



EcoTech-LR



ELSA

# Assessing water deprivation at the sub-watershed scale in LCA

Philippe Loubet<sup>1,2</sup>, Philippe Roux<sup>2</sup>, Montse Núñez<sup>3</sup>, Véronique Bellon-Maurel<sup>2</sup>

<sup>1</sup>Veolia Eau d'Île-de-France, 6 esplanade Charles de Gaulle, 92751 Nanterre, France

<sup>2</sup>Irstea, Research Unit: Information and Technologies for Agro-processes, 361 rue JF Breton, 34196 Montpellier, France

<sup>3</sup>INRA, UR050, Laboratoire de Biotechnologie de l'Environnement, Avenue des Etangs, Narbonne, F-11100, France

E-mail contact: [philippe.loubet@irstea.fr](mailto:philippe.loubet@irstea.fr)

*50th LCA Discussion forum  
on Water & LCA, Zurich  
December 4th 2012*

# Objectives

---

Midpoint indicator to assess water deprivation in LCA, where are we ?

## ■ Product LCA

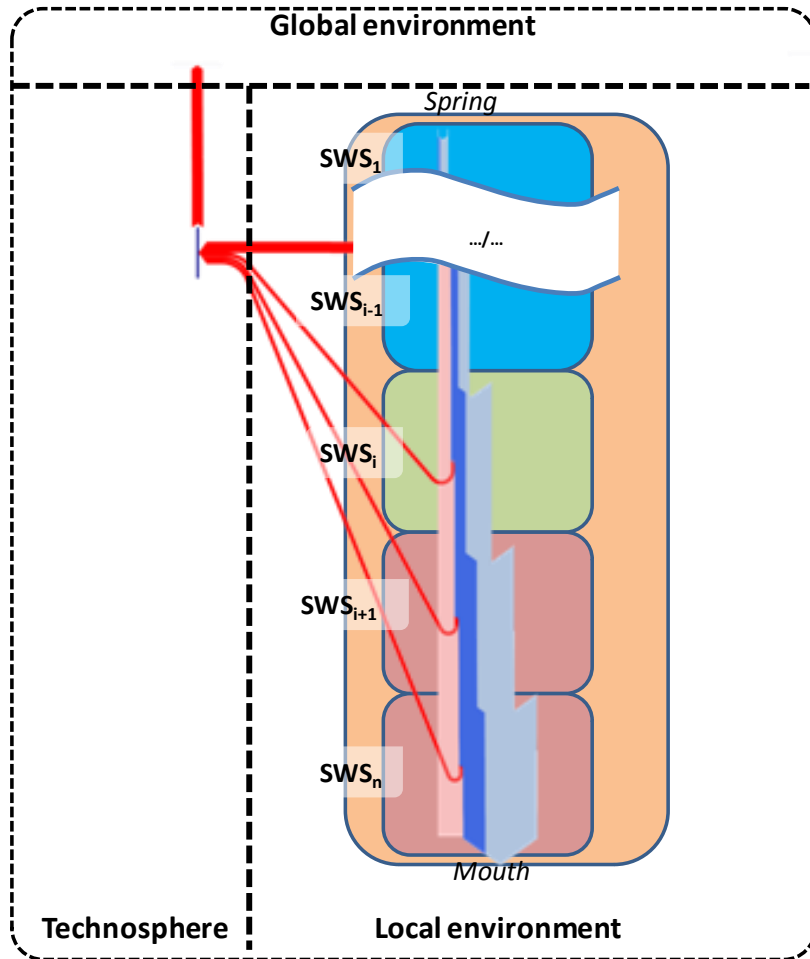
- ⇒ Current indicators (Pfister et al. 2009, Milà I Canals et al. 2008, etc.) are **operational**
- ⇒ Based on water scarcity indicators at the watershed scale

## ■ LCA focusing on water issues

- ⇒ *e.g., irrigated land areas, cities, non marginal users, etc.*
- **Needs for :**
  - ⇒ Finer geographical scale
  - ⇒ Finer temporal resolution
  - ⇒ Sensitivity to additional non marginal consumption
  - ⇒ Redefinition of water deprivation impact including cascade effects



# Framework



## Legend

- Water Availability (WA)
- Environmental Water Requirements (EWR)
- Water Consumption (tWC<sub>i</sub>)
- Upstream Water Consumption (∑<sub>k=1</sub><sup>i</sup> tWC<sub>k</sub>)
- Assessed SWS<sub>i</sub>
- Upstream SWS<sub>1 to i-1</sub>
- Downstream SWS<sub>i+1 to n</sub>

*Two-step approach at the sub-watershed scale*

## ■ 1- CTA (scarcity)

- ⇒ Consumption-to-availability ratio
- ⇒ Shows SWS<sub>i</sub> water scarcity

$$CTA_i = \frac{\sum_{k=1}^i tWC_k}{WA_i}$$

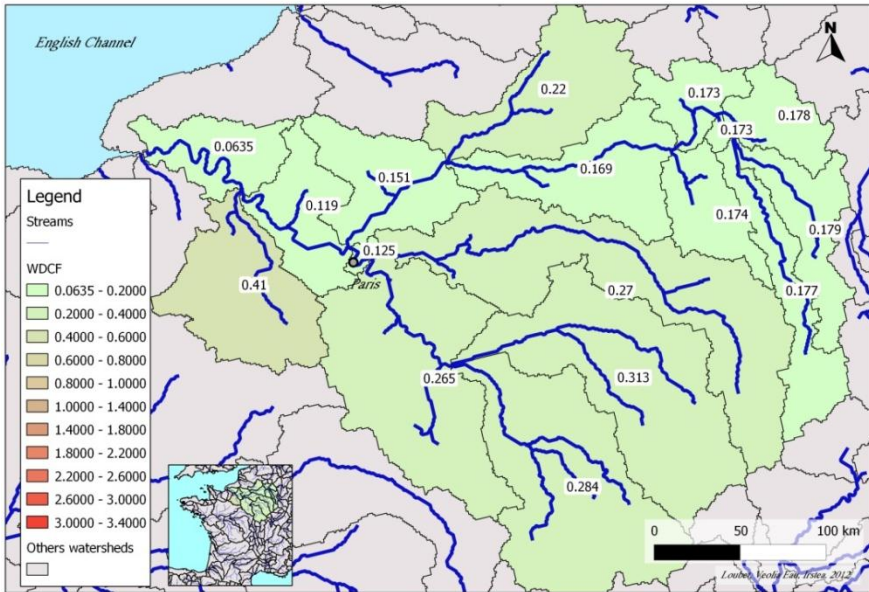
## ■ 2- WDCF (deprivation)

- ⇒ Water deprivation characterization factor
- ⇒ Assesses the cascade effect of water consumption in a SWS<sub>i</sub> on the downstream impacted SWS

$$WDCF_i = \sum_{j=i}^n (CTA_j \cdot K_j) \quad 3$$



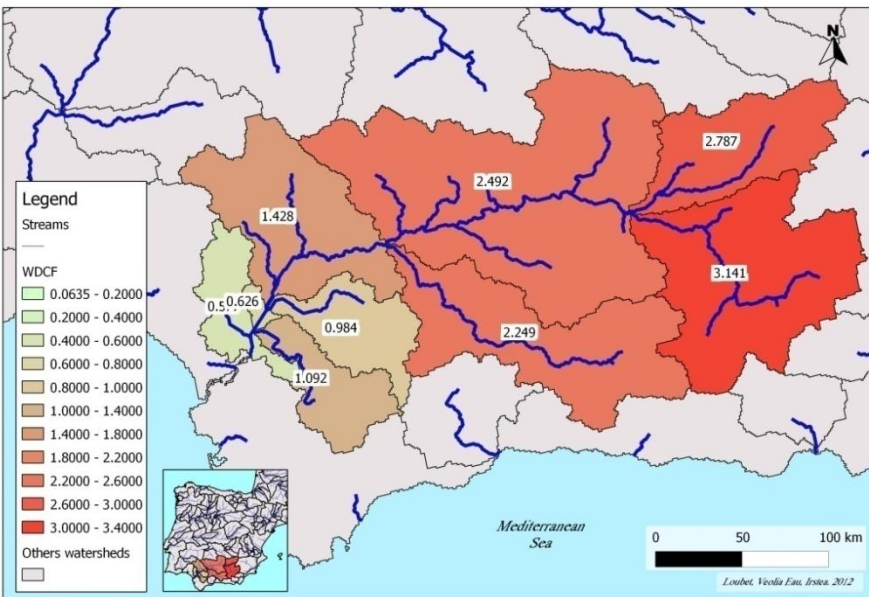
# Results



## ■ WDCF

⇒ Seine watershed,  
France

⇒ 0.06 to 0.41



⇒ Guadalquivir  
watershed, Spain

⇒ 0.58 to 3.14