

Selecting environmental indicator for use in strategic environmental assessment

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Abstract

The primary aim of carrying out Strategic Environmental Assessment (SEA) is to provide for a high level of environmental protection and to integrate environmental considerations into the planning process. The SEA Directive (2001/42/EC) recommends monitoring to determine the environmental impact of the implementation of plans and programmes. Environmental indicators are a useful tool by which this impact may be measured. However, careful consideration must be given to developing a set of indicators in order to isolate, plan or programme specific impacts. Here, we demonstrate the effectiveness of a workshop-based approach to develop appropriate criteria for selecting environmental indicator for use in SEA. A multi-disciplinary team was used in the approach which consisted of representatives from each of four environmental fields i.e. biodiversity, water, air and climatic factors, together with SEA experts, planning experts, academics and consultants. The team reviewed various sets of criteria, already in existence, for environmental indicator development but not specifically for SEA indicators. The results of this review together with original criteria were applied to the final list agreed upon. Some of the criteria recommended includes, relevance to plan, ability to prioritise, and ability to identify conflict with other plan or SEA objectives.

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1. Introduction

The use of environmental indicators at the national, regional, local and field level has become a common assessment tool (Bockstaller and Girardin, 2003). There is a growing need to establish appropriate environmental indicators to allow decision makers to make informed judgements

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regarding policies, programs, plans and projects (Cloquell-Ballester et al., 2006). The European Environment Agency's (2005) definition of an indicator is 'a measure, generally quantitative, that can be used to illustrate and communicate complex phenomena simply, including trends and progress over time. An indicator provides a clue to a matter of larger significance or makes perceptible a trend or phenomenon that is not immediately detectable. An indicator is a sign or symptom that makes something known with a reasonable degree of certainty and reveals, gives evidence, and its significance extends beyond what is actually measured to a larger phenomenon of interest.' In other words, indicators are measurable aspects of a project/environment/society that can be used to monitor its progress or direction (www.stats.govt.nz/products-and-services/user-guides/indicator-guidelines). The US Environmental Protection Agency together with the US Geological Survey define an *environmental* indicator to be 'a measurable feature or features that provide managerial and scientifically useful evidence of environmental and ecosystem quality or reliable evidence of trends in quality'. Consequently, environmental indicators should be measurable, scientifically valid and capable of providing information for management decision-making. In Strategic Environmental Assessment (SEA) environmental indicators may be used to demonstrate the changes in environmental quality resulting from the implementation of plans and programmes. Indicators must provide appropriate information to enable the objectives and targets, of the SEA, to be addressed. In addition, Cloquell-Ballester et al. (2006) suggest that indicators should be validated and accepted beforehand by participants and stakeholders of any impact assessment process. Therefore, it is useful to establish a set of criteria that can be used to select environmental indicators for use in SEA.

A key function of an indicator is to reduce the volume and complexity of information which is required by decision makers. For example, air or water quality indices are generally used as a measure of pollution; they usually imply that the better the air or water quality the less pollution. However, behind these indices are complex data on concentrations of chemicals or particulate matter in the receiving body. In order to make decisions, the decision maker needs to know if the air quality is a threat to human health or agricultural crops or if water is fit to bathe in, drinkable or can sustain a sensitive fish community. It is not necessary for the decision maker to know the detail behind these indices but it is the job of the indicator to relay this complex information in an accurate and understandable manner in order for informed decisions to be taken.

Many sets of indicators exist that have been developed to address specific environmental issues. Some of these include the OECD core set of environmental indicators (OECD, 2004) which consists of about 50 indicators covering issues that reflect the main environmental concerns in OECD countries. These indicators, and many others, are classified using the Pressure-State-Response (PSR) model composed of indicators of environmental pressures (direct and indirect), environmental condition (state) and society's response. In addition, the OECD provide a list of key environmental indicators which is a reduced set of their core indicators that serve communication purposes to inform the general public and provide key signals to policy-makers (OECD, 2004). Furthermore, the European Environment Agency (EEA) have also developed a core set of environmental indicators, 37 in total, which have been developed to provide a manageable and stable basis for indicator based reporting by the EEA, to prioritise improvements in the quality and geographical coverage of data flows and to streamline EEA contributions to other European and global indicator initiatives, such as, EU structural indicators and OECD environmental indicators (EEA, 2005). There is of course substantial overlap between these sets of indicators and each set has slightly different criteria associated with it or it may cover a different geographical area such as worldwide (OECD) or European (EEA), nevertheless all sets are deemed necessary.

As described above, of the similarities between the OECD and the EEA core sets of indicators, it is rarely possible to take one set of indicators and use it for another purpose. The reason for this is in

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