Assessing the Water Footprint versus Ecological and Carbon Footprints

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Overview presentation

1. Conceptual framework

2. Ecological Footprint

3. Carbon Footprint

4. Conclusions

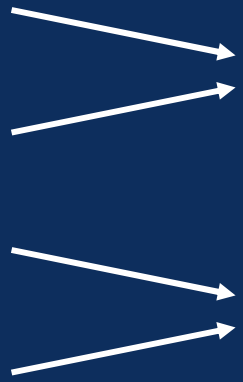
Conceptual framework

IPCC
(1990s)

Input-output & LCA
(1950s) (1960s)

Ecological Footprint
(Rees and Wackernagel,1990s)

Integrated Water Resources Management (Virtual Water)
(Allan,1990s)



Carbon Footprint

Water Footprint
(Hoekstra, 2002)

Ecological Footprint

Ecological footprint - Water footprint

Indicator of human appropriation of natural capital		Ecological footprint	Water footprint
common denominator		use of bioproductive space (in ha)	use of freshwater resources (in m^3/yr)
calculation method	item-by-item	component-based	bottom-up
	balance-based	compound	top-down

Ecological footprint - Water footprint

		Ecological footprint	Water footprint
footprint components	use of natural capital as a source	• arable land • pasture land • forest/woodland • built-up land • productive sea space	• green water (green WF) • blue water (blue WF)
	use of natural capital as a sink	• land for CO_2 absorption	• water to assimilate pollution (grey WF)
adding different footprint components		actual areas are weighted by equivalence factors before adding	actual water volumes are added without weighting

Ecological footprint - Water footprint

	Ecological footprint	Water footprint
local versus global productivity	most EF analyses are based on global average productivities (kg/ha/yr)	WF analyses are generally based on actual virtual-water content of products (m^3/kg)
ceiling to sustained natural resource appropriation	sum of biologically productive areas (biocapacity) (in ha)	available freshwater resources (in m^3/yr)
ecological reservation	biodiversity land	environmental flow requirements

Carbon Footprint

Carbon footprint – Water footprint

Indicator		Carbon footprint	Water footprint
common denominator		emission of GHG gases (in CO_2 equivalents)	use of freshwater resources (in m^3/yr)
calculation method	item-by-item	bottom-up (process analysis-LCA)	bottom-up
	balance-based	top-down (input-output)	top-down
Corporate accounting		3 scopes: 1. Direct 2. Indirect electricity 3. Indirect others	1. Direct (operational) 2. Indirect (supply chain)

Carbon footprint – Water footprint

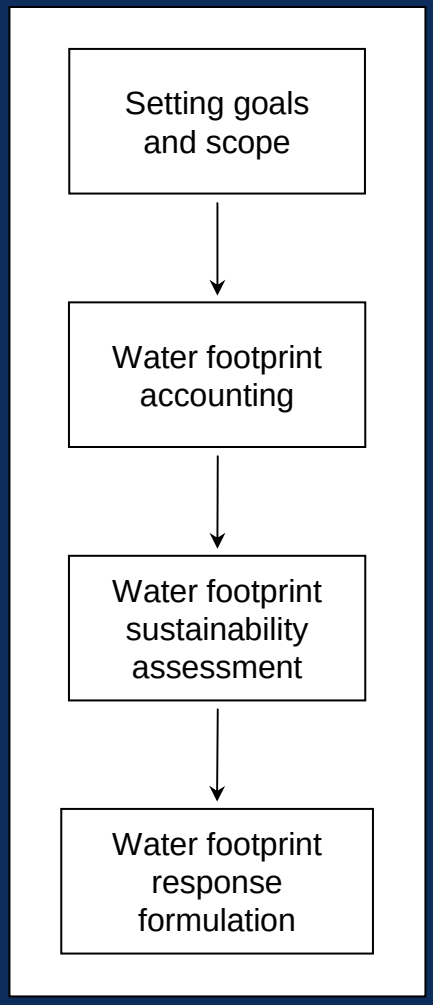
	Carbon footprint	Water footprint
footprint components	• CO_2 emissions • Other GHG emissions	• green water (green WF) • blue water (blue WF) • water to assimilate pollution (grey WF)
adding different footprint components	actual emissions are weighted by the global warming potential before adding	actual water volumes are added without weighting

Carbon footprint – Water footprint

	Carbon footprint	Water footprint
Dimension	No spatial / temporal dimension	Spatial and temporal dimension
Local versus global	Global average values	Actual, locally specific values
ceiling to sustained natural resource appropriation	To limit the rise in global T to 2.0^{o}C above pre-industrial levels by 2050 by reducing GHG emissions.	available freshwater resources (in m^3/yr)
focus	reduction and offsetting (carbon emission units are interchangeable)	reduction (water use units are not interchangeable)

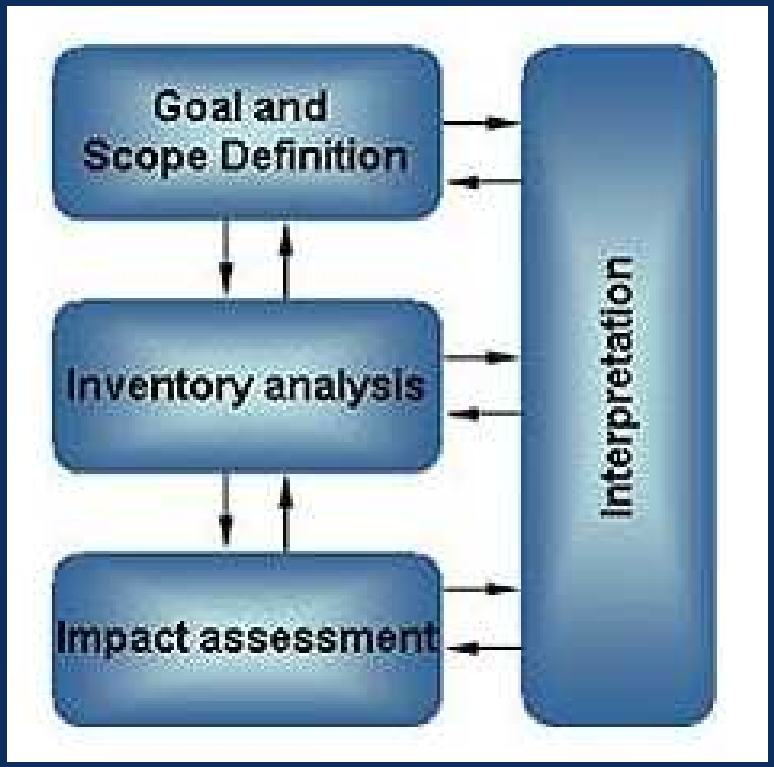
WF-CF assessment steps

Water footprint



(Hoekstra et al., 2009)

Carbon footprint – LCA



(UNEP, 2010)

Applications

Finished & ongoing applications:

- EF, CF & WF: OPEN: EU project
  Alpro pilot project
- EF & WF: WWF Living Planet Report
- CF & WF corporate accounting: Coca cola
  PepsiCo
  C&A
  Unilever
  Heineken
  SABMiller
  Natura
  Paper industries

Conclusions

Methodological differences:

- CF’s are based on global average values, EF’s are sometimes based on local productivities, while WF’s are generally based on local data;
- CF’s are not spatially explicit, EF’s are sometimes, WF’s generally are.

Conclusions

Outcome of the footprint estimates - similarities and differences:

- food consumption contributes significantly to EF, CF and WF;
- transportation and manufacturing of food (and associated energy use) is very important only for the CF and the energy component of the EF.

Conclusions

EF, CF and WF are similar concepts: they aim to quantify and visualize the extent of natural resource use and/or the use of the earth's assimilation capacity.

EF, CF and WF are complementary, each one providing another piece of information.