

**(Accounting tools, physical analysis tools and indicator sets**

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# **Accounting tools, physical analysis tools and indicator sets**

## Introduction

This tool group – somewhat a residual category – comprises a variety of tools. What these tools have in common is that they are used for elucidating the physical side in an assessment, rather than the economical, or monetised, side as with cost–benefit analysis.

The group comprises three subgroups:

1. Accounting tools – tools that add the physical dimension to common economic accounts, such as input/output tables;
2. Physical analysis tools – tools that can be used to calculate certain physical quantities, like the ecological footprint;
3. Indicator sets – a selection of data and assessment tools that are used in an assessment.

All assessments basically rely on raw statistical data. However, this data is often processed by tools before it enters the assessment. An example is the calculation of the ecological footprint (Wackernagel et al., 1999) from a broad variety of statistical data.

The tools in this group have in common that they all use raw data to calculate a certain meaningful output. In a sense, they form the link between data and assessment. Models and scenario studies can also be considered intermediaries between raw statistical data and meaningful assessment data, but these two groups are dealt with separately.

## The role of accounting tools, physical analysis tools and indicator sets in an integrated assessment

In general the accounting tools, physical analysis tools and indicator sets support each phase of an integrated assessment, mostly through other tool groups. The tools are deployed because of their specific quality to quantify certain dimensions of sustainable. They form the information basis in each phase of an integrated assessment.

Accounting tools, physical analysis tools and indicator sets have different origins and have been developed for different purposes. The accounting tools originate from the desire to complement national statistical accounts that tend to neglect the physical dimensions of an economy. The physical assessment tools can be said to originate from the desire to enrich economic impact calculations by adding the physical dimension. The indicator sets, to conclude, stem from the desire to use a system–analysis based approach, whereby indicators are used to show how different elements of a system behave.

## Choosing between accounting tools, physical analysis tools or indicator sets

The most relevant selection criterion for choosing between the three sub–groups is the purpose for which information is needed. Accounting is often done in monetary units, providing a monetary view on the economy. The methods for greening national accounts can be used for the purpose of adding to that overview the physical side of the economy. The physical analysis tools can be used for the purpose of illuminating the physical impacts of a problem or proposed policy. As such, physical analysis tools complement cost–benefit analysis tools by considering physical impacts next to the economic ones. Indicators sets can be used for the purpose of ensuring that a particular fixed set of impacts (economic, physical and social) are used throughout an assessment, in the decision–making process and for monitoring. Developing such sets can also be done purely for the purpose of agreeing on the problem and its drivers (in which case the developed set is less

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important than the process of developing the set).

## Choosing between accounting tools

By its focus on the economy as a whole, green accounting is particularly suitable to examine questions of de-coupling between economic growth and environmental pressures, in any stage of an integrated assessment. Different methods of accounting focus on different aspects of sustainable development. Obviously, all methods include a measure of economic development, but there are differences in the ways that methods include environmental damage, resource depletion, and income inequality. It can also be said that some methods focus explicitly on sustainable development, while others limit themselves to the adjustment of national accounts to environmental damage only. Among the methods that explicitly focus on sustainability, there is a difference between the so-called ‘genuine savings’ approach that is based on the concept of ‘weak’ sustainability (i.e. based on the assumption that natural capital can be replaced by human or economic capital), and the ‘sustainable national income’ approach that is based on the concept of ‘strong’ sustainability (i.e. based on the assumption that natural capital cannot be replaced by human or economic capital).

The type of accounting method to choose thus depends on the desire to focus on sustainable development or on the adjustment of national accounts to environmental damage. Table 8 below shows how various accounting methods can be clustered and how each deals with the economic, environmental and social dimensions of sustainable development.

Table 1. Selection criteria for accounting tools

Accounting tool	Dimensions of sustainability		
	Economic	Environmental	Social
<i>Tools that focus on adjusting national accounts for environmental damage</i>			
<u>National accounting matrix including environmental accounts</u>	Economic accounts	Environmental problems and environmental substances	None
<u>Measure of economic welfare</u>	Economic welfare, instrumental and defensive expenditures	None	Urbanization, Leisure and Non-market activities
<u>Index of sustainable economic welfare</u>	Economic welfare, defensive expenditures	Environmental stocks and flows and natural resource stocks	Distributional inequality
<i>Tools that focus on sustainable development</i>			
<u>Genuine savings</u>	Savings	Environmental and natural resource stocks	Education (human capital)
<u>Sustainable national income</u>	Sustainable income	All environmental aspects that are considered important for sustainable development	None

## Choosing between physical analysis tools

Physical assessment tools quantify the physical components in an assessment. Ecological impacts always have a physical component that can be quantified or qualified. There are various tools that calculate certain physical impacts of policy, each relying upon physical data concerning the consumption of natural resources or land resources by social units (society, economy, sector, etc.). The SustainabilityA-Test project covered the following four: ecological footprint (EF), economy-wide material flow analysis (MFA), life cycle assessment (LCA) and global land use accounting. Which one to choose depends on the dimension of impacts

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to be covered.

Table 2. Selection criteria for physical analysis tools

Physical analysis tool	Land use	Dimensions of impact	
		Production pattern	Consumption pattern
<u>Ecological footprint</u>	Land occupation for different life styles none	None	Land occupation due a specific consumption pattern
<u>Economy-wide MFA</u>	None	Material used (direct and indirect) for a production chain	Material used (direct and indirect) of a specific consumption pattern
<u>Lifecycle assessment</u>	None	Physical impact of the production of a specific product over the entire production chain	Physical impact of using / consuming a specific product, incl. recycling or disposal
<u>Global land use accounting</u>	Total land-use associated with material resource flows	None (delivered by material flow analysis)	None (delivered by material flow analysis)

## Choosing between indicator sets

An integrated assessment requires information. The information requirements can be made explicit in the form of indicator sets, specifying exactly what kind of information is needed to describe the system under study adequately enough to be able to assess its behaviour. Indicator sets differ widely in scope, and can be found in many different forms. A global directory to indicator initiatives for sustainable development can be found at <http://www.iisd.org/measure/compendium/searchinitiatives.aspx> [last accessed 1 August 2006].

What indicator set to use, or which indicators to use to create a set, is context specific. The main criterion for using a certain set, or for adding an indicator to a set, is its relevance for the system under study. Such relevance could be determined by scientists, policy makers and laymen. Building sets in a participatory setting is common.

A particular indicator set is a set of indicators designed to measure vulnerability. Vulnerability assessment attempts to capture what makes people or systems vulnerable to a range of stresses and how their vulnerability can be characterized. Vulnerability can be defined as the degree to which an exposure unit is susceptible to harm due to exposure to a perturbation or stress, and the ability (or lack thereof) of the exposure unit to cope, recover, or fundamentally adapt (Kasperson and Kasperson, 2001). Therefore assessing vulnerability depends on likelihood of exposure to a hazard or stress as well as on the underlying capacity to deal with the stress (i.e. to be resilient). It is this endogenous capacity to absorb and manage the stress that makes people or systems less vulnerable or more resilient. The indicator based approach to vulnerability assessment, covered by the SustainabilityA-Test project, is basically a selection of indicators with the aim to measure pressures and risks within an area under study. Vulnerability indicators are thereby a specific indicator set. When combined with geographical information data to identify vulnerable hot spots, it is called vulnerability mapping.

## References

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