Available online at www.sciencedirect.com
ScienceDirect
Environmental Impact Assessment Review 28 (2008) 439–454
Environmental Impact Assessment Review
www.elsevier.com/locate/eiar

# EcoEffect for outdoor environments; the process of tool development

Ulla Myhr [a,*], Rolf Johansson [b,1]

[a] Department of Urban and Rural Development, P.O. Box 7012, SE-750 07 UPPSALA, Sweden
[b] Royal Institute of Technology, Built Environment Analysis, SE-100 44 Stockholm, Sweden

Received 18 December 2006; received in revised form 27 August 2007; accepted 4 September 2007
Available online 21 December 2007

**Abstract**

Numerous evaluation tools for the built environment have been developed in recent decades only some however integrate the outdoor environment. In *EcoEffect*, a Swedish assessment system, the outdoor environment is one of five areas covered. The purpose of this article is to describe and discuss various issues that evolved during the testing and developing phase of the *EcoEffect Outdoor* tool. The tool is designed to cover all important health risks to people in an outdoor environment, to show the relationship between circumstances in the outdoor environment and the levels specified in Swedish legislation and to enable a speedy and accurate assessment of the outdoor environment on a property. The work has been carried out in cooperation with experts, residents and representatives of the construction and property sectors. The tool has been tested on existing properties, discussed in focus groups, and has been subject to theoretical development. The results have provided a basis for changing both the *EcoEffect Outdoors* tool and the framework of the *EcoEffect* system. Important conclusions here include the notion that a clear account should be given of the fundamental values of the tool, that environmental impact should be reported in the same way throughout the whole assessment process and that the tool has to adhere to both scientific and practical validity to be useful for the building sector.


*Keywords:* Tool development; Environmental assessment tool; Property-level assessment; Outdoor environment

## 1. Introduction

Both local authorities and the construction and property sector globally are currently searching for workable methods and tools for the environmental assessment of the built environment: the buildings and the outdoor environments. The past twenty years have seen the emergence of many different tools for the assessment of buildings. Tools assessing buildings have been elaborated in many countries, however, there are few tools having *both* the building *and* the outdoor environment in a property as the subject of their calculations in respect of environmental impact. One of the best known assessment tools for buildings, which also addresses the outdoor environment is *Breeam* (BRE, 2004), which was developed in Great Britain. Other tools designed to address outdoor issues include *Casbee*, Japan (Casbee, No year) and *Ecoprofile*, Norway (Dyrstad Pettersen, 2000) as well as an international effort based in Canada, *GBTool* (Cole and Larsson, 1999). *EcoEffect* is a Swedish property-level

* Corresponding author. Tel.: +46 18 67 25 87 (direct) or +46 18 67 10 00.
*E-mail addresses:* ulla.myhr@sol.slu.se (U. Myhr), rolfj@infra.kth.se (R. Johansson).
[1] Tel.: +46 8 7908498.

0195-9255/$ - see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1016/j.eiar.2007.09.001

assessment system including both the building and the outdoor environment (Glaumann, 1999).

This paper discusses and describes the main issues that emerged during the testing of the outdoor assessment tool within *EcoEffect*, describing also how these issues were resolved through the redevelopment and broadening of the tool. A preliminary tool, *EcoEffect Outdoors-1* (EEO-1) (Florgård, 2000) was tested, discussed and compared to pertinent literature. Changes were adopted and the tool was developed. Most of the reported changes were made before the end of December 2006. This article does not include reference to or commentary on the additional development phase conducted thereafter (throughout 2007) in respect of assessing biodiversity, which will be reported elsewhere. A full account of the developed tool, *EcoEffect Outdoors-2* (EEO-2) is given in Myhr (2007).

Tool development was carried out in cooperation with experts, residents and representatives of the construction and property industry. The aim here was to work out a credible and workable property-level assessment tool that reflects the diversity of environmental issues in an outdoor environment in respect of housing and offices properties. This goal has, in general, been achieved though some additional research is still required. What was a sketch of an assessment tool at the outset can now be used to assess both planned and existing outdoor environments. EEO-2 can also display how the outdoor environment relates to the levels specified in Swedish legislation. The weighting procedure is developed and described by Glaumann et al. (2005) and is only dealt with in general terms in this paper.

First a description of the contractual framework for the *EcoEffect* system is presented, and then the *EcoEffect Outdoor* tool is described. After that, the main issues and changes relating to tools development are displayed. Finally, conclusions are presented on the experience gained in the development process.

## 2. Environmental assessment according to *EcoEffect*

*EcoEffect* is a property-level environmental assessment system, intended to cover the full range of environmental issues by considering five separate areas at the same time: *Materials use*, *Energy use*, *Indoor environment*, *Outdoor environment* and *Lifecycle costs*. Fig. 1 illustrates an overview of the *EcoEffect* assessment system. The intention of *EcoEffect* is to provide, as far as possible, a measure of all environmental problems that have originated or can be experienced at a property. The assessment is intended to provide a basis for comparison and for decisions to be made in respect of the reduction of environmental impacts (Glaumann, 1999). As many different types of negative environmental impacts are assessed, the ambition here is to avoid sub-optimisation. The system is however made modular, so the user can choose to operate only one subset – one assessment area – of the total system.

*EcoEffect* assesses property-related environmental impacts, i.e. features of a building and land – the physical environment (Glaumann, 1999). Both external and internal impacts are assessed. External impacts are deemed to arise when the construction or management of a building and its outdoor environment, i.e. energy and materials use, give rise to health or environmental impacts in places beyond the immediate vicinity of the property itself. This is assessed through the use of life cycle analysis (Assefa et al., 2006). Internal impacts denote the impacts on people using the property, i.e. in those areas relating to both the indoor environment (Hult, 2002) and the outdoor environment (Myhr, 2007). Internal impacts are assessed using multi-criteria analysis. The fifth area, life cycle costs (Glaumann and Malmquist, 2004), is a method used to reflect environment-related costs, i.e. costs that are directly tied to activities that entail environmental impacts from a long-term perspective.

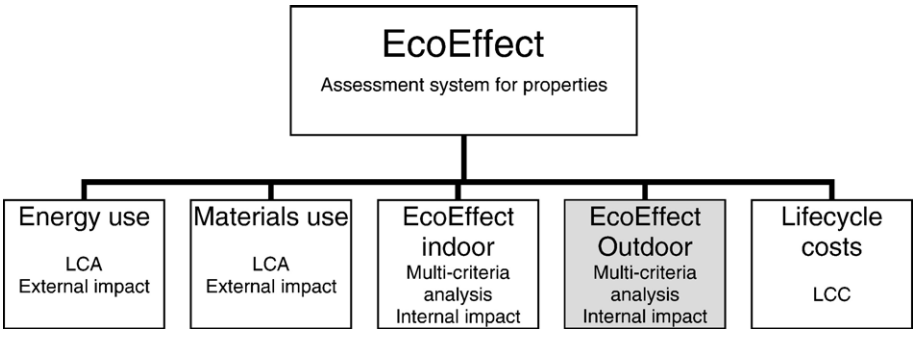


Fig. 1. Overview of the EcoEffect system with its various areas (Glaumann, 1999).