Common International Classification of Ecosystem Services (CICES V4): Consultation Briefing Note

European Environment Agency

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Common International Classification of Ecosystem Services (CICES) version 4

Briefing Note, July 2012

Background

1. **For the purposes of CICES, ecosystem services are defined as the contributions that ecosystems make to human well-being.** They are seen as arising from the interaction of biotic and abiotic processes, and refer specifically to the 'final' outputs or products from ecological systems. That is, the things directly consumed or used by people. Following common usage, the classification recognises these outputs to be provisioning, regulating and cultural services, but it does not cover the so-called 'supporting services' originally defined in the MA. The supporting services are treated as part of the underlying structures, process and functions that characterise ecosystems. Since they are only indirectly consumed or used, and may simultaneously facilitate the output of many 'final outputs', it was considered that they were best dealt with in environmental accounts, in other ways.

2. CICES V4 has a five level hierarchical structure (section – division – group – class – class type) (see Appendix 1). The more detailed class types makes the classification more user-friendly and provides greater clarification on what ecosystem services are included within each class. Using a five-level hierarchical structure is in line with United Nations Statistical Division (UNSD) best practice guidance as it allows the five level structure to be used for ecosystem mapping and assessment, while the first four levels can be employed for ecosystem accounting without reducing the utility of the classification for different users.

3. At the highest level are the three familiar sections of provisioning, regulating and maintenance, and cultural; below that are nested ten principle divisions of service. This basic structure is shown in Table 1, which also illustrates how the CICES grouping of services relates to the classification used in TEEB (The Economics of Ecosystems and Biodiversity, see: http://www.teebweb.org/).

Table 1: CICES basic structure and relationship of classes to TEEB classification

CICES Section	CICES Division	TEEB Categories			
Provisioning	**Nutrition**	Food			
	Water supply	Water			
	Materials	Raw materials	Genetic resources	Medicinal resources	Ornamental resources
	Energy				
Regulating and Maintenance	**Regulation of bio-physical environment**	Air purification	Waste treatment (esp. water purification)		
	Flow regulation	Disturbance prevention or moderation	Regulation of water flows	Erosion prevention	
	Regulation of physico-chemical environment	Climate regulation (incl. C-sequestration)	Maintaining soil fertility		
	Regulation of biotic environment	Gene pool protection	Lifecycle maintenance	Pollination	Biological control
Cultural	**Symbolic**	Information for cognitive development			
	Intellectual and experiential	Aesthetic information	Inspiration for culture, art and design	Spiritual experience	Recreation and tourism

4. Table 1 shows that it is relatively straightforward to cross-reference the TEEB categories with CICES. The labels used in CICES have been selected to be as generic as possible, so that other more specific or detailed categories can progressively be defined, according to the interests of the user. Thus the TEEB categories 'raw materials', 'genetic', 'medicinal' and 'ornamental' resources could be sub-classes of the CICES 'materials division'.

5. The structure for CICES below the division level is shown in Appendix 1[1], with twenty two 'service groups' and fifty three 'service classes' being proposed. Box 1 provides the formal definitions of the service themes and classes and the rationale that underpins them. Definitions need to be developed for all the levels in the classification.

BOX1: Definitions

Provisioning	Includes all material and biotic energetic outputs from ecosystems; they are tangible things that can be exchanged or traded, as well as consumed or used directly by people in manufacture. Within the provisioning service section, four major divisions of services are recognised: • Nutrition includes all ecosystem outputs that are used directly or indirectly for as foodstuffs (including potable water) • Water supply which includes that for human consumption • Materials (biotic) that are used in the manufacture of goods • Biotic renewable energy sources Within the provisioning services groups, additional classes and class types may be recognised.
Regulating and Maintenance	Includes all the ways in which ecosystems control or modify biotic or abiotic parameters that define the environment of people, i.e. all aspects of the 'ambient' environment; these are ecosystem outputs that are not consumed but affect the performance of individuals, communities and populations and their activities. Within the regulating and maintenance division, four major groups of services are recognised: • Regulation of bio-physical environment which covers remediation of wastes, arising naturally or as a result of human action. • Flow regulation, which covers all kinds of flows in solid, liquid or gaseous mediums. • Regulation of physic-chemical environment, including climate at global and local scales. • Regulation of biotic environment, including habitat regulation and maintenance, through such phenomena as pest and disease regulation, and the nursery functions that habitats have in the support of provisioning services. Within the regulation and maintenance classes, additional classes and class types may be recognised. The classification allows these to be distinguished by process and whether the processes operate 'in situ' or 'ex situ'.
Cultural	Includes all non-material ecosystem outputs that have symbolic, cultural or intellectual significance Within the cultural service division, two major groups of services are recognised: • Symbolic • Intellectual and Experiential Within the cultural classes, additional classes and class types may be recognised. The classification allows these to be distinguished using criteria such as whether it involves physical or intellectual activity.

[1] This table may also be downloaded as an Excel spread sheet from the CICES website :www.cices.eu

6. Several features of the structure of the CICES classification scheme should be noted:

   a. **Abiotic outputs from ecosystems are not included in the schema:** If ecosystems are defined in terms of the interaction between living organisms and their abiotic environment then it could be argued that an the generation of an ecosystem service must involve living processes (i.e. show dependency on biodiversity). According to this strict definition, abiotic ecosystem outputs such as salt, wind and snow, for example, would not be included.

   b. **The 'regulation and maintenance' section includes 'habitat services':** The main difference between the CICES and TEEB classifications is in the treatment of 'habitat services'. While TEEB identifies them as a distinct grouping at the highest level, CICES regards them as part of a broader 'regulating and maintenance' section. It is proposed that they form a groups and classes that capture aspects of natural capital that are important for the regulation and maintenance of 'biotic' conditions in ecosystems (e.g. pest and disease control, pollination, gene-pool protection etc.), and are equivalent to other biophysical factors that regulate the ambient conditions such as climate regulation.

   c. **That the service descriptors become progressively more specific at lower levels:** A key feature of the classification is its hierarchical structure. The feedback gained during previous consultations on CICES suggested that the naming of the higher levels should be as generic and neutral as possible. Thus 'flow regulation' is suggested, for example, as opposed to 'hazard regulation'. The assumption is that users would then identify the specific services that they are dealing with as 'classes' and 'class types', and use the hierarchal structure to show where the focus of their work lies, or aggregate measurement into the broader groupings for reporting or for making comparisons.

Issues for Consultation on CICES V4

7. Respondents are invited to comment on any aspect of CICES, however, there are a number of areas where responses would be particularly welcome. **These mainly relate to revisions that have been made from versions 3 to 4 and proposals that have arisen during that process.** The questions set out in this document are intended merely as an aid to discussion and comments need not be confined to the issues raised.

8. The consensus from recent reviews and discussions was that CICES required amendment to:

   a. Have a naming of the levels in the hierarchy that is consistent with other international classifications (i.e. Section, Division, Group, and Class); this has therefore changed the terminology used in Version 3.

   b. More fully include ecosystem service associated with the marine environment; Version 4 makes these additions.

      Question: Are these adjustments now sufficient to cover the marine sector?

   c. Exclude non-ecosystem based natural flows, i.e. renewable abiotic energy sources and abiotic materials. The renewable abiotic energy sources included wind, hydro, solar, tidal and thermal; and abiotic materials included mineral resources. These have been excluded from CICES version 4 and the UNSD has proposed combining these into a section called 'other environmental flows' because these could become a separate table in the SEEA Volume 2.

      Question: Should abiotic energy and material be excluded from the classification or included? They could be included by having them as distinct categories in provisioning as in CICES Version 3. For accounting purposes it may make sense to exclude them, for mapping and assessment purposes the rationale is less clear.

d. Water has been given its own division within provisioning services as it does not sit comfortably within either nutrition or materials and to reflect the water account component of ecosystem accounts. Three groups have been added along with new classes. Water supply also includes marine waters. Cooling water has been removed from water quality regulation to avoid double counting.

Question: Do you support this revision or have any suggestions for further improvement?

e. In the 'biotic materials' group, it has also been proposed to remove ornamental resources and include cosmetic resources. Ornamental resources have been retained and cosmetic resources combined with medicinal. Do you support this revision or have any suggestions for further improvement?

Question: Do you support this revision or have any suggestions for further improvement?

f. In the 'energy' group, abiotic renewables have been removed and 'renewable biofuels' renamed 'biomass based energy' to reflect wider use of biomass for energy (i.e. heat, power, fuels).

Question: Do you support this revision or have any suggestions for further improvement?

g. It has also been proposed to change the group 'dilution and sequestration' to 'dilution, trapping and recycling' as the current title does not include all processes included in the group. The three classes would be replaced with two broader classes – 'geophysical' and 'biochemical' processes to ensure inclusion of processes such as remineralisation and decomposition.

Question: Do you support this revision or have any suggestions for further improvement?

Appendix1: CICES Version 4 (July 2012) (This table may also be downloaded as an Excel spread sheet from the CICES website :www.cices.eu)

CICES for ecosystem service mapping and assessment					**Note: this section is not complete and for illustrative purposes only. Key components could change by region or ecosystem.**
CICES for ecosystem accounting					
Section	*Division*	*Group*	*Class*	*Class types*	Examples and indicative benefits
Provisioning	***Nutrition***	***Terrestrial plants and animals for food***	*Crops*	*e.g. by type of crop (cereals etc.)*	Cereals, vegetables, vines etc.
			Livestock and dairy products	*e.g. by animal type*	Sheep, cattle for meat and dairy products
			Wild plants and animals and their products	*e.g. by type*	Berries, fungi, honey, game etc.
		Freshwater plants and animals for food	*Fish (wild populations)*	*e.g. by fishery*	Plaice, sea bass etc.
			Aquaculture products	*e.g. by type*	Salmon, trout etc.
			Fresh water plants	*e.g. by type or source (river, lake etc.)*	Water cress or River x
		Marine algae and animals for food	*Fish (wild populations including shellfish)*	*e.g. by fishery*	Includes crustaceans
			Aquaculture products	*e.g. by fishery*	Includes crustaceans
			Algae	*e.g. by resource*	Macro and microalgae
	Water supply	***Water for human consumption***	*Drinking water*	*e.g. abstracted surface water, abstracted ground water*	Spring or well water, managed supplies from rivers or reservoirs, etc.
			Domestic water use	*e.g. abstracted surface water, abstracted ground water*	Water for personal hygiene, water for toilet systems
		Water for agricultural use	*Irrigation water (consumptive)*	*e.g. abstracted surface water, abstracted ground water*	For crop production
			Water for livestock (consumptive)	*e.g. surface water, abstracted ground water*	Natural water sources (brooks, ponds etc.), managed water supplies in stabled livestock systems etc.
		Water for industrial and energy uses	*Industrial water (consumptive)*	*e.g. abstracted surface water, abstracted ground water*	For manufacturing in a wide range of industries
			Cooling water (non consumptive)	*e.g. abstracted surface water, abstracted ground water*	For power production, incl. marine waters for nuclear power plants
	Materials	***Biotic materials***	*Non-food vegetal fibres*	*e.g. by type*	Timber, straw, flax; algae for fertiliser, packaging and chemicals
			Non-food animal fibres	*e.g. by type*	Skin, bone etc., guano, corals, shells
			Ornamental resources	*e.g. by type*	Bulbs, cut flowers, shells, bones, pearls and feathers etc.
			Genetic resources	*e.g. by type*	Wild species used in breeding programmes
			Medicinal and cosmetic resources	*e.g. by type*	Bio-prospecting activities
	Energy	***Biomass based energy***	*Vegetal based resources*	*e.g. by type*	Wood fuel, energy crops, algae for biofuel etc.
			Animal based resources	*e.g. by type*	Dung, fat, oils

Appendix1: CICES Version 4 (July 2012), cont

CICES for ecosystem service mapping and assessment					**Note: this section is not complete and for illustrative purposes only. Key components could change by region or ecosystem.**
CICES for ecosystem accounting					
Section	*Division*	*Group*	*Class*	*Class types*	Examples and indicative benefits
Regulation and Maintenance	***Regulation of bio-physical environment***	***Bioremediation***	*Remediation by plants or algae*	*e.g. by method*	Phytoaccumulation, phytodegradation, phytostabilisation, rhizodegradation, rhizofiltration,
			Remediation by micro-organisms	*e.g. by method*	In situ (Bioremediation), ex situ (composting), bioreactors
			Remediation by animals	*e.g. by method*	Bioremediation e.g. filtration of particles using molluscs
		Dilution and seauestration	*Dilution, decomposition, remineralisation and recycling*	*e.g. by method*	Dilution of municipal wastewater in rivers etc., removal of organic material and nutrients from waste water by biogeochemical processes e.g. marine denitrification
			Filtration	*e.g. by method*	Filtration of particulates and aerosols
			Sequestration and absorption	*e.g. by method*	Sequestration of nutrients and pollutants in organic sediments, removal of odours
	Flow regulation	***Air flow regulation***	*Rural microclimatic regulation*	*e.g. by process*	e.g. Natural or planted vegetation that serves as shelter belts
			Urban microclimatic regulation	*e.g. by process*	Ventilation
		Water flow regulation	*Attenuation of runoff and discharge rates*	*e.g. by process*	Woodlands, wetlands and their impact on discharge rates
			Water storage for flow regulation	*e.g. by process*	Flood plains and wetlands
			Coastal protection	*e.g. by process*	Mangroves, sea grasses, macroalgae, dune systems and coastal wetlands
		Mass flow regulation	*Erosion protection*	*e.g. by process*	Wetlands, mangroves, sea grasses, macroalgae, dune systems
			Avalanche and gravity flow protection	*e.g. by process*	Stabilisation of mudflows, erosion protection [reduction]

Appendix1: CICES Version 4 (July 2012), cont

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CICES for ecosystem accounting					
Section	*Division*	*Group*	*Class*	*Class types*	Examples and indicative benefits
	Regulation of physico-chemical environment	***Atmospheric regulation***	*Global climate regulation (incl. C-sequestration)*	*e.g. by process*	Atmospheric composition (air quality), hydrological cycle, marine cycle
			Local & Regional climate regulation	*e.g. by process*	Modifying temperature, humidity etc.; maintenance of urban climate and air quality, regional precipitation patterns
		Water quality regulation	*Water purification and oxygenation*	*e.g. by process*	Natural or planted vegetation that serves nutrient retention, translocation of nutrients, marine vertical circulation
		Pedogenesis and soil quality regulation	*Maintenance of soil fertility*	*e.g. by process*	Green mulches; N-fixing plants
			Maintenance of soil structure	*e.g. by process*	Soil organism activity
	Regulation of biotic environment	***Lifecycle maintenance, habitat and gene pool protection***	*Pollination*	*e.g. by process*	By biota
			Seed dispersal	*e.g. by process*	By biota
			Maintaining nursery populations	*e.g. by process*	Habitat refuges
		Pest and disease control (incl. invasive alien species)	*Biological control mechanisms*	*e.g. by process*	By plants and animals, control of pathogens

Appendix1: CICES Version 4 (July 2012), cont

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CICES for ecosystem accounting					
Section	*Division*	*Group*	*Class*	*Class types*	Examples and indicative benefits
Cultural	***Symbolic***	***Aesthetic, Heritage***	*Landscape character*	*e.g. by resource*	Areas of outstanding natural beauty
			Cultural landscapes	e.g. by resource	Sense of place
		Spiritual	*Wilderness, naturalness*	*e.g. by resource*	Tranquillity, isolation
			Sacred places or species	*e.g. by resource*	Woodland cemeteries, sky burials
	Intellectual and Experiential	***Recreation and community activities***	*Charismatic or iconic wildlife or habitats*	*e.g. by resource*	Bird or whale watching, conservation activities, volunteering
			Prey for hunting, fishing or collecting	*e.g. by resource*	Angling, shooting, membership of environmental groups and organisations
			Landscape character for recreational opportunities	*e.g. by resource*	Bathing, scuba-diving, recreational leisure boating, surfing, abseiling, hiking, mountaineering etc.
		Information & knowledge	*Scientific*	*e.g. by resource*	Pollen record, tree ring record, genetic patterns
			Educational	*e.g. by resource*	Subject matter for wildlife programmes and books etc.