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OF SUSTAINABLE COMMITMENT

Water scarcity footprint metrics

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POLYTECHNIQUE MONTRÉAL

ESG UQÀM

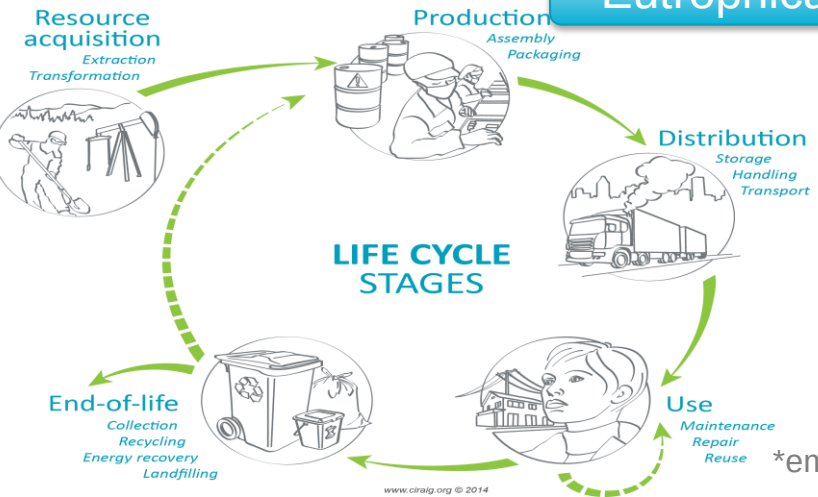
Water Footprint Framework – based on LCA (ISO 14046)

Inventory | **Problems** | **Damages**

→ Water consumption
→ Emissions to water*

- Human Toxicity
- Ecotoxicity
- **Water scarcity**
- Acidification
- Eutrophication

→ Human Health
→ Ecosystem Quality
→ Resources



*emissions to air and soil reaching water are also included

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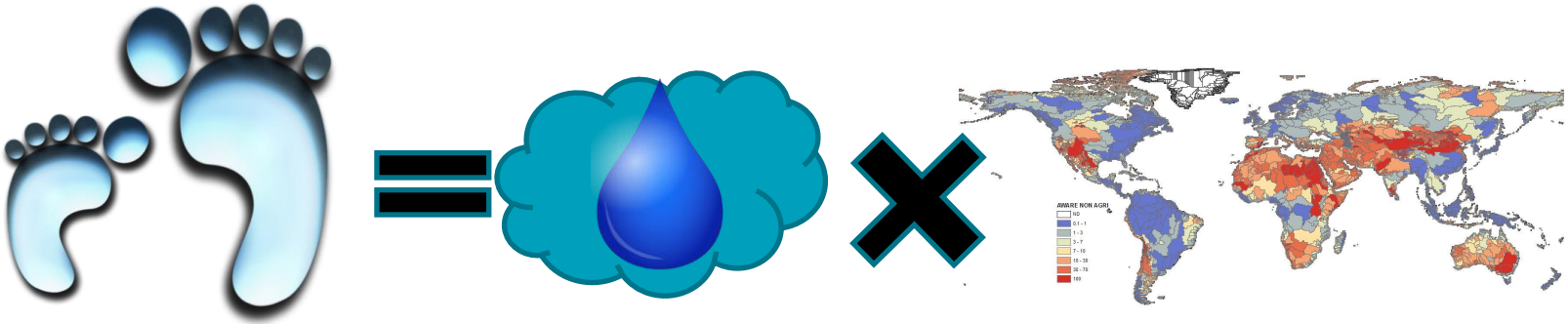
Water Scarcity Footprint



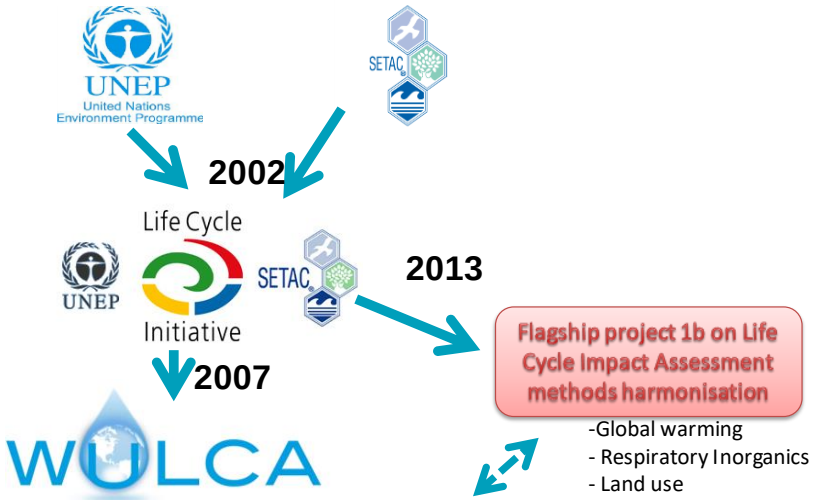
Water scarcity footprint (m^3 eq.)

Consumed water (m^3) (evaporated, integrated into a product, transferred to another watershed or the sea)

Scarcity Index (m^3 eq/m^3 consumed)

- 2 year work process
- > 100 hours of meeting
- 48 experts consulted in workshops
- 33 experts and stakeholders surveyed
- 3 publications

Methodological Consensus
Water Scarcity
AWARE methodology



Goal: Promote method development and harmonisation of water use impact assessment in LCA

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Stephan Pfister, ETH Zurich
Bradley Ridoutt, CSIRO, Australia
Taikan Oki, Tokyo University
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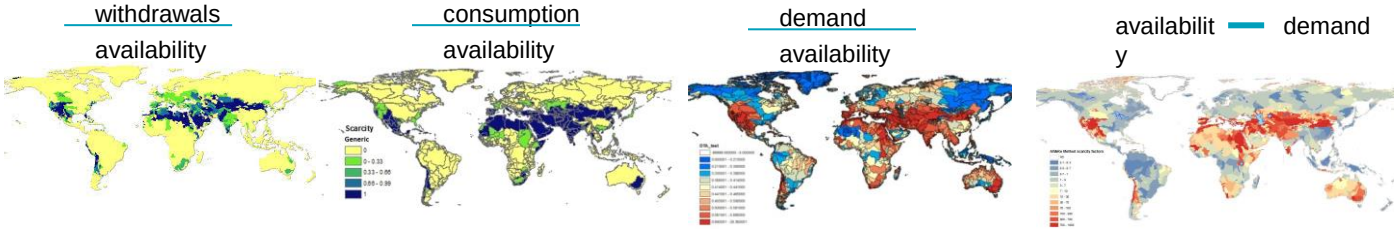
What is scarcity?

Evolution of scarcity indicators modeled in LCA



WTA → CTA → DTA → AWARE (Available Water Remaining)

WTA: Withdrawal-to-availability
CTA: Consumption-to-availability
DTA: Demand-to-availability (includes humans and ecosystems demand)

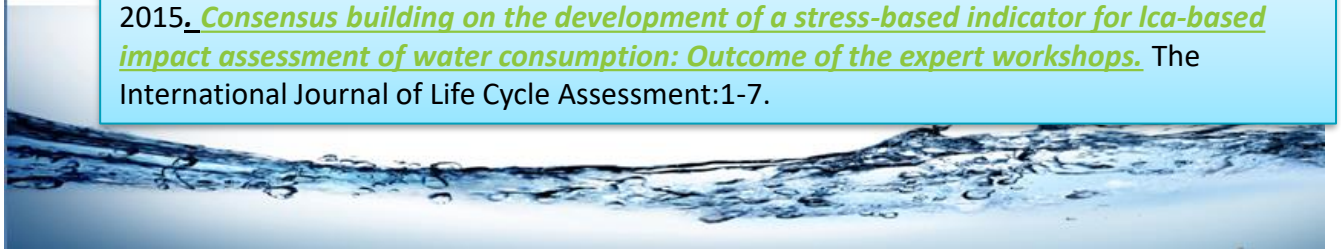
2006 2011 2013 2014 2015 ***WULCA Recommendation***

Water Scarcity Footprint

The question the indicator aims to answer

"What is the *potential of depriving* another user of water (human *or* ecosystems) when consuming water in this area"

Boulay A-M, Bare J, De Camillis C, Döll P, Gassert F, Gerten D, **Margni M**, et al. 2015. *Consensus building on the development of a stress-based indicator for lca-based impact assessment of water consumption: Outcome of the expert workshops.* The International Journal of Life Cycle Assessment:1-7.



AWARE Characterization Factor

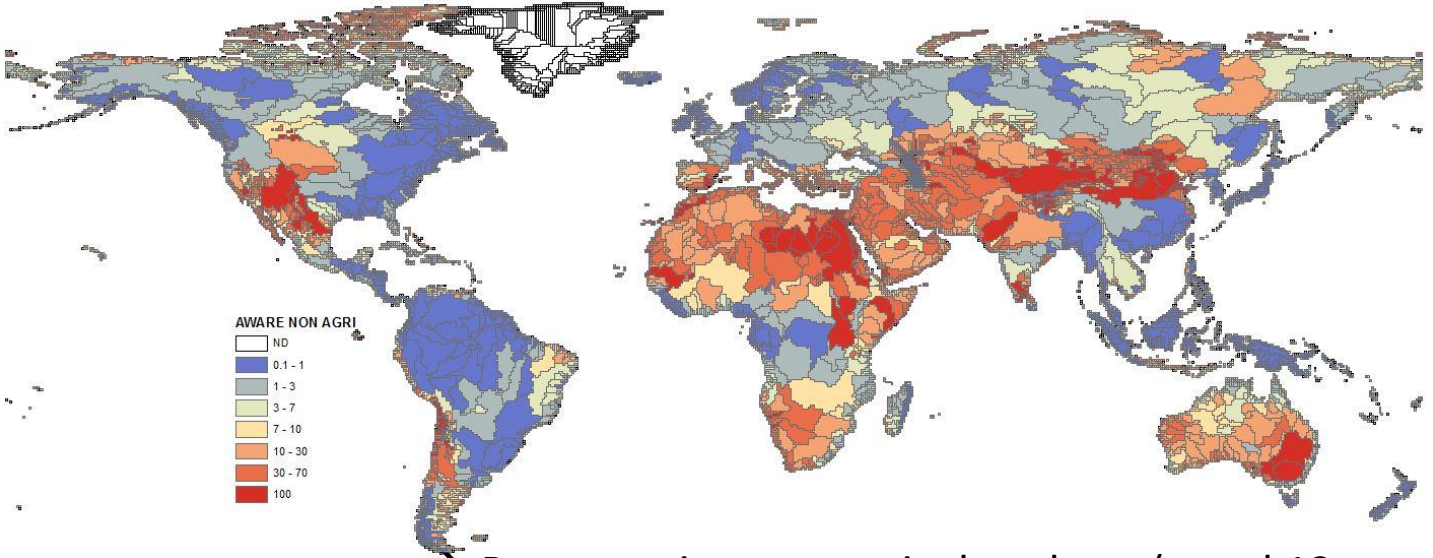
$$CF = Fn\left(\frac{1}{\text{Available Water Remaining}}\right)$$

Available Water Remaining = AVAILABILITY – DEMAND = AMD

➔ ***UNDERLYING ASSUMPTION: The more water remaining per area, the lower the potential to deprive another user***

$$CFunits = \frac{m^3 \text{ world eq}}{m^3 \text{region i}}$$

NOTE: equation valid for CF between cutoffs of 0.1 and 100



→ Representing non-agricultural use (equal 12 months average)

Consensus: the AWARE method

Available **Wa**ter **Re**maining: **Based on inverse of availability minus demand**

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For more details, factors, and related developments:

www.wulca-waterlca.org/aware.html

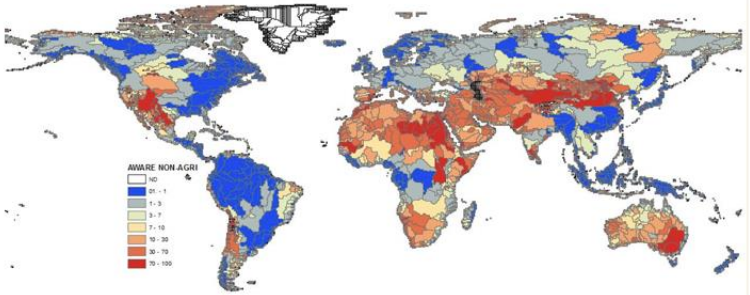
AWARE

- Background
- Description
- Download AWARE Factors
- Sub-national AWARE
- Input data (WaterGAP)
- Non-Marginal AWARE
- Sector-specific AWARE factors
- Regionally-adapted factors
- Case studies and applications
- FAQ

Description

AWARE is to be used as a water use midpoint indicator representing the relative Available WAter REmaining per area in a watershed, after the demand of humans and aquatic ecosystems has been met. It assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived.

It is first calculated as the water Availability Minus the Demand (AMD) of humans and aquatic ecosystems and is relative to the area (m3 m-2 month-1). In a second step, the value is normalized with the world average result (AMD = 0.0136m3m-2 month-1) and inverted, and hence represents the relative value in comparison with the average m3 consumed in the world (the world average is calculated as a consumption-weighted average). Once inverted, 1/AMD can be interpreted as a surface-time equivalent to generate unused water in this region. The indicator is limited to a range from 0.1 to 100, with a value of 1 corresponding to the world average, and a value of 10, for example, representing a region where there is 10 times less available water remaining per area than the world average. The map below shows the factors at annual level per watersheds (normal average over 12 months).



Dedicated partners

Thank you for your attention

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