and thus the entire biological context of the river, causing it to diverge from integrity.





Therefore the Dashboard is based on Karr's concept, where healthy ecosystem functions is set as the baseline, and disturbance is measured along the gradient away from the baseline, based on the indicators of the SAF.

The purpose of the Dashboard Tool is to provide environmental enforcement officials with a visual indication of the impacts to the riverine ecosystem functions as a result of activities on the site, and thereby determine areas for rehabilitation.

### Implementation of the DT

The calculations in the DT are a "back-office" function of the tool, and do not require the user to carry out any calculations. The official completes the Site Assessment Form on site and when back in the office, then captures it into

the DT in the Impact Form (which is identical to the Field Form), and then reviews the produced graphs in the Dashboard.

The enforcement official is required to describe which activities are taking place on the site, from a prescribed list of activities. The prescribed list is based on activities that require authorisation in the environmental legislation (e.g. the NEMA, NWA and CARA).

The DT starts with completing the Site Assessment Form. Using the SAF completed on site, the official then completes the Impact Form in the DT on their computer. This is completed by selecting the appropriate "answers" or descriptions from the drop-down lists that best describe the site for each of the indicators as observed on site.

#### Note:

The scores attached to the measures, and the various weightings attached to the indicators and activities were derived from the literature and existing methodologies. These were adjusted based on the outcomes of the case studies and testing. The Tool was designed to provide a rough indication as to the impacts to riverine functions, and a more fine-tuned assessment would result from the specialist studies. This tool successfully provides that indication. Future work could test this tool in broader context and refine the weightings a little bit more.

## 3 CONCLUSION

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, many of which focused on river health rather than river function.

**NOTE:** The WRC is currently working on a comprehensive River Rehabilitation Manual (a step by step guide) taking this initial study further into practise. This manual will be available from WRC in 2015/16.

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