Discussion paper: accounting, impacting and mitigating Water Footprint at field level.

Pre-amble: This document reflects the vision of SAI platform's Working Group Water and Agriculture (WGWA) as a whole. It does not reflect the position of each individual WGWA member companies.

Introduction

Under the threefold pressure of increasing food demand linked to growing population, climate change and rising water consumption, local water scarcity is becoming increasingly problematic. As agriculture is the largest user of all water withdrawn for human use, SAI Platform member companies are willing to play a major role in helping improve water management at farm level. In that context, SAI Platform's Water Working Group identified the "Water Footprint" (WF) as one of the main topics to address in 2009. Through the WF indeed, food companies shall be able better account for water withdrawals and changes in water quality linked to the farming activity, hereby identifying mitigation and improvement opportunities. Furthermore there is an increasing demand from companies and governments to develop a methodology and integrate water footprint into strategic business planning and governance structures at both global and local level.

The water footprint is part of a larger family of footprint concepts that has been developed in the environmental sciences over the past decades. The concept of water footprint has been introduced in 2002 by Hoekstra in analogy to the carbon and ecological footprint.[1] It is a consumptive-based indicator of fresh water use of a consumer or producer, which takes into account volumes of water use as well as locations of that use.

What is the Water Footprint of a crop?

SAI Platform defines the water footprint of a primary crop (i.e. a crop in the form as it comes directly from the land without having undergone any processing) as per the currently available water footprint glossary [2]: WF of a primary crop is the volume of water used to grow it (evapotranspiration) at the place and during growth, plus the theoretical volume required to dilute polluted water (generated during growth) to an unpolluted condition. Focusing on field level, the crop water consumption is defined in term of evapotranspiration since it is difficult to separate transpiration of the crop from evaporation from the soil surface between the plants (which does not contribute directly to crop production). The water footprint of a primary crop is the same as its virtual water content.

The water footprint consists of three components: the green, the blue and the grey waters.

Considering agricultural raw material, the 'green' virtual-water content of a crop refers to the total rainwater evapotranspiration from the field during the growing period. The 'blue' virtual-water refers to the total volume of surface water or groundwater evapotranspiration during the growing period. The 'grey' virtual-water content of a crop is the theoretical volume required to dilute polluted water generated during growth to an 'unpolluted' condition. This can be quantified by calculating the volume of water required to dilute pollutants emitted to the natural water system during its production process to such an extent that the quality of the ambient water remains beyond agreed water quality standards.[2]

Based on the above, the water footprint methodology of a crop might be divided in three sub-components:

- *Water footprint accounting method*, which refers to the calculation of the crop virtual water content.
- *Water footprint impact assessment*, which refers to the evaluation of environmental, economic and social impacts.
- *Water footprint impact mitigation* through water use reductions, which refers to the identification of good agricultural practices to reduce water use-impacts.

Water Footprint Network

Today, The Water Footprint Network, which brings together partners from diverse origins (academic institutions, non-governmental organizations, private sector, governments agencies and international organizations), is the central actor to promote the development of methods and tools.

The founding partners that have established the network are: University of Twente, WWF-the global conservation organization, UNESCO-IHE Institute for Water Education, the Water Neutral Foundation, and the World Business Council for Sustainable Development (WBCSD), the International Finance Corporation (part of the World Bank Group) and the Netherlands Water Partnership.

The work of the Water Footprint Network has been arranged in two work programmes:

A Technical Work Programme, which covers the development of water footprint accounting standards, practical manuals and tools, the execution of pilot projects and the organisation of technical meetings.

A Policy Work Programme, which focuses on the development of practical knowledge on how to incorporate water footprint analysis into governmental and catchment policies, into corporate strategies for environmental and social responsibility, and into existing environmental standards and certification schemes.

For more information concerning timetables and programmes or to access to case studies and publications: http://www.waterfootprint.org

Next steps

- The Water Footprint Network is currently working on the development of a "Water Footprint Decision Support System" (DSS). A DSS is an interactive software-based system designed, compiling databases and models, to assist decision makers. The DSS will include a water footprint accounting module, a watershed hydrology module, a water footprint impact assessment module (build on the experience from: WBCSD water tool, Life-Cycle Assessment (LCA) project on water footprint leads by UNEP/SETAC, water footprint impact research project and impact pilot project) and a water footprint response strategy module. The bitter version will be completed for peer-review and pilot testing by the agricultural sector in August 2010 and the final version is attended for the end of 2011.

- SAI Platform promotes good agricultural practices and will create an on-line database that could be used to support WF mitigation.

- The SNV Swiss standardisation body propose to initiate the development of an ISO Water Footprint standard. The scope of the proposed project is to "deliver principles, requirements and guidelines for a water footprint metric of products, processes and organisations, based on the guidance of impact assessment as given in ISO 14044. It will define how the different types of water sources (for example ground, surface, lake, river, green, blue, grey, etc.) should be considered, how the different types of water releases should be considered, and how the local environmental conditions (dry areas, wet areas) should be treated. For products, it will apply the life cycle approach and will be based on the same product system as specified in ISO 14040 and ISO 14044. At the organisation level, it will consider the guidance given by ISO 14064 for greenhouse gases."

Pending points and recommendations

SAI Platform's WGWA and its Members encourage the WFN to develop a water footprint methodology including better definitions and methods to calculate the following issues:

1. The grey virtual water content generated during the production agricultural products needs to be improved in defining: the list of pollutants to take into account to determine the "agreed" standards. Moreover, since not all chemicals applied on the field are leached to the groundwater, leachate fraction should be assessed.

2. The salinity issue of land arising notably from excessive use of fertilizer should also be tackled. Indeed, the leaching requirement, i.e. the amount of water needed to wash the soil in order to maintain root zone salinity at a satisfactory level, should also be

included together with evapotranspiration as the amount of water consumed (depleted) during plant growth.

3. The calculated crop water requirements refer to the evapotranspiration under optimal growth conditions. This means that the blue and green VWC values are overestimates if crops are managed under water shortage conditions or if the crops are tolerant to water stress (e.g. cotton, coffee) and managed thereof.

4. We must carefully define the boundaries of the water footprint methodology (time, farm boundaries etc).

Finally, SAI Platform's WGWA encourages the WFN to pay particular attention to, and dedicate relevant resources to the development of appropriate communication means aimed at avoiding possible misunderstanding of the WF concept by various stakeholder groups.

References

1. Hoekstra and Hung (2002) *Virtual water trade: a quantification of virtual water flows between nations in relation to international crop trade*. Value of Water Research Report Series No. 11, UNESCO-IHE, Delft.

2. Water Footprint Network Glossary (http://www.waterfootprint.org/?page=files/DefinitionVirtualWater)