WULCA

WULCA
A LIFE CYCLE
INITIATIVE PROJECT

Life Cycle Initiative

UNEP

SETAC

Water Footprint: introduction to a sustainability tool for water use

Anne-Marie Boulay, Ph.D.

The unbreakable link between Sustainability and Water

ASABE conference, Montreal, July 14th, 2014

Water: How much is there?

Precipitation on land:

119’000 km^3 / year (100%)

Evaporation and transpiration (62%)

Runoff (38%)

Human water use (3%)

2.1%

0.3%

0.6%

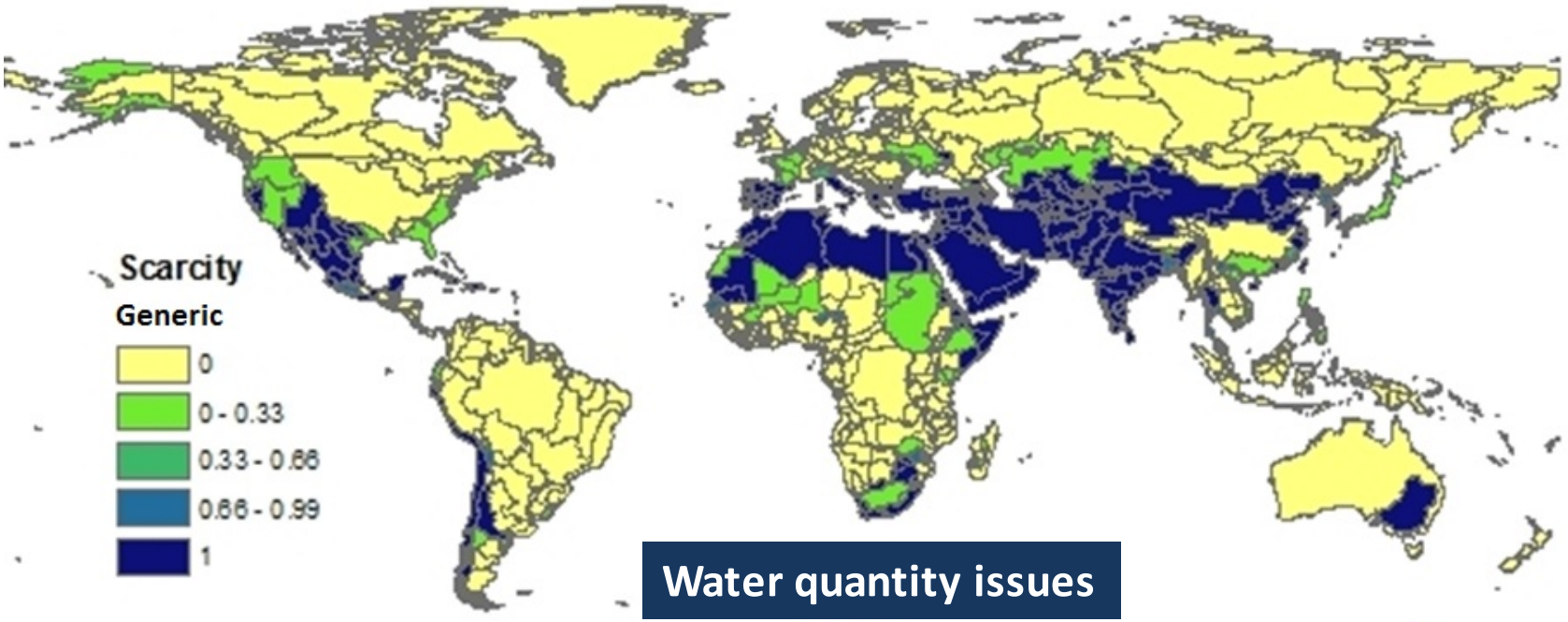
Water: what is the problem?

"There is a water crisis today. But the crisis is not about having too little water to satisfy our needs. It is a crisis of managing water so badly that billions of people - and the environment - suffer badly."

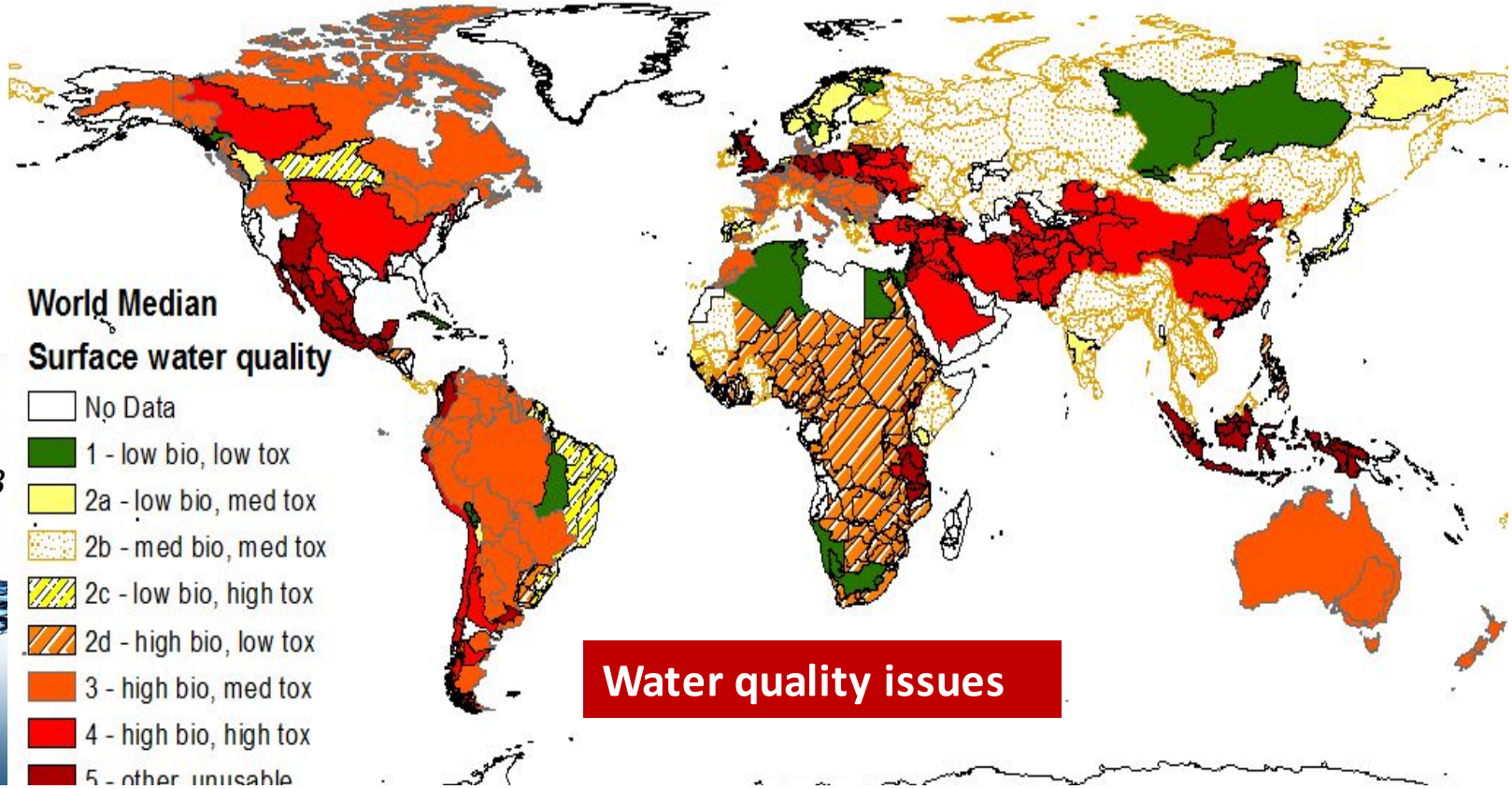
World Water Council

- 3900 children die every day from water borne diseases
- 1 out of 6 people lack access to safe drinking water
- 8 Mighty rivers are running dry from overuse, greatly affecting humans and ecosystems *(Colorado, Indus, Amu Darya, Syr Darya, Rio Grande, Yellow, Teesta and Murray)*

→WATER IS NOT EQUALLY DISTRIBUTED IN TIME AND SPACE, AND ITS QUALITY IS DEGRADING AROUND THE GLOBE



Water quantity issues

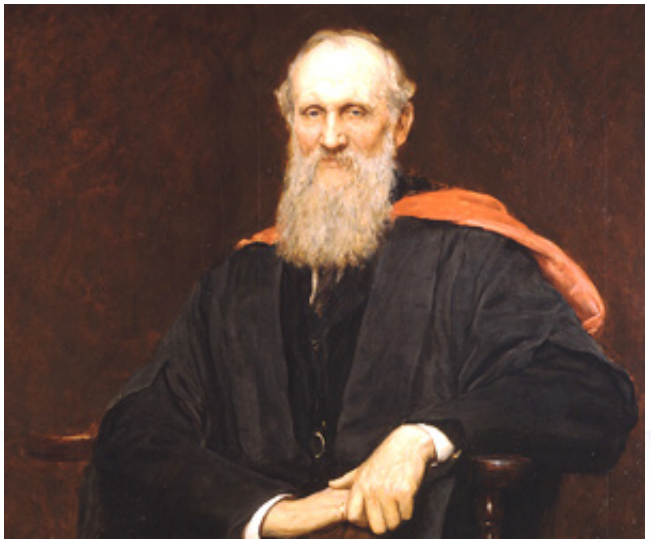


Water quality issues

Source: Boulay et al, 2013

As Kelvin said…

"If you can not measure it,
you can not improve it."



Life Cycle approach: a global view

Mid-point – damage conventional framework

Emissions and Waste

Pesticide
SO_2
Cu
CO_2
Phosphate
…

Energy and Resources

Irrigation Water
Crude Oil
Iron Ore
…

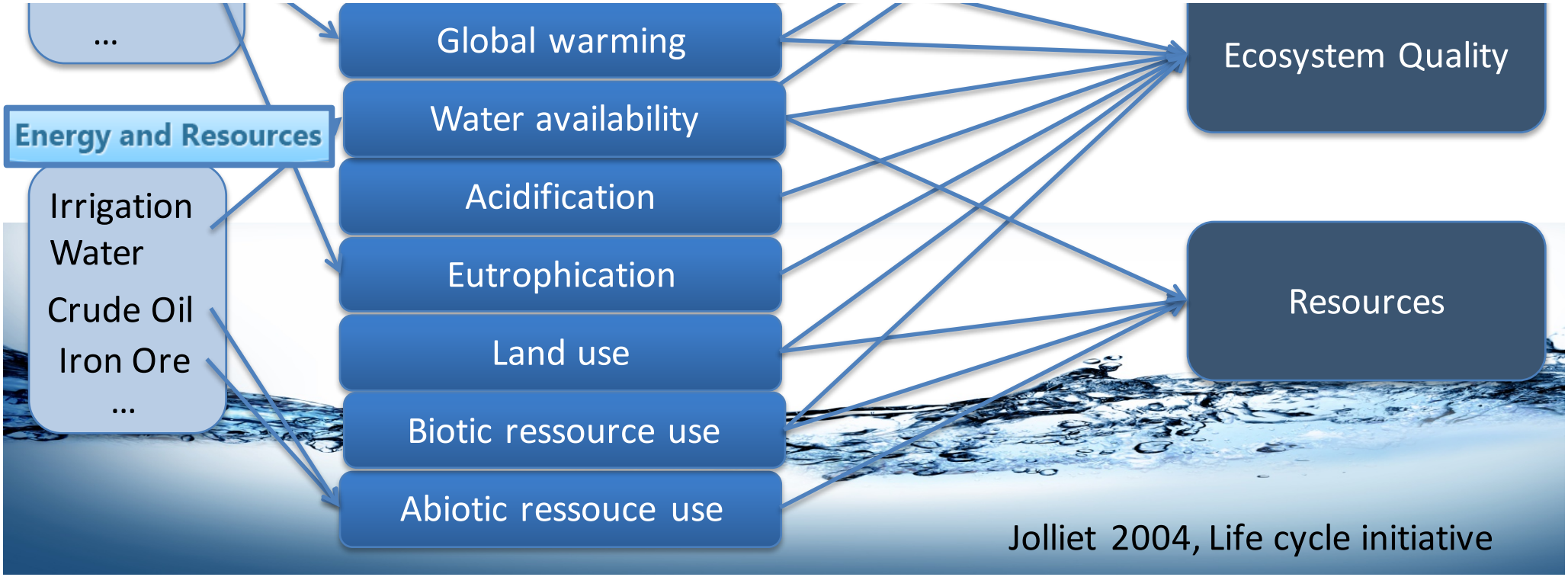
Electric car: Better or Worst?

Zero emissions?

Emissions elsewhere!

Mid-point – damage conventional framework

- Methodological tool, decision making
- Quantifies potential environmental impacts
- Entire life cycle of a product
- ISO standards 14 040/44



From inventory, to risk, to impacts…

Inventory of water use and emissions

Water-related problems (midpoint)

WATER FOOTPRINT

Resource Availability

Toxicity

Acidification

Water-related damages (or endpoint)

Human health

[DALY / y]

Ecosystem quality

[PDF·m²·y / y]

Resources

[MJ / y]

(c) Quantis

Types of water footprint metrics and assessments

Water Footprint Network (WFN)

A Volumetric Approach:

Blue water

Green water

Grey water

ISO 14046: Water footprint: Principles, requirements and guidelines

International Organization for Standardization

Developed in an international consensus-based process 2009 – 2014

Approved in May 2014

Published in August 2014

ISO 14046 WATER FOOTPRINT

IMPORTANT CONCEPTS

–Should be life-cycle based

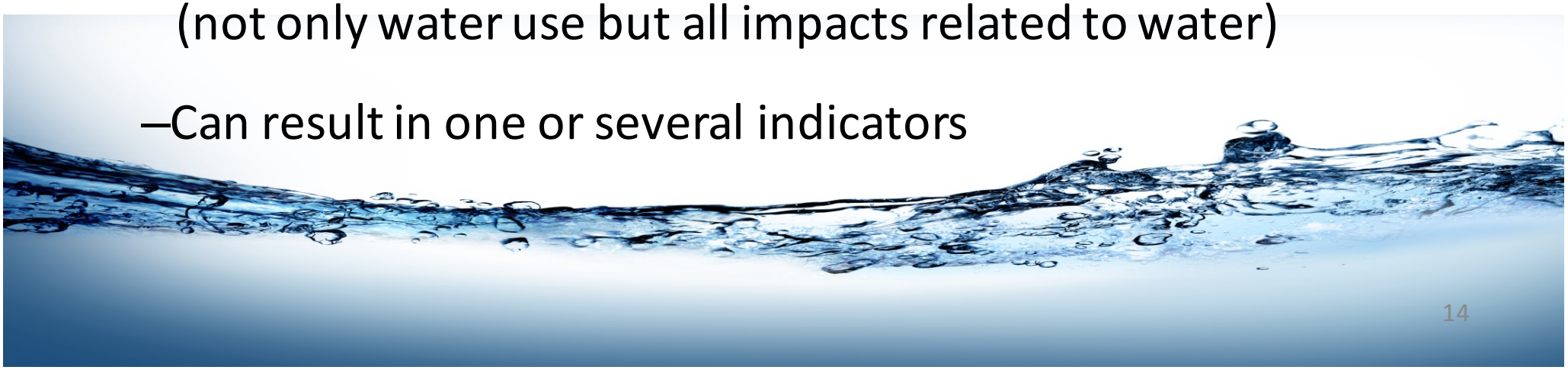
–Could be “stand-alone” or part of a full Life Cycle Assessment

–Results should include impact assessment (volumes not sufficient) and address regional issues

–Both quantity and quality should be considered

–Comprehensive impact assessment related to water (not only water use but all impacts related to water)

–Can result in one or several indicators



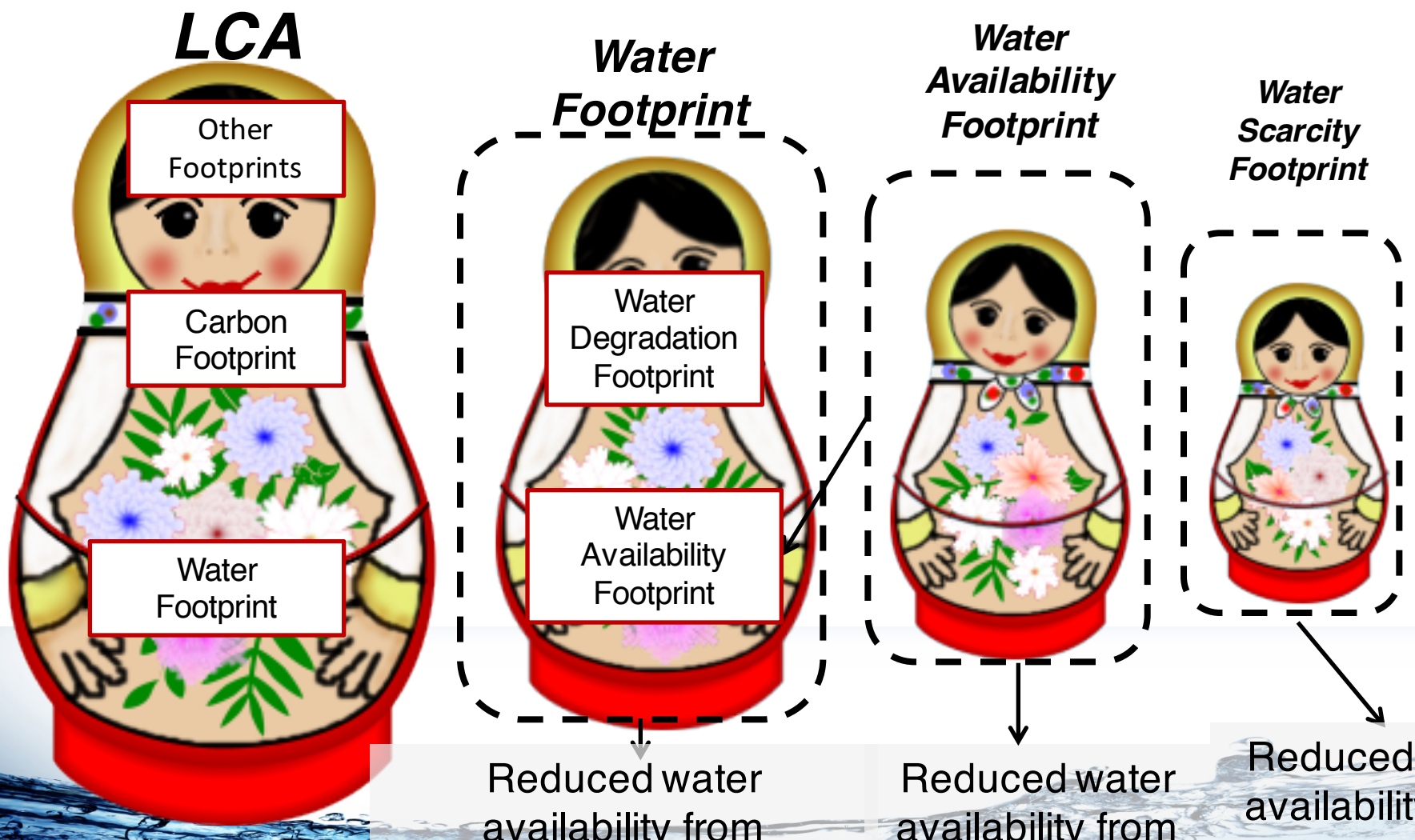
Water Footprint types as per ISO 14046

	Water availability	Water degradation
	MIDPOINT	
Profile of midpoint indicators	-Water scarcity footprint OR - Water availability footprint	-Human toxicity -Ecotoxicity -Eutrophication -Acidification
	ENDPOINT	
Human health	- Malnutrition and/or water related diseases	Human toxicity
Ecosystems	- Terrestrial ecosystems - Aquatic ecosystems	-Ecotoxicity -Eutrophication -Acidification

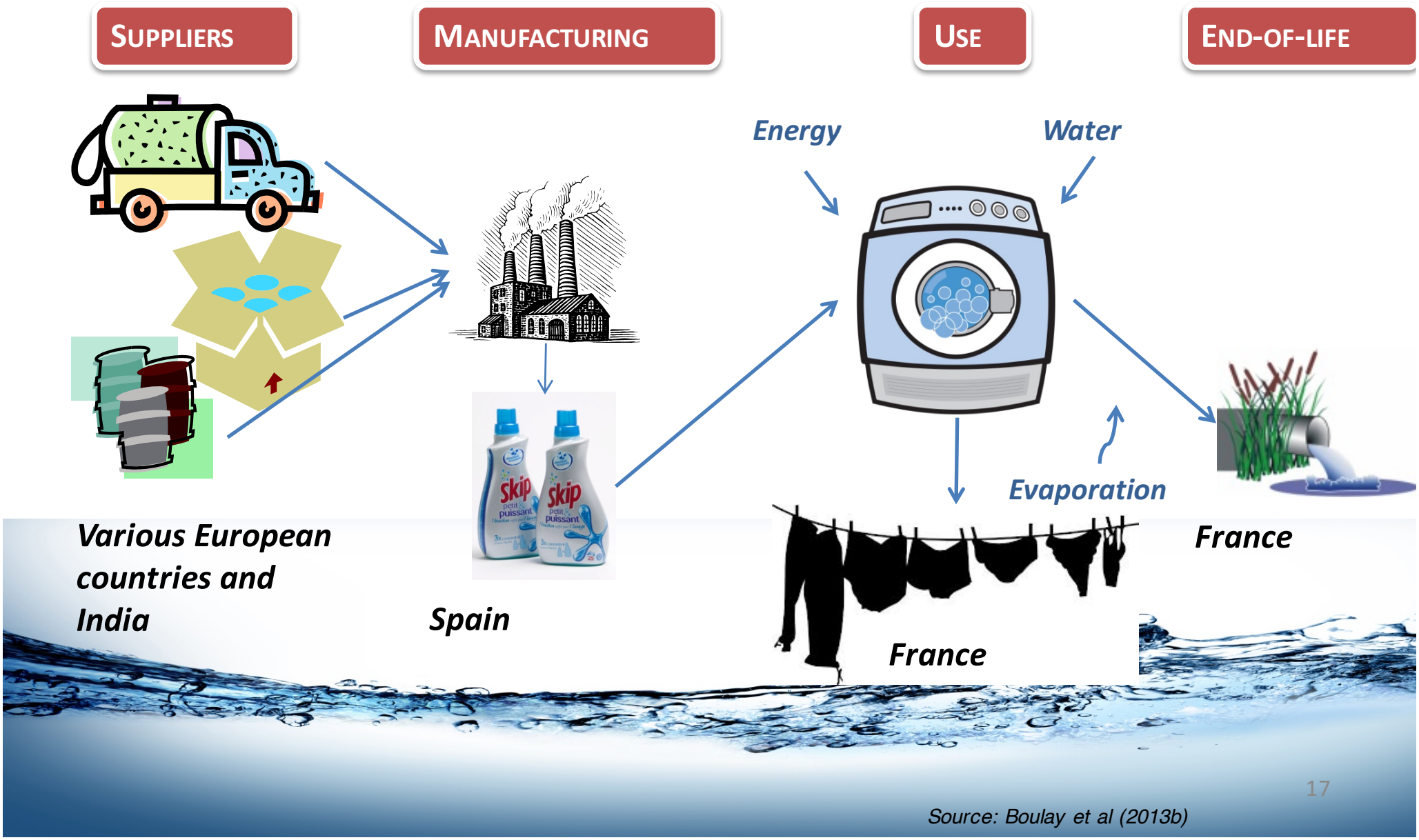
"qualified" water footprint (ex: "degradation" WF, "scarcity" WF, etc)

Water footprint

Types of Water Footprints

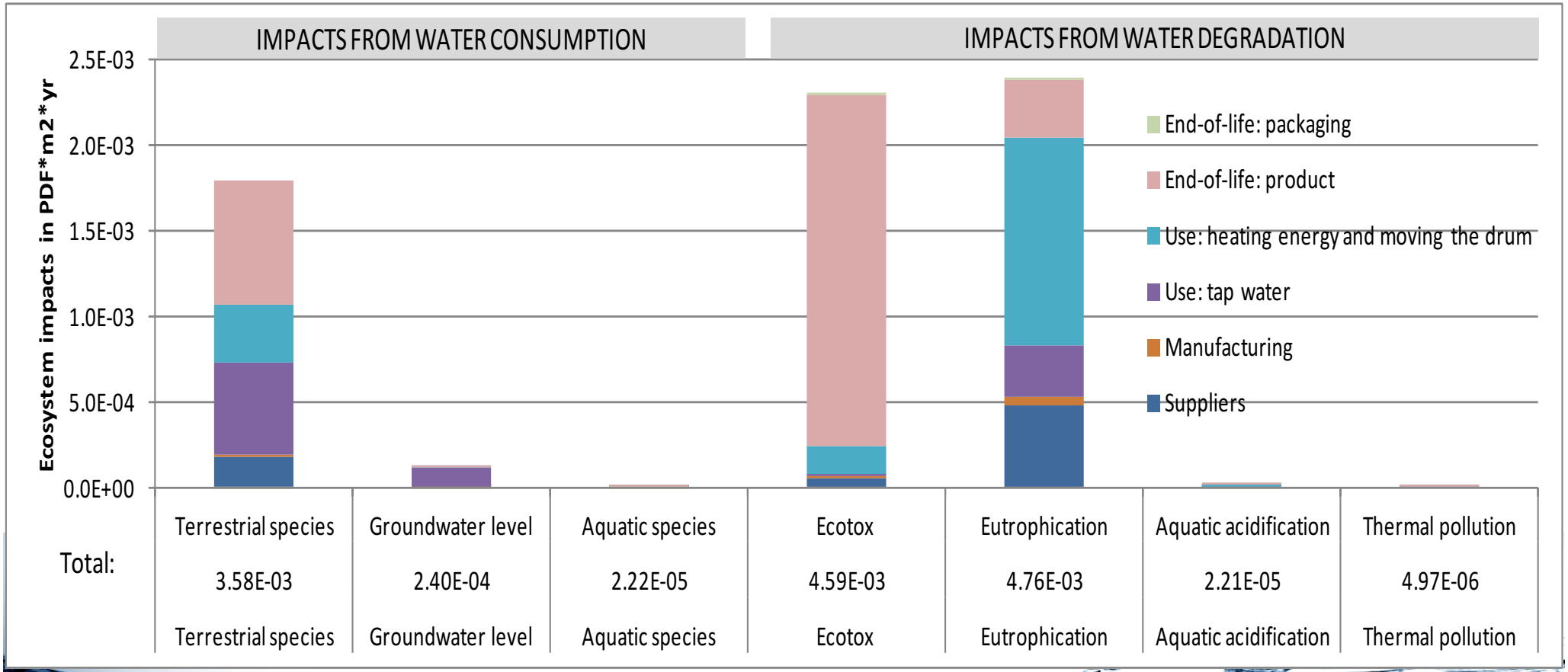


Example: Water Footprint from a load of laundry



Source: Boulay et al (2013b)

Ecosystem Water Footprint



Source: Boulay et al (2013b)

COMMUNICATION AND LABELLING

NESCAFÉ

PERFORMANCE ENVIRONNEMENTALE | NESCAFÉ vs CAFÉ FILTRE | ACTIONS CONSOMMATEURS

Au-delà de la tasse
LE PLAN NESCAFÉ

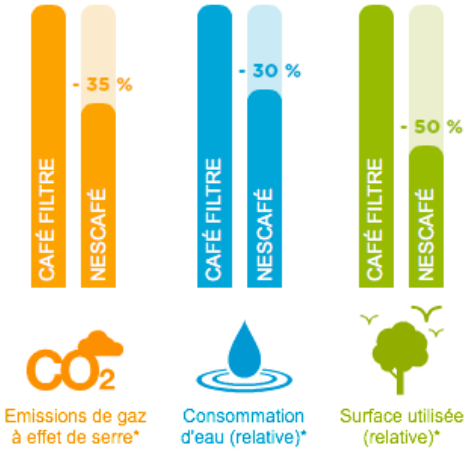
NESCAFÉ vs CAFÉ FILTRE

LE SAVIEZ-VOUS ?

Selon une étude ACV réalisée en Angleterre en 2009, publiée dans le journal scientifique « Journal of Cleaner Production », le café instantané a une meilleure performance environnementale que le café filtre.

ÉCONOMIES DE MATIÈRES PREMIÈRES

- **Extraction** : A qualité égale, une tasse de café instantané nécessite moins de café vert grâce à la maîtrise du processus de percolation à haute pression.
- **Valorisation** du marc en énergie renouvelable.
- **Transport** : Moins de volume à transporter pour une même quantité de tasses, car pas de marc de café transporté.
- **Zéro déchet** : Vous savourez entièrement votre café NESCAFÉ, sans produire de marc de café, contrairement à la préparation avec du café moulu.



*Source : Journal of Cleaner Production, 2009

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http://nescafe.outil-acv.com/

slide from Quantis

Method development: the WULCA working group of the UNEP/SETAC Life Cycle Initiative

UNEP/SETAC Life Cycle Initiative

Water Use in LCA (WULCA)

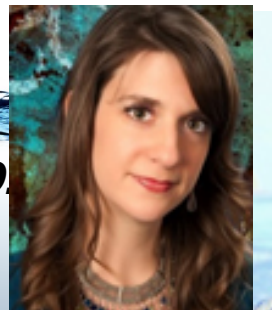
Founded in 2007, now includes → 100 experts from 21 countries

- **Phase 1:** Proposed a framework to evaluate water in LCA (Bayart et al. 2009)
- **Phase 2:** Review of different methods (Kounina et al. 2012)
- **Phase 3:** Quantitative comparison (Boulay et al A and B, under review)

Current mandate (2014-2015):

Guide the scientific development of a **consensual and operational method** which shall be in line with both the **ISO Water Footprint Standard** and the **LCA principles**

www.wulca-waterlca.org



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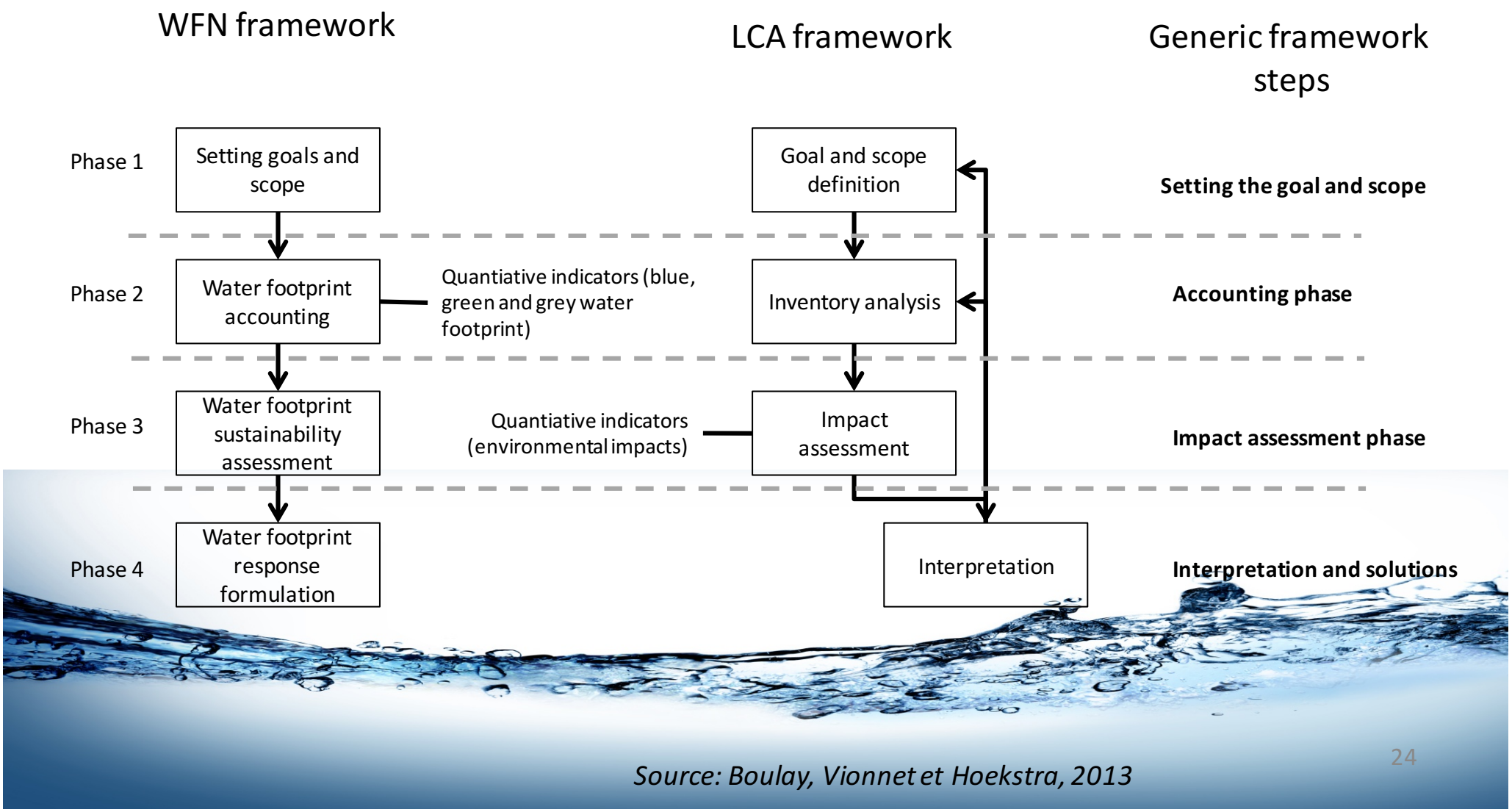
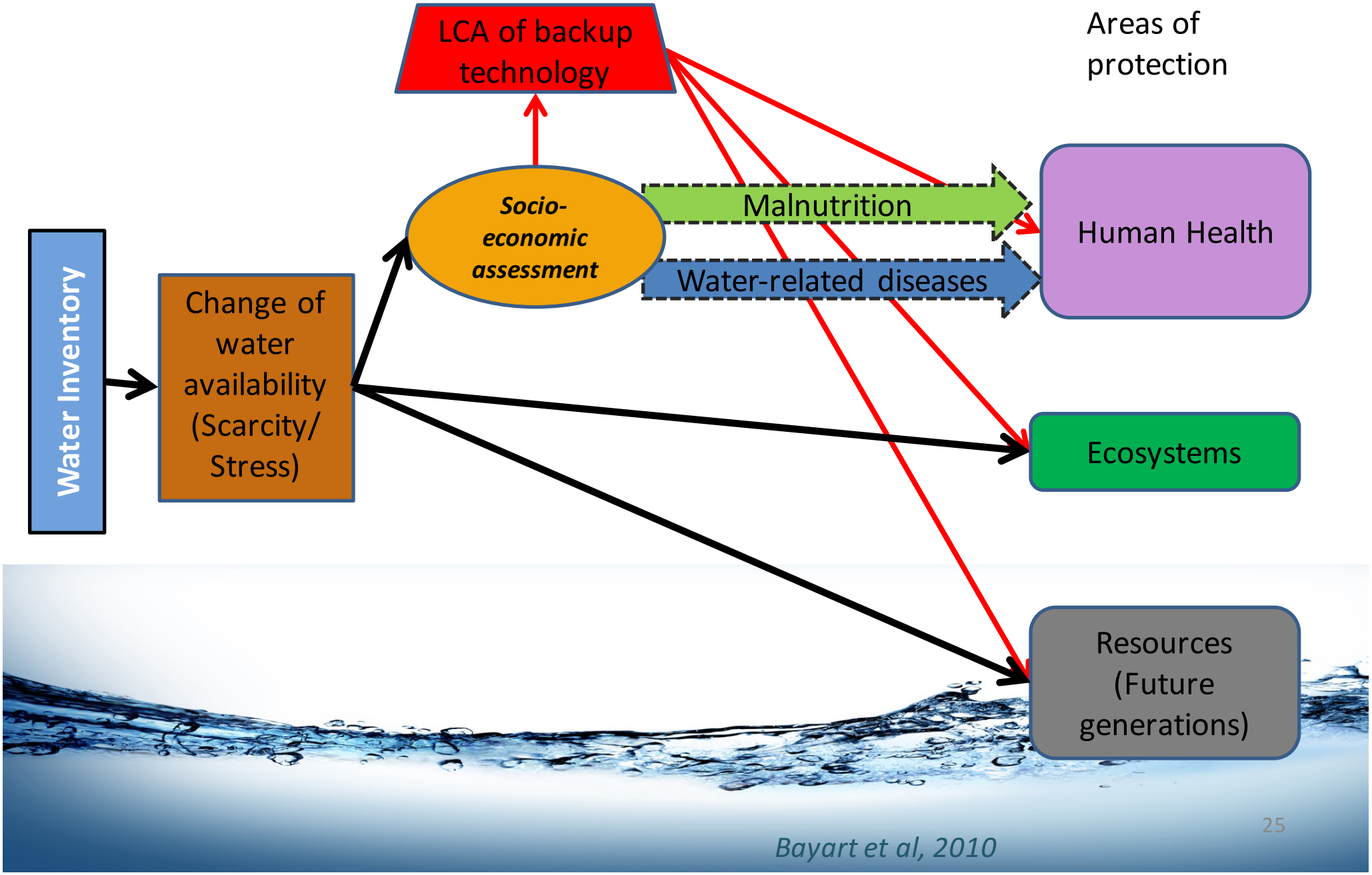
WATER FOOTPRINT NETWORK VS LCA



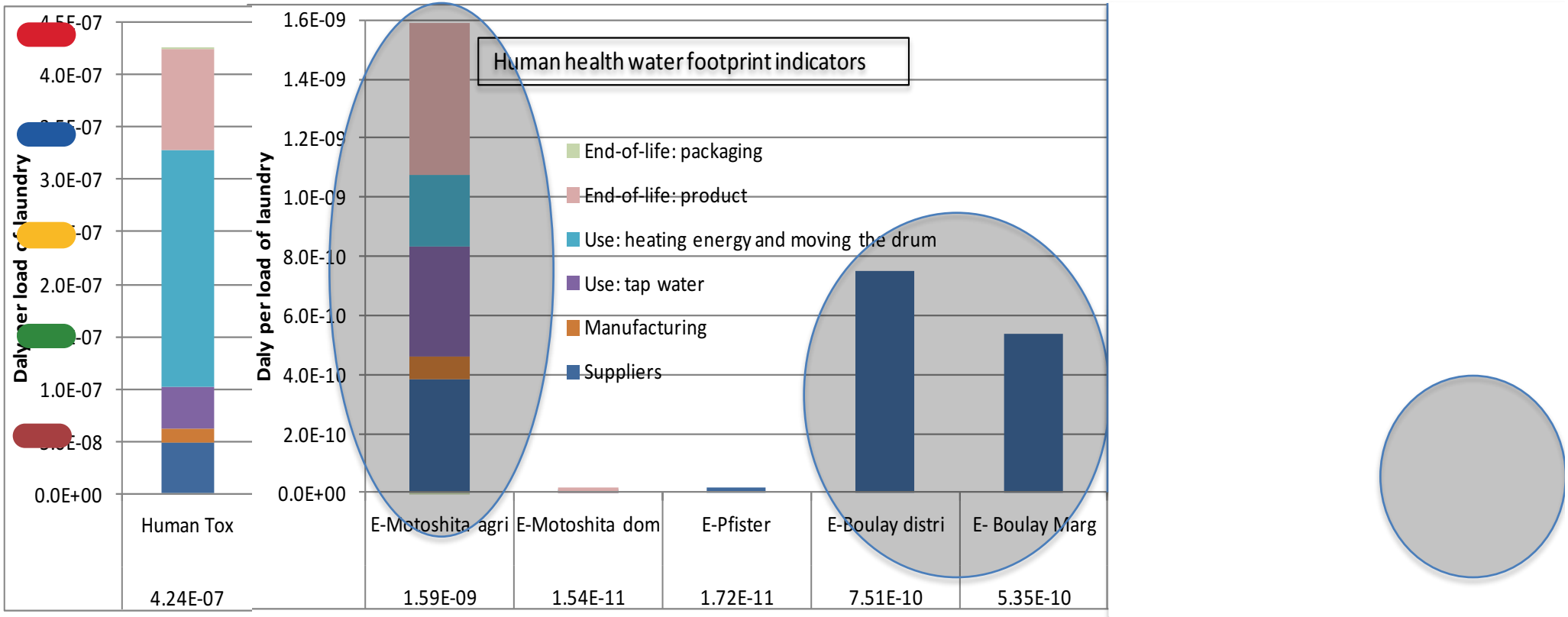
Source: Boulay, Vionnet et Hoekstra, 2013

Impact pathway Framework for Freshwater use



Bayart et al, 2010

Endpoint WF profile Human health



Boulay, A.-M., Bayart, J.-B., Bulle, C., Franceschini, H., Motoshita, M., Muñoz, I., Pfister, S., et al. (2013). Water impact assessment methods analysis (Part B): Applicability for water footprinting and decision making with a laundry case study. *International Journal of Life Cycle Assessment, Submitted*.

Source: Boulay et al (2013b)