Water Footprint: Application in the food industry

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Impacts of water use: a gaining momentum

What we can’t measure, we can’t manage

Google Insights for Search beta

Compare by
- Search terms
- Locations

Search terms
Tip: Use a comma as shorthand to add comparison items. (tennis, squash)

water footprint

Interest over time

2004 2005 2006 2007 2008 2009 2010
Water Use and Life Cycle Assessment - History

Inventory

Input
- Oil
- Water

Output
- Phosphorous
- Aluminium
- Water
- CO₂
- ...

Impacts

Aquatic ecotoxicity
Eutrophication
Aquatic Acidification
Human toxicity
Global Warming
Resources depletion
...

Damages

Ecosystem quality
Human health
Natural Resources

Water pollution

Veolia Environnement Recherche & Innovation – Sophie Barteau
Volume is a very good indicator to raise awareness…
… but not sufficient to represent the impact on water resources
Going beyond a volumetric approach

Water Footprint: tomato pasta sauce vs peanut candies

Volumetric approach

The production of peanut candies requires 6 times more water than the production of tomato sauce.

Going beyond a volumetric approach

- Water Footprint: tomato pasta sauce vs peanut candies

**Volumetric approach**

<table>
<thead>
<tr>
<th>Gallon of water</th>
<th>Stress-weighted water footprints</th>
</tr>
</thead>
<tbody>
<tr>
<td>575g of tomato pasta sauce</td>
<td>250g of peanut candies</td>
</tr>
</tbody>
</table>

Applying impact assessment factors
Going beyond a volumetric approach

Water Footprint: tomato pasta sauce vs peanut candies

Tomato sauce contributes 10 times more to freshwater depletion

Peanut production: rain fed agriculture

Tomatoes are produced in water stressed areas

Stress-weighted water footprints

Gallon-eq of water

575g of tomato pasta sauce
250g of peanut candies

0 10 20 30 40

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Going beyond a volumetric approach

Take home message n°1

- Water Footprint is not (only) a question of the volume of water used; it should reflect the **impact(s)** of an activity on water bodies

**Water Footprint:** *life cycle impact category indicator result(s) that assess(es) the contribution of the system under study to water impact*

ISO 14046 – Water Footprint – in preparation
Several methodologies in development...

**Databases**
- Quantis
- WDB
- Ecoinvent
- GaBi
- WFN

**Methods**
- WFN
- Bayart
- Boulay
- Mila-I-Canals
- Vince
- Peters

**Inventory**
- Frischknecht
- Pfister
- Ridoutt Pfister
- Veolia
- Hoekstra
- Boulay

**Endpoint**
- Human health
  - Pfister
  - Motoshita
  - Boulay

**Water indexes**
- Water resource per capita
  - Falkenmark
- Water resource per capita and HDI
  - Ohlsson
- Basic water needs
  - Gleick
- Withdrawal to availability
  - Smakhtin
  - Alcamo
  - Raskin
  - Seckler
  - Pfister
  - Frischknecht
  - Veolia
- Consumption-to-availability
  - Hoekstra
  - Boulay
- Water Poverty Index
  - Sullivan
Several methodologies in development...

Take home message n°2

- Different methodologies in development, for different purposes
Example: the Water Impact Index – a simplified water footprint metric

The Water Impact Index accounts for...

... the reduction of water resources availability generated by a human activity. It allows evaluating how other water users (both humans and ecosystems) would potentially be deprived from this resource.

... expressed in “m$^3$ – Water Impact Index - equivalent”
Application: industrial water management

- Functional unit: water management of a food can factory for producing 10 tons of product
Application: industrial water management

- Functional unit: water management of a food can factory for producing 10 tons of product

System boundaries

Energy; Chemicals

Food production process 1 → Food production process 2 → Food production process i

Water treatment process 1 → Water treatment process 2 → Water treatment process i

RIVER

Sludges

Municipal WWTP
Application: industrial water management - results

Raw water abstraction is responsible for water availability decrease.
Application: industrial water management - results

Water release = limited decrease of the Water Impact Index (quality degradation)

Raw water abstraction is responsible for water availability decrease
Raw water abstraction is responsible for water availability decrease.

Water release = limited decrease of the Water Impact Index (quality degradation).

Important contribution of indirect Water Impact Index (because of scarcity).
Higher contribution of chemicals production (assumed to be produced in Spain)

Water Scarcity
- Spain: WSI = 0.7
- Plant location: WSI = 0.2
Application: industrial water management

Wish: implementing water reuse. Is it «water friendly»?

Indirect effect: reduction of chemicals and energy consumption
Application: industrial water management

Reduction of direct water impact index through water saving…

…but higher benefit from chemicals and energy saving! (better leverage for improvement)

An optimum should be find between direct water saving and energy/chemicals consumption

Take home message n°3

- Water Footprint is already an operational decision-support tool
Combination of decision support tools

- « Footprint » combination
Conclusion

Take home message n°1

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Take home message n°2

- Different methodologies in development, for different purposes

Take home message n°3

- Water Footprint is already an operational decision-support tool
Thank you for your attention

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