'Triple-bottom-line' assessment of urban stormwater projects

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ABSTRACT
New guidelines have been developed and trialled in Australia to assist urban stormwater managers to assess options for projects that aim to improve urban waterway health. These guidelines help users to examine the financial, ecological and social dimensions of projects (i.e. the so-called 'triple-bottom-line'). Features of the assessment process described in the guidelines include use of multi criteria analysis, input from technical experts as well as non-technical stakeholders, and provision of three alternative levels of assessment to suit stormwater managers with differing needs and resources.

This paper firstly provides a background to the new guidelines and triple-bottom-line assessment. The assessment methodology promoted in the new guidelines is then briefly summarised. This methodology is compared and contrasted with European guidelines from the 'SWARD' project that have been primarily developed for assessing the relative sustainability of options involving urban water supply and sewerage assets. Finally, the paper discusses how assessment methodologies that evaluate the financial, ecological and social dimensions of projects can, under some circumstances, be used to evaluate the *relative progress* of options for urban water management on a journey towards the widely pursued, but vaguely defined goal of 'sustainable development'.

KEYWORDS
Triple-bottom-line; urban stormwater; assessment; multi criteria analysis; sustainability

INTRODUCTION

Aims of this paper
This paper aims to:

- Provide an overview of a recently developed Australian methodology that can be used to assess the ecological, social and financial dimensions of options generated by urban stormwater projects that aim to improve waterway health.
- Compare and contrast the Australian methodology with similar European guidelines that have been developed primarily for decisions involving water supply and sewerage assets.
- Discuss the use of triple-bottom-line (TBL) assessment methodologies as a tool to evaluate the relative sustainability of options for urban water management.

Background to the project

From 2003 to 2005 a research project was undertaken by the Cooperative Research Centre for Catchment Hydrology (CRC) entitled 'Tools for Evaluating the Economic and Social Performance of Stormwater Management Measures'. This project developed and trialled two main products:

- A life cycle costing module in version 3 of the CRC's MUSIC model (Model for Urban Stormwater Improvement Conceptualisation: see www.toolkit.net.au) that allows users to easily predict likely costs associated with proposed structural stormwater measures to improve urban waterway health (for more details, see Taylor, 2005a).
- Triple-bottom-line assessment guidelines (Taylor, 2005b) for stormwater projects which are proposed to improve urban waterway health (the focus of this paper).

The need for a triple-bottom-line assessment tool

Increasingly, urban stormwater managers in Australia need to make decisions about the use of stormwater management measures that improve waterway health (e.g. constructed wetlands, bioretention systems, non-structural measures, etc.) within the context of the TBL. That is, such decisions need to be made after a careful review of many financial, social and ecological considerations.

The Australian TBL assessment guidelines have been developed primarily for use by local government authorities and major drainage authorities who are responsible for urban stormwater management and assets. Feedback from local government authorities early in the project indicated that the guidelines needed to:

- be as simple and as practical as possible;
- be flexible so that they could be used for small and large projects;
- include specific examples of how the process can be used for typical *stormwater* projects; and
- accommodate the needs of stormwater managers who have little time to run the assessment process, as well as limited expertise and funds to undertake local data gathering exercises (e.g. social surveys, modelling, environmental evaluations, etc.).

Background to the triple-bottom-line approach

The term 'triple-bottom-line' was first coined by Elkington (1999). In practice, TBL frameworks are flexible tools that can be used for corporate planning, corporate reporting and assessment / decision making, where one of the primary objectives of the user is progress towards the lofty, but often poorly defined goal of 'sustainable development'.

A move towards assessment methodologies that incorporate financial, ecological and social dimensions is occurring in organisations around the world (Environment Australia, 2003; ICLEI, 2003; Clarke, 2001). Sometimes these methodologies also incorporate an element of public participation (e.g. stakeholder involvement in the TBL assessment process or at the very least, stakeholder consultation during the assessment). The importance of public participation in the delivery of 'more sustainable' urban water management initiatives is now well recognised, especially those techniques that create an information-rich environment for deliberation and learning (Marks, 2004).

Potential benefits of a TBL approach to assessment include:

- The framework can help to align an organisation's visions, values and actions / projects.
- The process can help to improve stakeholder relations through the use of open communication channels and participation techniques, as well as greater transparency and accountability.
- The process can help improve communication pathways within organisations, helping to breakdown 'silos' that may exist around functional groups or disciplines, as well as build knowledge and dispel myths.
- The process can be designed to utilise and share the knowledge and views of technical experts as well as non-technical stakeholders (including the general public).
- The process can help to identify and consider the trade-offs between, or relative importance of, the different 'bottom lines' of an organisation (Ministry for the Environment, 2002).
- TBL assessment processes that use multi criteria analysis can manage *qualitative* and *quantitative* information and involve deliberative public participation methods to create a learning environment that can help to "bridge the gap between calculation and communication" (Holz *et al.*, 2004, p. 47). Such processes can be an attractive alternative to cost-benefit analysis that seeks place a dollar value on all costs and benefits.
- The use of a TBL assessment process involving multi criteria analysis can assist urban stormwater managers to make more systematic, informed, holistic, participatory, transparent, multidisciplinary, defendable, socially acceptable, ecologically sustainable and cost-effective decisions (Taylor, 2005a).

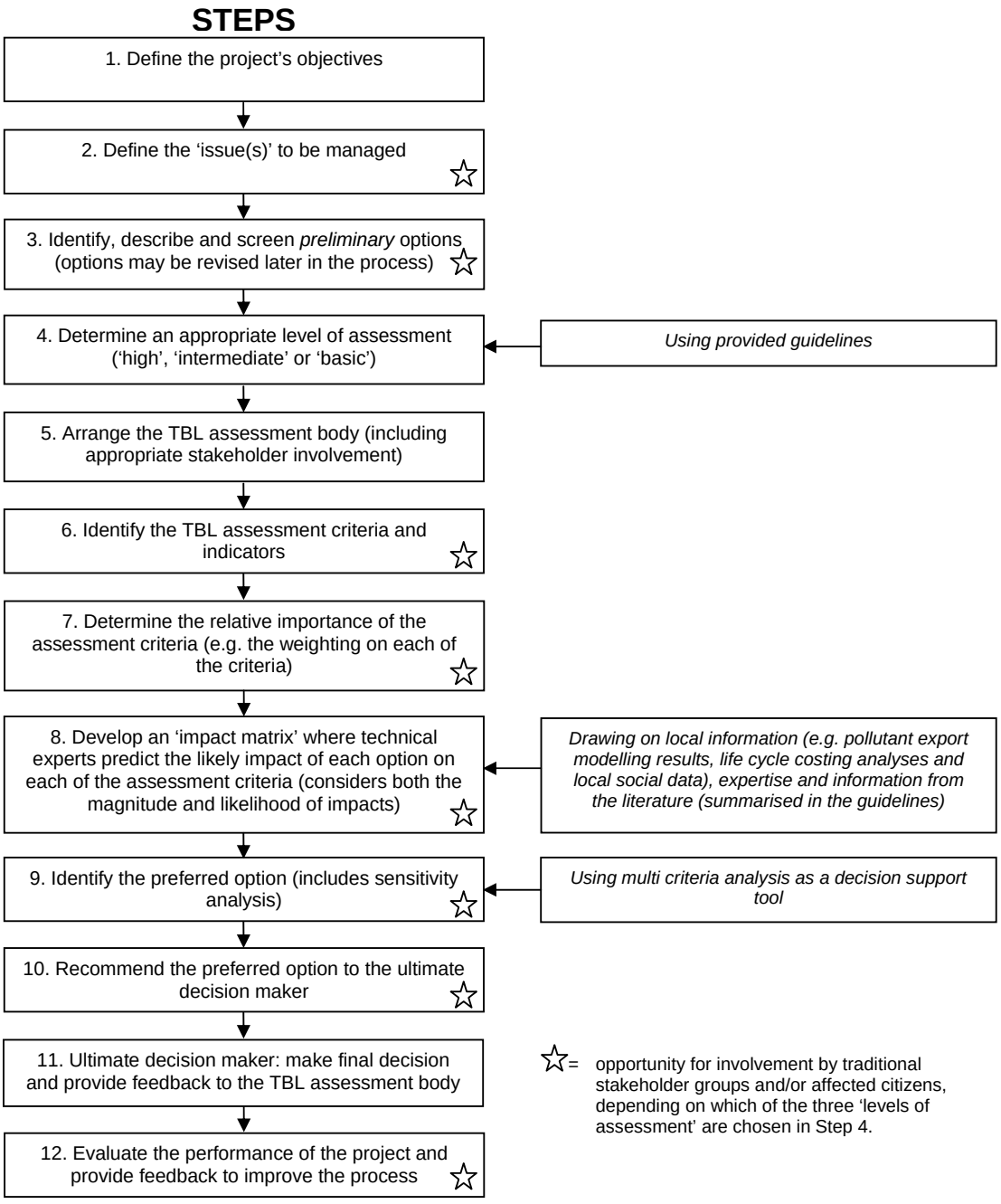
TBL assessment processes also have their weaknesses, although these do not appear to be hindering their popularity at present within Australia. These include: the resources needed to undertake the assessment process; the complexity that can be generated if many assessment criteria and/or stakeholders are involved; and no guarantee of a 'sustainable' outcome.

Recent examples where TBL assessments involving multi criteria analysis have been successfully used in the context of Australian urban water management include:

- CSIRO's Geelong Region Stormwater Reuse Project (Maheepala *et al.*, 2004), which involved a TBL multi criteria analysis to select an option using assessment criteria that were based on principles of sustainable development.
- The Waterfuture Project in the Pimpama Coomera region of the Gold Coast where a TBL multi criteria analysis was used to evaluate integrated water cycle management options at the master planning level (GCCC, 2003).
- The City of Melbourne's sustainability assessment process for proposed capital works (City of Melbourne, 2004).
- A TBL multi criteria analysis to screen potential 'best management practices' that could be used on the Swan Coastal Plain in Perth to minimise the discharge of nutrients in stormwater and groundwater to sensitive receiving water bodies (Parsons Brinkerhoff and Ecological Engineering, 2004).

OVERVIEW OF THE ASSESSMENT PROCESS

The new TBL assessment methodology for stormwater projects is summarised in Figure 1. This methodology incorporates knowledge from many case studies and papers, the most significant of which are Renn *et al.* (1993), Land and Water Australia (2001), Gold Coast City Council (2003) and Ashley *et al.* (2004).



Note: Steps in the assessment process may need to be repeated in an iterative manner (e.g. initial weightings on assessment criteria may need to be revised to accommodate views held by the assessment body that evolve throughout the process).

Figure 1. Overview of the new TBL assessment methodology for urban stormwater projects (source: Taylor, 2005b).

COMPARISON WITH THE 'SWARD' PROCESS

The procedural guide for sustainable water services produced by the Sustainable Water industry Asset Resource Decisions (SWARD) project (Ashley *et al.*, 2004) is a well-known, European assessment guideline aimed primarily at major decisions involving water and sewerage assets. The CRC's TBL assessment guidelines for stormwater projects benefited from the findings of the SWARD project and has many similarities. These include:

- Both processes are multi objective decision support systems that encourage the use of multi criteria analysis techniques to rank options.
- The major steps in both processes (e.g. those in Figure 1) are similar.
- Both processes encourage criteria to be developed to assess the economic / financial, environmental / ecological and social dimensions of projects to reflect the three core objectives of sustainable development (although the SWARD process creates an additional technical dimension).
- Both processes encourage flexibility in the use of the guidelines (e.g. suggest a range of tools and techniques to support each assessment step).

There are however some significant differences. These include:

- The CRC's guidelines outline an assessment process for three alternative 'levels of assessment' ('high', 'intermediate' and 'basic'), corresponding to projects of differing size, complexity and potential impact. The guidelines provide simple advice on how to choose the most appropriate level of assessment for a given project. This feature ensures that the guidelines remain practical for users with modest needs and resources.
- The CRC's guidelines encourage significantly greater input from affected non-technical stakeholders (e.g. local residents that may be directly affected and traditional stakeholder groups). Depending on the 'level of assessment' chosen, members of the public may even be involved in the assessment process through the use of public participation methods such as Small Deliberative Panels (essentially scaled-down Citizen Juries). The CRC's guidelines also explicitly seek non-technical stakeholder input when assessing the relative importance of the assessment criteria, while technical experts assess the performance of each option against the criteria. This point of difference may reflect the significant *local impact* that stormwater assets such as large constructed wetlands in residential areas may have on the community.
- The CRC's guidelines have been tailored for urban stormwater managers, so that the examples, suggested criteria, supporting models, etc. are all highly relevant to stormwater projects (and thus may be less suitable for water and wastewater projects).
- A risk assessment element is built into the CRC's guidelines. When technical experts construct an 'impact matrix' to determine how each option performs against the assessment criteria, they consider the estimated magnitude of performance *as well as* the likelihood of this performance being delivered over the project's life cycle. This is important, as there may be considerable uncertainty associated with aspects such as the *long-term* pollutant removal performance of relatively new types of stormwater treatment systems.
- The CRC's guidelines encourage the generation of assessment criteria that reflect the project's specific, local objectives (e.g. to minimise the risk of a child drowning in a stormwater asset) as well as the broad objectives and principles of 'sustainable development' (e.g. to achieve inter-generational equity).

- The CRC's guidelines encourage assessment criteria to be structured under the broad headings of 'financial', 'ecological' and 'social' (to reflect the three objectives of Australia's National Strategy for Ecologically Sustainable Development [DEH, 1992]), whereas the SWARD guidelines use 'economic', 'environmental', 'social' and 'technical'. While much attention is paid in the literature on the categorisation of assessment criteria under various headings, what *really* matters is whether the assessment criteria reflect the project's objectives and whether the weightings on each criterion adequately reflect the views of stakeholders.
- The CRC's guidelines provide information on nine public participation methods to support basic, intermediate and high-level assessment processes.
- The CRC's guidelines provide a large amount of condensed information from the literature on potential costs and benefits associated with stormwater projects (e.g. results from studies that examined the effect of various designs on residential property prices, people's willingness to pay for water quality improvement in urban areas, community acceptance of alternative stormwater designs, etc.). This information is provided to help stormwater managers make *qualitative* assessments in the absence of significant resources to undertake *local* social surveys, local environmental valuation studies and/or life cycle assessments.

USE AS A SUSTAINABILITY ASSESSMENT TOOL

Occasionally, TBL assessment systems are promoted as tools that will help to identify a 'sustainable option' for an urban water management problem. There are several flaws with this suggestion.

Firstly, there is considerable uncertainty over what a truly 'sustainable' water management solution is (Ashley *et al.,* 2002a). Consider the core objectives of Australia's National Strategy for Ecologically Sustainable Development (DEH, 1992):

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations.
- To provide equity within and between generations.
- To protect biological diversity and maintain essential ecological processes and life-support systems.

Such vague objectives of sustainability result in uncertainty over the exact *destination* that water managers must work towards, but a relatively clear understanding of the *direction* that journey must take. Consequently, urban water managers are seeking to determine 'comparative sustainability' (see Ashley *et al.,* 2002b), that is, to determine which options are furthest along the journey towards the lofty but ill-defined goal of 'sustainable development'. TBL assessment methodologies are a tool that can be used to do this, but they do not *guarantee* an outcome that is sustainable in terms of the local economy, ecology and/or social well-being (Donnelly and Boyle, 2004).

Secondly, TBL assessments only evaluate relative sustainability in a meaningful manner if the assessment criteria are deliberately aligned with widely accepted objectives and principles for sustainability and options that clearly fail to meet any of these objectives / principles are eliminated from the process.

Finally, it is incorrect to assume that a well designed TBL assessment process will always identify a good option. For example, a TBL assessment process may highlight one option as being the best of several very bad alternatives. For urban stormwater projects, good outcomes are likely to occur if the TBL assessment process is supported by:

- a clear organisational (or regional) strategic vision with objectives that address the three elements of the TBL (e.g. a vision and objectives for sustainable development), as clarity on these aspects is needed during the assessment process;
- thorough and effective processes to identify projects that require TBL assessment and are scoped so that innovative options can be generated during the assessment process;
- the necessary resources to properly run the assessment process (e.g. time, money, skills and information); and
- an organisational culture that is prepared to invest in a structured, transparent and rigorous assessment process, involving stakeholders with varying skills and opinions.

CONCLUSIONS

The CRC's TBL assessment guidelines for environmentally-focussed urban stormwater projects provide a new tool for water managers. This tool can be used when the financial, ecological and social dimensions of projects with several alternatives need to be carefully evaluated. The guidelines provide a useful companion to equivalent European (SWARD) assessment guidelines that primarily assist decisions involving water and sewerage-related assets.

The new TBL assessment guidelines for stormwater projects use the same basic approach as the European guidelines, but include some important differences which reflect the local nature of decisions involving stormwater projects, particularly those involving residential neighbourhoods. These differences include: greater input from non-technical stakeholders; three levels of assessment to cater for users with different assessment needs and available resources; the provision of information from the literature that can be used in lieu of local data where resources are limited; and the inclusion of a risk assessment element in the assessment process where each option is being assessed against the assessment criteria to allow for uncertainty.

Care is needed in the language surrounding sustainable urban water management and TBL assessment methodologies so that stakeholders do not get the impression that such assessment methods are a recipe for sustainable outcomes. TBL assessment methodologies can be used to determine which option, from a set of options, best meets a project's objectives, where these objectives incorporate financial, ecological and social elements. In some cases, these objectives can be clearly aligned with widely accepted objectives and principles for sustainable development, so that the assessment system can be used as a broad indicator of the options' *relative* progress on the journey towards the elusive goal of sustainable development.

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