Developing a water footprint for business resilience

Christopher White discusses the basis behind developing a water footprint and how it can support business and investment decisions

The hidden cost of water

Water usage currently seems to be at the tail end of any sustainability agenda. Yet to grow and remain financially competitive, many businesses rely on the affordability of water across their whole value chain. Given that water demand for agriculture and power generation is expected to increase by 30 to 50% (and predicted to outstrip supply) by 2030 (1), it is not unreasonable to expect water prices to rise significantly, perhaps even mirroring the acute recent price rises of other resources such as oil and natural gas.

The European Commission reported in August 2010 (2) that water scarcity was an increasingly frequent and worrying phenomenon that affects at least 11% of the European population and 17% of EU territory.

Challenges to business and the role of the water footprint

Businesses have been talking about water conservation for decades. They would be quick to point out advances made in reducing water usage and wastewater treatment (hence their water footprint) within direct operations, due to the positive impact on operational cost savings and increased competitiveness. Beyond the factory door however, data on water usage within the supply chain becomes more sketchy, often because suppliers are in the agricultural sector, or from overseas.

Furthermore, the concept of water conservation should go beyond the amount of water that matters for the business alone. Within each water catchment it should look at the competition for supply from other water users, such as communities, other industries and the biodiversity of natural habitats.

Developing a *water footprint* can create a more holistic picture and provide ways of quantifying water usage and its impact through the supply chain. Water footprinting has some way to go before catching up with carbon footprint development – the detail is more involved, information is less easy to come by and standards institutions are still developing a consensus approach. However, there is meaningful guidance available from governments (3), institutions, including Ceres (4), EIRIS (5), Carbon Disclosure Project (6), Institute of Grocery Distribution (7), Lloyds (8) and some leading food and beverage companies, Coca-Cola (9), Marks & Spencer (10), Unilever (11), SAB Miller (12) to name but a few.

The challenge now for business is how to take practical steps to determine and collect pertinent data. From here, business decision support can be readily achieved, integrated with other information to deliver a clear strategy and reasonable anticipation of risks over the next 10 years or so.

The business risks of water scarcity

Water scarcity risks to business include:-

- Physical risks – lack of water availability, interruption of supply, reduction in water quality.
- Regulatory risks – more stringent targets, restrictions of supply, which are likely to lead to water supply and treatment price rises.
- Reputational risks – competition for supply, food safety.
- Financial risks – increased water supply and water treatment costs, supply chain cost increases.
- Investment risks (omitting water scarcity in any Mergers and Acquisitions due diligence).

Impact on biodiversity is also a subject of increasing public scrutiny. The social, aesthetic and economic value of healthy aquatic ecosystems is integral to each individual community and associated livelihoods.

Knowledge of potential water scarcity hot spots across the supply chain will become increasingly important to any business strategy, as well as keeping abreast of potential technical or socio-economic solutions. From an investment perspective, it would be prudent during any acquisition to be aware of the degree of "water richness", in the same way that certain industries have moved to countries with cheap labour. In addition, future investment potential within any existing company portfolio should consider water availability both as a key performance and key risk indicator.

Water management therefore needs to be included as part of a wider *water stewardship* that addresses a more holistic approach (Fig.1) related to a business's licence and freedom to operate, as well as opportunities to increase market share through brand enhancement and competitiveness. Developing some kind of *water footprint* can help identify such issues.

For it to work, water stewardship also requires a strong communication with both internal and external stakeholders. Internally, this involves

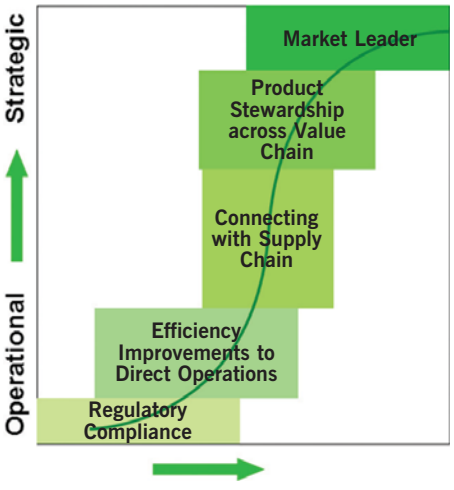

Figure 1. Implementing a more holistic approach to corporate water management.

empowering and communicating between many parts of a business; from operational engineering, environmental management, finance and procurement through to senior management and the board of directors. External stakeholders will include regulators, other water users, conservation groups and more.

It is also vital not to tackle water stewardship in isolation or with tunnel vision. The linkages between water footprints, energy, carbon footprints and food production are key to future company management and investment strategies. There therefore needs to be a strategic approach that addresses the whole water cycle, and carbon and energy requirements throughout the supply chain. This may well be embodied in a life-cycle assessment (LCA) or an enterprise risk management (ERM) approach.

Developing a water footprint and measuring performance

Water footprinting is a way to quantify water consumption and to understand where, in any given scenario, the most significant water use occurs through the supply chain. Specifically, it has been developed to assess how much potable water is used, how much waste (polluted) water is subsequently created and to what extent rainfall contributes. In water footprint terms, these are denoted as blue, grey and green waters, respectively.

Many will be more familiar with the term "carbon footprint" to quantify greenhouse gas emissions. Both types of footprint complement each other but there is a subtle and important difference. In a global carbon strategy an emission could occur in one place and be offset by carbon reduction somewhere else. However, in a global water strategy, the resource is location-specific, as water use creates a local impact that can only be mitigated in the same place. Such finite sources of water are also shared between a number of stakeholders including local communities, agriculture, natural habitats and industry. Water footprints therefore have a greater emphasis on social, as well as environmental and economic, considerations.

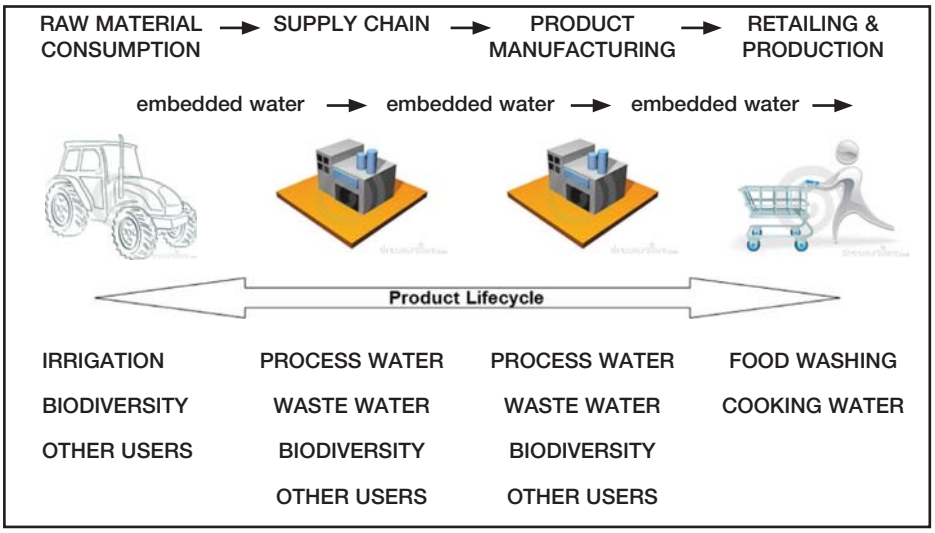

Figure 2. Developing the water footprint of a food product.

Water footprints can be expressed in a number of ways. Firstly, the bigger picture can be viewed, for example, by considering the water footprint of the UK. This provides a useful context for how much water we actually import through what is "embedded" within any crops purchased overseas. The World Wildlife Fund (13) estimated that around 73% of the UK water footprint was attributable to growing food, whilst 62% of this figure is from food imported from other countries and consumed within the UK.

So the UK actually imports a considerable portion of its total water footprint, some of it from regions experiencing even more acute water scarcity. For example, the UK relies on Spain for around 3% of its water footprint, primarily through the olives, oranges, grapes, rice and meat that we import.

Spain is also the largest supplier of tomatoes to the UK. Whilst there is likely to be a greater impact on the water resources in some parts of Spain than there is when they are home-grown, it may however be more carbon efficient to grow them there. This shows that to determine the most sustainable approach overall, it therefore becomes important to consider the nexus of water, carbon and food and not treat each issue in isolation.

Water footprints can be determined in a variety of ways, such as water consumed per company, per facility, per product, per kilogram of product, per unit of energy etc. Note that water is often and traditionally viewed in terms of quantities withdrawn because that's what water flow meters measure. This can be quite different to actual amount consumed, hence the need to look at processes in more detail.

A number of water footprints have already been determined by companies and institutions for particular food products. For example:-

- A 330 ml tin of Coca-Cola (14) requires an average of 200 litres of water to grow and process the sugar.
- 16,000 litres of water are required to feed and grow the cattle to make one kilogram of beef.
- On average, producing one tomato (weighing 100 g) evaporates about 1.4 litres of green water and 6.1 litres of blue water, and pollutes nearly 0.7 litres of freshwater – a total of 8.2 litres per tomato (15).

As the saying goes, "what you can measure you can manage". Developing this sort of metric raises awareness for which product categories are most water intensive and where the most intensive uses of water are located within the product's supply chain (Fig. 2). From these data it is then possible to pinpoint high risk areas and gauge the probability and magnitude of business impact, identify "low hanging fruit" operations that could yield biggest water reductions and additionally develop a benchmark through which future improvements can be measured and reported.

There is currently a global water footprint methodology which was

jointly developed by the Water Footprint Network (WFN) (16), its 139 partners, and scientists of the University of Twente in The Netherlands. The Water Footprint Assessment Manual can be downloaded for free from the WFN website (16). This methodology sets out in detail how to assess and quantify water usage to enable it to become more sustainable and measureable against future goals. As always the challenge is having sufficient data to determine an in-depth water footprint. An ISO standard on water footprinting is also likely to be published in the future.

Tools are also being created to help understand the impact of water scarcity impact and to develop water footprints. Some examples are shown in Table 1.

Water footprints can provide a real perspective on just how much water is used in a particular food product, but this is only part of the story. They do not (nor are they intended to) address the severity of the environmental impact on location. So having defined a *water footprint* and determined where significant water resources are used within the supply chain, the next steps would be to look at how sustainable such impact is (on an environmental, social and economic basis). From there, any future business strategy to manage risk or identify opportunities can be determined. Depending on how much water is available at operational locations and throughout the supply chain, it may not necessarily be the largest water user creating the biggest impact on resources.

Water footprint data requirements

Put simply, the starting point is: "What do you already know?" This is likely to be knowledge of a facility's water balance, with water meters measuring input prior to usage and then output quantities to any wastewater treatment plant and final discharge offsite. You may also have water efficiency measures such as routine monitoring for leaks, water recycling and more, from which a facility or product water footprint can begin to be established.

To progress further there are many checklists available (within many of the references mentioned) for companies to then look in more detail into water usage within direct operations or indirectly through supply chain contributions. A useful start for assessing water within any supply chain is given by the Institute of Grocery Distribution (7). For a detailed list of water footprint questions it is worth consulting the Carbon Disclosure Project's Water Disclosure List (21).

Checklists will include a range of strategic and operational questions from which a water footprint should provide some quantifiable evidence, such as:-

Strategic

- How secure are your water supplies?
- Is your facility or supplier located within a water scarcity or climate change prone region?
- Have you considered how population growth, climate change, product yield, regulation etc. could affect your business in different parts of the world?
- Do you have any contingency plans to respond to risks such as supply disruption, commodity price increases etc?
- Have you considered water risks within your supply chain and identified where the critical risks are located (for example, in packaging manufacture, food safety, fertiliser usage)?
- Is there sufficient communication, information exchange and coherence of approach with internal and external stakeholders (employees, investors, regulators, community, customers etc)?
- Have you moved from risk identification to risk management for what is within and outside of your control?

Operational

- How accurate are your data used to develop a water footprint?
- Have you evaluated water risks in terms of probability of occurrence, their likely magnitude and how such risks could be managed? This could include an evaluation of water infrastructure, storage capacity to maintain water supply during disruption, possible long term need for increased CAPEX, OPEX etc?
- Do you know your direct and indirect water use, including peaks in demand, water quality, wastewater treatment challenges, irrigation challenges, degree of water reducing technologies already in place?
- Do you actively manage water consumption and its linkage with energy consumption?

Informed business decisions for future business resilience

Bearing these sorts of questions in

TOOL	DEVELOPER	AIMS TO
WBCSD Global Water Tool (17)	World Business Council for Sustainable Development	Provide global portfolio overview of which sites are in water stress areas
Aqueduct (18)	World Resources Institute	Provide an on-line global database of water risk at sub-river basin level
Watershed Risk Assessment (19)	The Nature Conservancy	Create a methodology to assess impacts within a river basin
GEMI Local Water Tool (20)	Global Environmental Management Initiative	Set a questionnaire to assess risks per site
Aqua Gauge (4)	CERES	Develop water management strategy and benchmark against peers. Help investors assess the quality of corporate water management

Table 1. Some tools being used to study water scarcity impact and to develop water footprints.

mind, the following process will then set a path for the type of assessment needed, probably undertaken as a phased approach to be able to reflect and then build on collected knowledge.

Step 1: set a benchmark for what information is available (see above)

Step 2: select the relevant data for your organisation

This step can be achieved through developing ideas from various departments within a company (and also consulting with external stakeholders, perhaps for a more independent insight). A collective approach should be able to identify further (or better accuracy of) data to collect, to then build a more detailed water footprint as an aid to help prioritise critical risks. As part of this process it would be worth making comparisons with peers within the food sector using recent reports of companies surveyed, for example, CERES (22), Carbon Disclosure Project (23) and ERIS (24). These and other reports mentioned provide a useful insight to the food and beverage sector as a whole, as well as to what extent similar companies have tackled water stewardship and have applied a water footprint approach to their business.

You may find, for example, that the most financially material impacts are increased costs related to food processing and agricultural input price. More data and deeper scrutiny may require factory sub-metering of water use and closer ties with food growers and the sustainability of supplier cultivation practices overall. Here's an example of how data might be used for a water footprint: to assess the potential for reducing *green* water use in crop growth through exploring possible increases in land productivity; reducing the use of *blue* water through optimising of any irrigation; and reducing the *grey* water footprint through use of less fertiliser and pesticides, improving plant uptake and less leaching to rivers.

Having completed a gap analysis of what data it would be useful to collect, you can turn your attention to some detailed consideration of vulnerabilities and risk exposure at a company level. There may still be gaps and uncertainties within any given programme of data gathering, but using a sensitivity analysis (Step 3) will provide some structure for moving from risk identification to risk management.

Step 3: use information to understand risk and potential impact

Step 3 uses the information gathered in Step 2 to obtain a better understanding of the probability of occurrence and the potential magnitude of impact. A company could consider identifying scenarios resulting from possible "triggers" and "effects". This type of sensitivity analysis can then also help a company ascertain how risk may vary between regions and countries, and how this impacts both positively and negatively on cost.

Step 4: develop a higher level analysis

A fourth step could follow to develop a higher level "what if" scenario analysis, examining how water scarcity and climate change modelling could potentially affect the long-term resilience of a business, its profitability, reputation and implications to food safety, right through to consumer demand.

In conclusion, setting a water footprint will in turn enable future targets and goals to be set towards a more sustainable and resilient operation, for example, by increasing production growth whilst using fewer resources. The water footprint will also provide data and interpolated risk factors that will typically translate into real business issues, such as business continuity, social license to operate and brand value, all of which are increasingly becoming key drivers of investor interest.

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