GSI Technical paper 2: Sustainable water use in agricultural supply chains - The WaterData4Action Approach

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For agricultural supply chain partners, it is very complex to define concretely what needs to be done to increase sustainable water use through the supply chain. The main reason for this is that supply chains source from producers in many different locations with just as many different water situations. The result is that there can never be a one size fits all solution that will generate sustainable water use in all locations.

The only way to solve this problem is to deepen the understanding of supply chain partners on what sustainable water use means in the frame of their specific supply chain. It is our experience that this learning can only effectively take place based on strong information on the water situations in the various locations that a supply chain sources from.

Over the years, through our work with farmers and their supply chain partners, we have learned together how water use sustainability in agricultural supply chains may take shape.

The result of this learning is the *waterdata4action* approach (WD4A). This technical paper lays out the WD4A sustainable water use approach in agricultural supply chains to enable practitioners to take note, learn, apply it and contribute to its further development.

WaterData4Action

WaterData4Action was born end 2015 out of our experience in using data and information as tools to stimulate stakeholder engagement to define appropriate action for sustainable water use in catchments. The WD4A approach is unique in that it brings together and cross-validates, global data, global models and global tools with local data, quantitative and qualitative information, models and tools to create the best possible understanding of the water situation in a specific locality so that stakeholders can define appropriate action to improve the sustainability of water use.

Since its inception, we have used WD4A as a framework that keeps on evolving. WD4A now comprises the Geographic Agricultural Water Footprint Calculator (GAWFC)[i], the Watershed Information System[ii], Blue-Thumb-Up[iii], the water stewardship implementation tool[iv], the water chain of custody mapping tool and the Water Canvases methodology[v]. This paper focuses on the WD4A approach as a framework to stimulate action for sustainable water use in agricultural supply chains.

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Agricultural supply chains and water:

Agricultural supply chains are inherently complex and diverse. Take for example, a box of cereals on the shelve in a supermarket. The contents of the box are the result of processing and mixing together of multiple ingredients from agricultural origin. These ingredients in turn come from a variety of sourcing places. The focus of a cereal-producing company is to organize their operations and supply chains such that they efficiently produce and sell the box of cereal with a profit.

As society's focus on sustainability increases, companies need to engage in more and more topics apart from efficiently organizing their business. As a result, companies with large agricultural supply chains now understand that water is one of the key topics to address, not only from an environmental and social perspective, but also increasingly from an economic business perspective. This means that in a way the agricultural supply chain expands. It now not only comprises production and processing, it also comprises the water context of that production and processing. This adds a new layer of complexity to all agricultural supply chains.

Water itself is a complex subject. The nature of the water situation differs from place to place. To understand this complexity requires capacities that are normally not found in company supply chains. It is thus fully understandable that companies have difficulty addressing water sustainability issues in their supply chains.

Applying the WD4A approach in supply chains: process and outcomes

The WD4A, as an approach for sustainable water use in agricultural supply chains, is a logical 10 step approach that structures a process of data and information collection, tool use and interpretation to stimulate joint learning and empowerment of supply chain partners in order to define and take concrete action across agricultural supply chains in order to make water use more sustainable (figure 1).

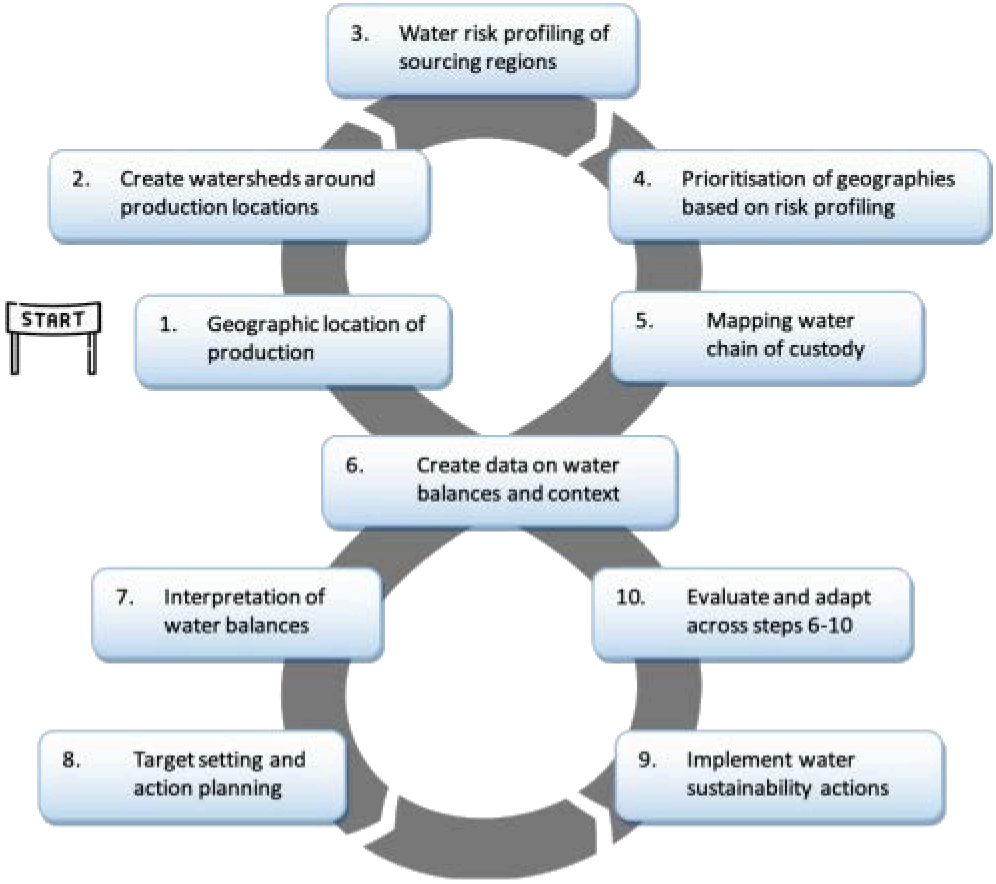

Figure 1: Ten steps of the WaterData4Action sustainable water use in supply chains approach

The stepwise process starts in **step 1**, in which producers in the sourcing locations are mapped with the Lat/Long coordinates, plotted in the geographies and put in a GIS system to increase the understanding of the geographic nature of the specific production component in the supply chain. Also, the supplier(s) can be mapped in this step.

To better grasp the geographic situation related to water, in **step 2**, the producer locations are used to determine the watersheds or catchments that they are part of. For this, global watershed information can be used as provided by Hydrosheds (Lehner et al., 2008)[vi] or Digital Elevation Maps and the open source QGIS (QGIS Development Team, 2018)[vii] can be used to do so. Important is that the catchments are of a size that is not too large, in other words graspable by humans and not too small as that would undermine the contextual understanding required to engage meaningfully in water. Generally, a size of up to 100x100km is the size for humans can still grasp. Of course, if local sources on watershed delineation are available from water management authorities or knowledge institutes, these are preferable.

Water risk profiling of sourcing regions comes in **step 3**. Sourcing locations of a specific raw material supply chain (for a multinational, retailer, country or city) are assessed using and executing a water risk assessment with a global tool (for example, WWF water risk filter[viii] and/or World Resources Institute WRI Aqueduct[ix]). The output is a list or map of geographies with risk scores.

The list is used in **step 4**. The company discusses the list in combination with company-specific information and interests on priority agricultural raw materials or markets to prioritize the geographies where the company wants to focus its efforts for water sustainability on. The outcome of this process is a list or map of prioritized geographies.

In **step 5**, a water chain of custody is produced for each of the catchments using the water chain of custody mapping tool. This tool is used to describe how a volume unit of water becomes available to the supply chain and how it moves through the supply chain in physical and in virtual form. The outcome of the mapping is an increased understanding of how water ends up in the supply chain. It is a concrete tool to create insight in the water management and stakeholder context in the catchment (figure 2).

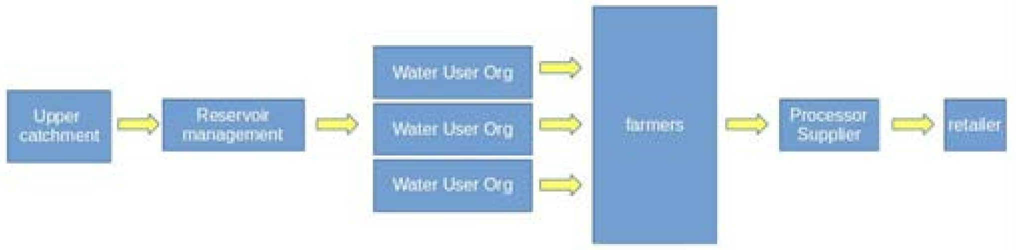

Figure 2: Simple example of a water chain of custody mapping

Step 6 entails to create a quantitative understanding of the water balance in the catchments and in the farms. For the catchment water balance please refer to the GSI technical paper on the subject (GSI technical paper 1[x]). The farm water balance is produced by simulating and understanding the soil water balance during the entire growing season.

For this we use the Geographic Agricultural Water Footprint Calculator (GAWFC, 2017) that takes five input data files: reference evapotranspiration, precipitation, irrigation, soil data and crop data. Also, other tools can be used obviously. Also in step 6, while working to collect data for the water balance generation, deeper information on the water management context and stakeholders is gathered that helps increase the detail in the water chain of custody.

Step 7 is a critical step to connect the catchment quantitative water context with the farm water context and practices. For example, if the catchment water context points to water scarcity levels that are not sustainable in certain periods of the year, the farm water balance across the season will provide insight into cause-effect relationships that help define what can be done to become more sustainable. It could for example be that high irrigation water losses occur on farm. Reducing those losses could lead to a more sustainable catchment water balance.

Step 8 brings together the farm/catchment water balance relationships and the water chain of custody water management context to help define actions at various levels: the farm, the water management, policy context, with the supplier, etc. Step 8 constitutes a creative process that initially will take place within (or part of) the supply chain context, but the process can be extended to engage other stakeholders in the catchment to align action. The output is an action plan or strategy for the relevant supply chain actors.

Step 9 is the operationalization of the strategy and action plan with the relevant supply chain partners, it is not only writing up an implementation plan and implement it but also building the understanding and capacity across supply chain actors on how sustainable water use can materialize within their specific part of the supply chain.

In the implementation process, new knowledge and information is gathered, also the situation in which the water actions take place changes over time. **Step 10** drives supply chain partners to explicitly assess implementation and revisit action and implementation plans to adapt to the changing understanding and environment. The step embraces the notion of continuous learning and development.

It is our experience that in the process of going through the ten steps, quite some iteration takes place especially **between steps 3 to 8**. This movement between the steps allows for an organic deepening of the understanding of and joint learning by the partners involved in the process.

Contribution to global water initiatives and approaches

The ten step WD4A approach fully contributes to and aligns with all main stream Global Water Initiatives and approaches:

- Global Water Stewardship standard of the Alliance Water Stewardship (AWS, 2018)
- Water Footprint Network (WFN) Water Footprint Assessment Standard (Hoekstra,2008)
- CDP water disclosure (CDP, 2018),
- Context Based Water Target development
- WWF one- planet-living
- Catchment level water risk assessment and response formulation
- Water accounting and reporting

GSI Technical Papers

Through carrying work for over a decade, we have built vast amount of experience especially in the field of sustainable water management. And because of our societal mission, we want to openly and freely share knowledge that we think is key to improve the sustainable use of water resources all around the world.

For this we are publishing GSI Technical Papers. The objective of these papers is to describe methodologies and approaches that we have developed and/or used in our work on sustainable water use. You can freely download the papers and use them for your own benefit.

Kuiper, D. Zarate Torres, E. Fernandez Poulussen, A. 2018. GSI Technical Paper 2: Sustainable water use in agricultural supply chains – The WaterData4Action Approach. Good Stuff International. www.goodstuffinternational.com.

References and further reading:

[i] Good Stuff International (2019) Geographic Agricultural Water Footprint Calculator. http://www.goodstuffinternational.com/index.php/en/our-work/tools/gawfc-tool

[ii] Good Stuff International (2019) Watersheds Information System (WIS) https://watersheds.pythonanywhere.com/

[iii] Good Stuff International (2019) Blue-Thumb-Up (BTU) Web app. https://www.bluethumbup.org/

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[vi] Lehner, B., Verdi, K., Jarvis, A. (2008): New global hydrography derived from spaceborne elevation data. Eos, Transactions, AGU, 89(10): 93-94. https://hydrosheds.cr.usgs.gov/overview.php

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[viii] Water risk Filter V 5.0 (2018). WWF Water Risk Filter. http://waterriskfilter.panda.org/

[ix] Aqueduct (2019). WRI Aqueduct Water Risk Atlas 3.0. http://www.wri.org/our-work/project/aqueduct

[x] Good Stuff International (2017) GSI Technical Paper 1: The Water Balance as a fundamental methodology to inform sustainable water management. http://www.goodstuffinternational.com/images/PDF/GSI_Tech_paper_1_Water_balance_as_fundamental_methodology.pdf