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**Monetary valuation of environmental  
impacts and related environmental  
aspects**

*Évaluation monétaire des impacts environnementaux et des aspects  
environnementaux associés*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 1, *Environmental management systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Private and public organizations are facing risks and opportunities due to the beneficial or adverse environmental impacts and related environmental aspects of their activities. The monetary valuation of these environmental impacts and related aspects supports organizations in developing business models and practices that are more sustainable. Using monetary valuation does not mean that money is the only metric of value.

This document is for all organizations that wish to undertake monetary valuation studies or review, compile or use the results. Organizations often have experience in assessing at least some environmental aspects and environmental impacts resulting from their activities in physical units. To further integrate this information in decisions, it is useful to determine the monetary values of these environmental impacts and/or of related environmental aspects. Monetary valuations enable comparisons and trade-offs between different environmental issues and between environmental and other issues. This is useful in, for example, organizational strategy and investment considerations, product and service design, management accounting, performance evaluation, environmental monitoring and reporting, legislation or environmental policy and regulation.

Monetary valuation methods determine monetary values of changes in the environment and not the absolute value of the environment.

This document supports environmental and risk management methods, such as cost-benefit analysis, risk and life cycle assessments.

The main purpose of the document is to increase the awareness, comparability and transparency of the monetary valuation of environmental impacts and related environmental aspects. It demonstrates the benefits that monetary valuation methods offer to users. To achieve this purpose, standardized and transparent documentation of the methods, data and assumptions used to derive monetary values is essential. The multiplicity of monetary values, methods to determine monetary values, and ethical perspectives on money requires careful consideration and prudent communication.

This document provides a framework that includes principles, requirements and guidance for the monetary valuation of environmental impacts and related environmental aspects, following the principles of welfare economics. Monetary valuation methods in this document can also be used to value actual or potential impacts on natural capital, for example, abiotic resources, biodiversity, ecosystems and ecosystem services. The impacts valued could result from environmental aspects and from the dependencies of organizations on the environment. Environmental impacts can occur on the stocks and quality of natural capital, affecting associated flows of benefits (including for human health).

This document focuses on valuation methods and not on costing methods. This means that requirements and guidance on assessing costs are only given if costs are used as measures of monetary values.

In this document, many methodological requirements or recommendations are intended for people assessing monetary values. Following these requirements and recommendations enables good practice of monetary valuation. The requirements in the reporting clause can assist the user of monetary values in assessing the quality of the monetary valuation study.

This document addresses the planning of a monetary valuation (see [Clause 5](#)), the monetary valuation itself (see [Clause 6](#)), the way in which links between environmental impacts valued in monetary terms and related environmental aspects are established (see [Clause 7](#)), checking the quality of the monetary valuation (see [Clause 8](#)) and reporting (see [Clause 9](#)).

# Monetary valuation of environmental impacts and related environmental aspects

## 1 Scope

This document specifies a methodological framework for the monetary valuation of environmental impacts and related environmental aspects. Environmental impacts include impacts on human health, and on the built and natural environment. Environmental aspects include releases and the use of natural resources.

The monetary valuation methods in this document can also be used to better understand organizations' dependencies on the environment.

During the planning of the monetary valuation, the intended use of the results is considered but the use itself is outside the scope of this document.

In this document, monetary valuation is a way of expressing value in a common unit, for use in comparisons and trade-offs between different environmental issues and between environmental and other issues. The monetary value to be determined includes some or all values reflected in the concept of total economic value. An anthropocentric perspective is taken, which asserts that natural environment has value in so far as it gives utility (well-being) to humans. The monetary values referred to in this document are economic values applied in trade-offs between alternative resource allocations, and not absolute values.

This document does not include costing or accounting, although some valuation methods have the term "cost" in their name. This document does not include the development of models linking environmental aspects to environmental impacts.

**NOTE** In this document, what is valued in monetary terms is either environmental impacts or environmental aspects. When valuing environmental impacts of an organization, it is important that links between environmental aspects and environmental impacts are established.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1 Environmental impacts and environmental aspects

#### 3.1.1 environment

surroundings in which an organization operates, including air, water, land, *natural resources* (3.1.5), flora, fauna, humans and their interrelationships

Note 1 to entry: Environment includes natural capital, *ecosystem services* (3.2.11), climate, abiotic services and biodiversity.

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Note 2 to entry: Natural resources include mineral resources.

[SOURCE: ISO 14001:2015, 3.2.1, modified — A new Note 1 and Note 2 to entry have replaced the original Notes 1 and 2 to entry.]

### 3.1.2 good

*natural resource* (3.1.5), *ecosystem service* (3.2.11), product or service, marketed or not, that satisfies human wants or needs

Note 1 to entry: In this document, the term “good” includes human health.

Note 2 to entry: In ISO 14040, the term “product” is defined as “any goods or service”.

### 3.1.3 environmental impact

change to the *environment* (3.1.1), whether adverse or beneficial, wholly or partially resulting from an organization’s *environmental aspects* (3.1.4)

[SOURCE: ISO 14001:2015, 3.2.4]

### 3.1.4 environmental aspect

element of an organization’s activities or products or services that interacts or can interact with the *environment* (3.1.1)

Note 1 to entry: An environmental aspect can cause (an) *environmental impact(s)* (3.1.3). A significant environmental aspect is one that has or can have one or more significant environmental impact(s).

Note 2 to entry: Significant environmental aspects are determined by the organization applying one or more criteria. This process can be referred to as a “materiality assessment”.

[SOURCE: ISO 14001:2015, 3.2.2, modified — Note 2 to entry has been extended.]

### 3.1.5 natural resource

part of nature that provides benefits to humans or underpins human well-being

### 3.1.6 ecosystem

dynamic complex of plant, animal and micro-organism communities, and their non-living *environment* (3.1.1) interacting as a functional entity

EXAMPLE Deserts, coral reefs, wetlands, rain forests, boreal forests, grasslands, urban parks, cultivated farmlands.

Note 1 to entry: Ecosystems can be influenced by human activity.

### 3.1.7 release

emission to air or discharge to water or soil

[SOURCE: ISO 14040:2006, 3.30, modified — The term has been changed to singular form.]

### 3.1.8 reference unit of monetary value

unit of environmental change for which the *monetary value* (3.2.3) is determined



**3.1.9****environmental impact pathway**

series of consecutive, causal relationships, ultimately starting at an *environmental aspect* (3.1.4) and ending at an *environmental impact* (3.1.3)

Note 1 to entry: A synonym for environmental impact pathway is “cause-effect chain”.

Note 2 to entry: It can be considered a system of interlinked environmental mechanisms.

**3.1.10****environmental impact factor**

quantity of *environmental impact* (3.1.3) per quantity of *environmental aspect* (3.1.4)

**3.1.11****environmental baseline**

state of *environment* (3.1.1) without the change(s) that is valued

**3.2 Environmental economics****3.2.1****willingness to pay****WTP**

maximum amount of money an individual is prepared to give up to secure an environmental improvement or to avoid an environmental loss

Note 1 to entry: In practice, WTP and *willingness to accept compensation* (WTA) (3.2.2) appear to diverge, often substantially, and with WTA > WTP. Hence, the choice of WTP or WTA can be of importance.

**3.2.2****willingness to accept compensation****WTA**

minimum amount of money an individual is prepared to accept as compensation to forgo an environmental improvement or to tolerate an environmental loss

Note 1 to entry: In practice, *willingness to pay* (WTP) (3.2.1) and WTA appear to diverge, often substantially, and with WTA > WTP. Hence, the choice of WTP or WTA can be of importance.

**3.2.3****monetary value**

amount of money representing *willingness to pay* (WTP) (3.2.1) or *willingness to accept compensation* (WTA) (3.2.2)

Note 1 to entry: What is valued in monetary terms by default is marginal changes in quality or quantity of *goods* (3.1.2). It is not the absolute value of any given good or service that is valued. The size of change depends on the context.

Note 2 to entry: Commonly, the WTP distribution in a given population is skewed. While mean WTP is the theoretically correct measure to use, for example, in cost-benefit analyses, median WTP can be argued to be the better predictor of what the majority of people would actually be willing to pay if the WTP distribution is skewed. This equally applies to WTA.

**3.2.4****monetary valuation**

procedure for determining *monetary value* (3.2.3)

**3.2.5****use value**

*monetary value* (3.2.3) of a *good* (3.1.2) in relation to its actual, planned or possible use

**3.2.6****non-use value**

*monetary value* (3.2.3) of a *good* (3.1.2) independent of its actual, planned or possible use

### 3.2.7

#### **revealed preference**

*monetary value* (3.2.3) placed by an individual on a market *good* (3.1.2) from which the individual's valuation of a non-market good is inferred

Note 1 to entry: The market of the market good is termed "surrogate market".

### 3.2.8

#### **stated preference**

*monetary value* (3.2.3) expressed by an individual through survey-based response for a *good* (3.1.2) in a constructed or hypothetical market

Note 1 to entry: The market of the good to be valued does not exist or exists but the change valued is not experienced. It is therefore termed "constructed" or "hypothetical".

### 3.2.9

#### **value transfer**

transfer of a *monetary value* (3.2.3) estimate from a primary *monetary valuation* (3.2.4) study to another context

### 3.2.10

#### **affected human population**

group of people whose well-being, utility or values are influenced directly or indirectly by the *environmental impact* (3.1.3)

### 3.2.11

#### **ecosystem service**

benefit people obtain from *ecosystems* (3.1.6)

Note 1 to entry: These are generally distinguished into provisioning, regulating, supporting and cultural services. Ecosystem services include the provisioning of *goods* (3.1.2) (e.g. food, fuel, raw materials, fibre), regulating services (e.g. climate regulation, disease control), and non-material benefits (cultural services) (e.g. spiritual or aesthetic benefits). The supporting services are necessary for the production of all other ecosystem services (e.g. soil formation, nutrient cycling, water cycling) and are also referred to as "ecosystem functions".

Note 2 to entry: Ecosystem services are sometimes called "environmental services" or "ecological services".

### 3.2.12

#### **total economic value**

net sum of all relevant *use values* (3.2.4) and *non-use values* (3.2.5)

Note 1 to entry: Total economic value does not encompass other kinds of values unrelated to human preferences.

### 3.2.13

#### **discounting**

process of calculating the present value of future *monetary values* (3.2.3)

### 3.2.14

#### **discount factor**

factor applied to future monetary amounts in order to compute their present value

### 3.2.15

#### **equity weighting**

procedure to modify the costs and benefits incurred by people in different social and economic contexts to reflect their loss of utility

Note 1 to entry: The effect of equity weighting is to make *willingness to pay* (3.2.1) or *willingness to accept compensation* (3.2.2) of different groups (e.g. income) comparable.

**3.2.16****co-benefit**

benefit accompanying the intended benefits

Note 1 to entry: Co-benefits can be termed “ancillary benefits”, “secondary benefits”, “spill-over benefits” or “indirect benefits”.

**3.2.17****marginal utility**

additional satisfaction a person gains from consuming one more unit of a *good* (3.1.2)

Note 1 to entry: In an environmental context, the term “consuming” does not necessarily involve a physical consumption, i.e. it can also imply a person enjoying a landscape.

**3.2.18****elasticity**

measure of the response of one variable to a change in another variable

Note 1 to entry: The elasticity of *marginal utility* (3.2.17) of income is the relative change of the marginal utility as a result of the relative change in income. The elasticity of marginal utility of consumption is the relative change of the marginal utility as a result of the relative change in consumption.

**3.2.19****purchasing power parity**

currency exchange rate between two countries at which the same bundle of *goods* (3.1.2) can be bought

**4 Principles**

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**4.1 General**

These principles are fundamental and shall be followed when planning, conducting, documenting and reporting a monetary valuation of environmental impacts and related aspects.

**4.2 Description of principles****4.2.1 Accuracy**

Aim for accuracy by minimizing uncertainty and bias towards a particular perspective.

**4.2.2 Completeness**

Ensure that all significant information for the intended use is included, in such a way that no other relevant information needs to be added and, to the knowledge of those undertaking the study, no additional information will substantially change the results.

NOTE In this principle, “significance” includes, among others, environmental aspects, impacts or dependencies that are material to an organization.

**4.2.3 Consistency**

Ensure that assumptions, methods and data are, unless motivated by relevance, applied in the same way throughout the monetary valuation process to arrive at conclusions in accordance with the goal and scope of the monetary valuation.

**4.2.4 Credibility**

Conduct all steps of a monetary valuation in a transparent and fair manner, and ensure that the information provided to interested parties is truthful, accurate, substantive and not misleading.

#### 4.2.5 Relevance

Ensure that selected environmental impacts and environmental aspects, data sources, assumptions, temporal and spatial boundaries and methods used are appropriate to the needs, and meet the known requirements, of the intended users as outlined in the goal and scope of a given monetary valuation study.

#### 4.2.6 Transparency

Aim for transparency by ensuring that documentation and reports are available, comprehensive and understandable to allow the intended audience to use the monetary valuation results and/or facilitate replicability of the monetary valuation and potential value transfer.

### 5 Planning a monetary valuation

#### 5.1 General

At the outset of a monetary valuation study, the goal and scope of the study shall be defined and documented. This includes identifying the environmental impacts or environmental aspects that are intended to be considered, the way and extent to which the associated monetary values are determined (see 5.2 to 5.6) and the way in which environmental impacts are linked to environmental aspects, if applicable. Monetary valuation may concern analysis of potential scenarios. The goal and scope may have to be refined during the study (iteration).

In a monetary valuation, the following shall be defined and documented for all monetary values:

- a) the currency of the monetary value;
- b) the base year of the monetary value;
- c) the time period of the monetary value (annual for a given time period or one-off);
- d) reference unit of monetary value (e.g. per individual, household, community, population, property, business);
- e) whether and how the monetary value is aggregated over time, space, people, environmental impacts or aspects;
- f) whether and how a value transfer is carried out (see 6.5);
- g) whether and how the monetary value is equity weighted (see 6.7);
- h) whether and how the monetary value is discounted (see 6.8);
- i) whether and how uncertainty and confidence intervals are quantified and sensitivity analysis is carried out;
- j) whether the monetary value is a marginal, average or median measure based on a distribution over people, environmental impacts, space or time.

Any assumptions made shall be documented. For items e) to j), an explanation as to the choices made shall be provided in the documentation.

[Annex A](#) provides a flow chart showing the application of this document.

**NOTE** The choices made for each item in the above bulleted list can depend on the environmental impacts or aspects that are considered (see 5.3).

## 5.2 Goal of the monetary valuation and its intended audience

The goal of the monetary valuation, its intended use, audience and the way it is communicated shall be defined and documented.

The intended use may be for the organization's internal decision making or for communication with external interested parties. The intended audience can include management, investors, local communities, government, suppliers, citizens or customers.

**EXAMPLE** A corporation can use monetary valuation to provide information regarding risk and opportunities in strategic and operational decisions. A government can also use monetary valuation (e.g. to define and support public policies).

When the result of a monetary valuation is intended for public disclosure (e.g. in public policies, companies' environmental or financial reports), an independent review should be considered to enhance credibility.

**NOTE** For more guidance, see ISO 14044, ISO 14045 and ISO/TS 14071.

## 5.3 Specification of the environmental impact or aspect

When planning a monetary valuation, the environmental impact(s) or aspect(s) that will be valued shall be identified and documented. Criteria for the selection of the environmental impact(s) or aspect(s) should be provided.

Monetary valuation can include more than one environmental impact or aspect.

**EXAMPLE 1** Monetary valuation of climate change related impacts could include impacts on both humans and ecosystems. Similarly, a monetary valuation that focuses on environmental impacts of transportation can take into account releases of several substances (environmental aspects).

When planning a monetary valuation of an environmental impact(s) or environmental aspect(s), the following shall be identified and documented for all monetary values:

- a) whether an increase or a decrease in the environmental impact or aspect is valued, for example:
  - 1) a decrease in life-expectancy or an increase of soil fertility;
  - 2) a decrease of CO<sub>2</sub> emitted or an increase in water consumption.
- b) the spatial extent and resolution of the environmental impact or aspect that the monetary value is to be valid for (e.g. an administrative unit or ecosystem with defined borders, including its spatial resolution);
- c) the temporal extent and resolution of the environmental impact or aspect that the monetary value is to be valid for (e.g. year 2010 to 2100, including its temporal resolution);
- d) the environmental impact pathway(s) included in the study and the model(s) used (see [Clause 7](#));
- e) the indicator(s) by which the environmental impact or aspect is measured (e.g. crop yield as an indicator for soil fertility);
- f) the unit and quantity of environmental impact or aspect that the monetary value of the study is to be estimated for (e.g. 100 tonnes of topsoil lost by erosion, 1 kg of CO<sub>2</sub> emitted);
- g) the context of the environmental impact or aspect, to the extent that it influences the monetary values obtained from the study, for example:
  - 1) the environmental baseline, potentially subject to change over time;
  - 2) if applicable, the name and type of the source(s) causing the environmental aspect, e.g. a specific activity (e.g. space heating and cooling) at a specific production site (e.g. a factory) of a specific organization (e.g. a name of a company);