



Water valuation Building the business case



wbcSD water

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Leveraging its strong relationships with stakeholders as the leading advocate for business, the Council helps drive debate and policy change in favor of sustainable development solutions.

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Printer: Atar Roto Presse SA, Switzerland. Printed on paper containing fiber certified 100% to FSC labeled paper according to the mixed credit system, or certified 90% to PEFC labeled paper according to the percentage average method. 100% chlorine free. ISO 14001 certified mill.
ISBN: 978-3-940388-98-8

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Foreword

Water is life. Without water there would not be life on Earth. We all depend on water – people, business and ecosystems. At the same time, people and business also impact water. We use it without realizing its real value and often take the resource itself and the services it provides for granted.

Water availability is increasingly limited. Globally, water resources are constant, but if current trends continue, water demand is predicted to increase by 55% worldwide between 2000 and 2050, with some industries increasing much more, such as manufacturing by 400% and electricity production by 140% (OECD, 2012). Water resources will not allow for such growth without an increase in the productivity of water use. Business as usual is simply not an option and reversing this trend is imperative.

How? We need to stop wasting and mismanaging water. The unsustainable use of water can be partly attributed to the fact that we do not pay the full cost of using it. This may be due to subsidies or because we do not account for the societal costs linked to its use. This is where business can play a positive role. Companies impact and depend upon water. By looking at the value of the water they use in their operations, they can better inform management actions and limit wasteful practices.

This publication, *Water Valuation: Building the business case*, aims to demonstrate the business case for companies to engage in water valuation and is supported by a review of 21 business case studies that illustrate why and how different companies have carried out water valuation. It is a first response to *Vision 2050*, a WBCSD report that lays out a pathway leading to a world where 9 billion people live well, within the limits of the planet, by 2050 (WBCSD, 2010). *Water Valuation: Building the business case* paves the path towards the integration of true water values and true water costs into decision-making.

I deeply believe that progressive businesses need to look at their externalities so as to understand and manage their impacts and dependencies on natural resources, and the way these interact with societies and economies. I strongly encourage all companies to start tackling this issue, accounting for the real value of the water they are using, and to do it now, before it is too late.

A handwritten signature in black ink, appearing to read 'Peter Bakker'. The signature is stylized and includes a small mark at the end.

Peter Bakker
President

The business case for undertaking water valuation – a summary

Companies can undertake water-related valuation to provide better data and understanding to inform various decisions that businesses increasingly need to make. Such applications include:

- 1) Option (investment) appraisals
- 2) Water use efficiency
- 3) Water allocation and shared value
- 4) Pricing for water usage, water services and products
- 5) Damage and compensation assessments
- 6) Sustainable financing options
- 7) Conservation actions and offsetting
- 8) Reporting performance.

The knowledge, understanding and outcomes gained by undertaking such valuations can create numerous interrelated benefits. In all cases, decision-making can be enhanced. Maintaining and enhancing revenues, reducing costs, managing risks, and enhancing reputation may also be achieved.



1 Enhance decision-making

Undertaking water-related valuation tends to enhance decision-making in the following ways:

- **Improve sustainable decision-making**
All water-related valuation studies improve the sustainability of decisions made by companies. When undertaken comprehensively, valuation ensures that broad environmental, social and economic issues and trade-offs are considered, integrated and made more comparable.
- **Inform mindsets, behavior and actions**
The process of undertaking water-related valuation studies enhances the awareness of internal company staff and stakeholders at all levels in relation to the different values businesses and stakeholders generate and hold, and the impacts and benefits that company activities and decisions may have.
- **Enhance collaboration**
Undertaking water-related valuation studies often involves bringing together different experts from within a company to share views and information, which can improve business results.

2 Maintain and enhance revenues

Water-related valuation can help ensure that revenues are maintained and enhanced:

- **Maintain license to operate**
Water-related valuation can help highlight the role businesses play for society and local communities, and demonstrate how responsible companies are being with their operations, thereby maintaining a license to operate and maintaining their revenues.
- **Evaluate new revenue streams**
Studies that involve valuing water-related ecosystem services, particularly when evaluating an individual's willingness to pay for improvements, can help evaluate the potential nature and scale of new revenue streams, such as payments for ecosystem services.
- **Improve pricing**
Valuation studies, particularly questionnaires on the willingness to pay, are ideal for providing businesses and governments with relevant information to inform pricing. This may relate either to the pricing of water services or company products with a strong association with water.
- **Justify demand for products**
In certain situations valuation can be used to help justify expenditures on certain activities or the need for certain products, for example by demonstrating environmental and social values that are not obvious.
- **Focus product development**
Water-related valuation can be used to help improve product development, for example by designing specifically to reduce the water needed to make or use a product, or determining the potential value of different costs and benefits associated with using a product.

3 Reduce costs

Water-related valuation can help reduce company costs:

- **Justify infrastructure investments**
Valuation can play a key role in helping to justify investments in infrastructure, including the use of natural or green infrastructure as an alternative to man-made interventions. This may not only reduce costs, but may also lead to additional societal benefits.
- **Enhance investment planning**
Water-related valuation can help inform investment planning, in particular by helping to compare trade-offs, but also by revealing cost savings and externality benefits.
- **Improve operational efficiency**
Valuation can help identify and quantify cost savings from improved operational efficiency throughout the value chain. For example, this may be in terms of water use or associated energy use by applying alternative and innovative processes.
- **Inform social and environmental liabilities and insurance premiums**
Companies can undertake valuation to help eliminate potentially harmful outcomes and to ensure that any necessary compensation payments or associated insurance premiums are set at an appropriate and fair level, which may save money.

4 Manage risks

Water-related valuation is ideal to help evaluate and manage a broad range of risks:

- **Secure supplies**
Water-related valuation can be used to highlight where the security of water supply may be compromised due to over-use or from ecosystem degradation, and to justify existing or alternative water resource allocation arrangements or enhanced watershed management and the optimal societal use of water.
- **Assess risks**
Linked to securing supplies, valuation can be used to assess and manage a broader range of potential water-related risks, such as price rises, new environmental markets, droughts and floods.
- **Maintain license to operate**
The use of valuation can help identify and manage risks, thereby maintaining a company's license to operate.

5 Enhance reputation

Water-related valuation can be used to help enhance brand value and reputation, which in turn can lead to increased revenues, reduced costs and potentially an increased share price:

- **Enhance transparency**
Valuation enables the provision of greater transparency to shareholders and stakeholders in relation to the actual impacts a company is causing, therefore engendering greater trust.
- **Demonstrate shared value**
Valuation offers a means of evaluating and potentially demonstrating that a company is creating shared value (i.e. generating net societal value to stakeholders in addition to generating financial value for shareholders).
- **Demonstrate leadership in sustainability**
Given the embryonic status of environmental valuation within a business context and its potential to enhance sustainability, companies that embrace and help mainstream water valuation will be seen as sustainability leaders.



1 Water valuation: a growing issue for business

Understanding the value of water and the related services it provides will benefit society as a whole and the long-term sustainable interests of the business community. On the one hand, it will improve water allocation for competing uses, such as agriculture, industry and the environment. On the other, it will help better assess and inform price setting to enhance collection of the funds necessary to finance the water infrastructure needed to provide clean water for everyone. As all businesses depend or impact upon water in some way, the topic is of considerable relevance to all.

Intensifying global demand for water, diminishing supplies and exacerbated climate change are resulting in stronger associated government regulations. Part of the recognized global solution is to adopt integrated river basin management (IRBM)¹. This involves managing both the supply and demand of water within a watershed while considering the use of water by different stakeholders and the various roles that natural ecosystems play in the water cycle.

“Intensifying global demand for water, diminishing supplies and exacerbated climate change are resulting in stronger associated government regulations.”

Integral to IRBM is understanding the value of water and using this to improve its management and allocation. Although valuation is usually best undertaken to determine monetary values, it is not always necessary or possible, and assessing qualitative values can sometimes suffice to better inform decisions. In addition, IRBM also aspires to recover the full cost of using water through improved pricing policies that reflect environmental and societal impacts from water use and contaminants.

As well as increased legislation, there are associated global business-related initiatives, such as the Rio+20 call for integrated sustainability reporting and the

banking sector’s Natural Capital Declaration. The latter calls for governments and the private sector to facilitate the internalization of environmental costs, such as water use. This global move towards better understanding and pricing the true value of water will give rise to significant business risks and opportunities.

This publication highlights the business case for companies to engage in valuing water to enhance their decision-making processes. It is informed by a brief review of 21 water-related valuation studies, further details of which can be found on the WBCSD website at www.wbcsd.org.

It will also be supplemented by two WBCSD documents to be published in 2012-2013:

- *Water Valuation: Introduction to concepts and techniques for business* further explains some of the concepts associated with valuing water;
- *Why sustainable watersheds are important for business* reviews how businesses can benefit from the adoption of a broader watershed approach to their water management.

¹Sometimes referred to as integrated water resource management.

2 The relationships between business and water

All businesses depend and impact on water in some way, either directly or indirectly. While most companies are water users, other companies may be water providers. Figure 1 highlights some of the main links between different businesses and water. In addition, the diagram reveals the underlying role that ecosystems such as forests and wetlands play in the overall interrelationship between businesses, human activities, water and the environment.



Direct water use

- 1 Dam providing hydroelectricity
- 2 Industry abstracting river water
- 3 Fields irrigated by abstracted river water
- 4 Water utility treating and providing water
- 5 Industry abstracting groundwater
- 6 Transport and recreational use

Indirect water use

- 1 Industry using virtual water embedded in crops for processed food
- 2 Water treatment partly dependent on natural water filtration of wetland
- 3 Game fishing

Water impacts

- 1 Deforestation for timber production leads to flooding downstream
- 2 Industry discharging effluent to river
- 3 Flooding of houses and businesses
- 4 Agriculture effluent to river

- Water abstraction → (light blue arrow)
- Water transfer → (dark blue arrow)
- Effluent discharge → (red arrow)
- Water embedded in product → (yellow arrow)

Figure 1: Links between business and water

Companies may use water directly because they need it for their operations. For example, water may be used within the product (e.g. beverages), in the process, such as for extracting (e.g. mining), cleaning (e.g. food and clothing) and cooling purposes (e.g. thermal power plants), or simply for consumption/use by employees (all companies). Companies may also depend on water indirectly as a result of water reliance within their value chain. Many products have upstream supplier dependencies on water, for example a food manufacturer's use of crops and a clothing manufacturer's use of cotton, which are highly dependent on water. In addition, downstream consumer dependencies on water exist, for example, in terms of use of appliances (e.g. washing machines and power showers), cleaning of products (e.g. cars and reusable diapers), and maintaining of products (e.g. plants and grass lawns) that require water consumption.

Companies may also depend on certain habitats (ecosystems) such as forests and uplands that help to regulate the flow and quality of water (e.g. towards those industries located downstream).

Some companies provide water to others as part of their business. This may either be by abstracting water from rivers, lakes, reservoirs or groundwater, or by treating wastewater, or both. Water-using companies may also provide their own water, for example from their own abstraction, recycling or water treatment plants.

Companies that use and/or provide water may also impact water and water bodies directly through abstraction, which depletes water quantity, or by discharging effluents, which may reduce water quality. In addition, indirect water impacts may occur through habitat modification (e.g. damaging or restoring habitats) that in turn reduce or enhance the natural regulation of water in terms of its flow and quality. This can, for example, cause or reduce flooding and change the quality of water for those located downstream.

3 Increasing demand, dwindling supply and climate change

Various studies predict a growing discrepancy between global water supply and demand. According to *Charting our Future Water* by the 2030 Water Resources Group (2009), global water demand may be 40% greater than the currently available water supply by 2030. The Organisation for Economic Co-operation and Development predicts that demand for water will grow by around 55% by 2050, and that by then, more than 240 million people will be without access to improved water supplies (OECD 2012).

The situation is likely to be exacerbated by climate change. The Intergovernmental Panel on Climate Change states with “high confidence” that changes in climate have the potential to seriously affect water management systems (IPCC, 2012). The National Oceanic and Atmospheric Administration of the United States Department of Commerce also points out that over the past few decades, the El Niño and La Niña weather patterns in the equatorial Pacific Ocean, which often give rise to extreme droughts and floods, appear to be increasing in frequency (NOAA, 2012).

Continued water degradation will add to the problem. According to the United Nations: over 80% of untreated sewage is discharged into water bodies in developing countries; industry discharges or disposes of 300 million to 400 million metric tons of waste into water bodies each year; and a growing number of poorly understood new contaminants, such as endocrine disrupting compounds, are being detected in water bodies (UN, 2011).

Society, and businesses, should thus prepare for increased periods of drought, flooding and degraded water quality. Depending on the local and business context, this will lead to increasing business risks (e.g. dealing with water shortages and flooding), but also new business opportunities (e.g. selling products that conserve water and treat contaminated water).

“Society, and businesses, should prepare for increased periods of drought, flooding and degraded water quality.”

4 The trend towards valuing water

Efforts to address the impending water resource problems around the world have intensified. Commonly proposed solutions feature improved governance structures and integrated river basin management (IRBM) comprising cross-sectoral water supply and demand management actions.

A core principle underpinning IRBM, which is also sometimes referred to as water resource management, is that of improved pricing of water usage. This may in theory be achieved through full cost pricing or the increasingly accepted approach of sustainable cost recovery. It is now commonly recognized that inefficiencies in water use arise because water users (e.g. agriculture, industry and households) rarely pay the full cost, if any at all, of using water. Enhanced cost recovery from water users also generates much needed financing for the significant investments required to provide clean and safe water for a multitude of uses.

Full cost pricing involves setting a price for water usage that reflects the true economic value of water resources and related services, including the societal costs (e.g. environmental damages) incurred from using them, as well as the financial costs incurred from providing the water (e.g. sourcing, treatment and distribution).

“It is now commonly recognized that inefficiencies in water use arise because water users rarely pay the full cost, if any at all, of using water.”

However, bearing in mind water access and human rights issues, a more appropriate goal would be to achieve sustainable cost recovery while assuring affordability (OECD, 2009). Sustainable cost recovery involves setting a mix of tariffs, taxes and transfers to facilitate long-term investment planning that ensures affordability for all and financial sustainability for service providers (OECD, 2009). Box 1 reproduces text from various European Union and OECD sources relating to the need for improved water pricing.

Box 1 – International calls for improved pricing of water use

The EU Water Framework Directive (Directive 2000/60/EC) states in Article 9 (1): *“Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.”*

The European Union’s Blueprint to Safeguard Europe’s Water will *“develop a consistent approach for the internalisation of costs from water use and water pollution”* and *“foster the recovery of environmental costs through the application of a portfolio of economic and communication instruments, complementing regulatory instruments.”* (EU, 2012)

According to the OECD’s Environmental Outlook to 2050 *“Water pricing can be used to signal scarcity and to create incentives for efficient water use in all sectors (e.g. agriculture, industry, domestic). Social consequences are best addressed through well-designed tariff structures or targeted measures. In combination with regulations, standards and public support to innovation, water pricing will curb water demand and make alternative water sources (such as reusing treated wastewater) competitive.”* (OECD, 2012)

“Water pricing and market-based instruments are essential for sustainable water management and should be applied consistently to support efficient water allocation within sustainability boundaries. Water prices and tariff structures have to reflect the true costs of water — internalising all externalities, including environmental and resource costs.” (European Environment Agency, 2012)

Linked to improved water use pricing are the increasing international demands for biodiversity and ecosystem services to be valued and incorporated within government and business decision-making. The Economics of Ecosystems and Biodiversity (TEEB, 2010) stresses how demonstrating the value of ecosystem services in economic terms can often help decision-making by business. This is echoed in the Convention on Biological Diversity (CBD) Strategic Plan for Biodiversity 2011-2020, in particular target 2.

Ecosystem service (and thus water) valuation is also at the heart of the OECD's Green Growth initiative (OECD, 2011) and the United Nations Environment Programme's Towards a Green Economy Report (UNEP, 2011). The green economy approach was recognized in the Rio+20 outcome document (UNCSD, 2012) as an important tool that policy-makers could use to achieve sustainable development. Box 2 highlights two international requirements for taking into account the value of water and biodiversity.

Box 2 – International calls for valuing water and ecosystem services

The fourth principle of the Dublin Statement on Water and Sustainable Development (1992), which should be read in the context of the other Dublin Principles, states that *"water has an economic value in all its competing uses and should be recognized as an 'economic good'. Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources."*

Convention on Biological Diversity Aichi Biodiversity Target 2 specifically states that *"by 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes, and are being incorporated into national accounting, as appropriate, and reporting systems."*

Although not an international requirement, the banking sector's Natural Capital Declaration *"calls upon governments to develop clear, credible and long-term policy frameworks that support and incentivise organizations to value and report on their use of natural capital, thereby working towards internalizing environmental costs."* (UNEP FI et al, 2012)

Some businesses have already started incorporating the value of water and associated ecosystem services into their decision-making (WBCSD, 2011a). Valuing water is also recognized as a leading practice in the Ceres *Aqua Gauge*, which defines a framework for 21st century corporate water management (Ceres et al, 2012).

Quantifying water use, for example by using the WBCSD *Global Water Tool* (WBCSD, 2011b) or the GEMI *Local Water Tool* (GEMI, 2012) is an important first step that can help to assess and disclose water-related risks. However, going one step further and understanding competing water uses and their different values provides a powerful added dimension to aid decision-making around business risks and opportunities.

"Some businesses have already started incorporating the value of water and associated ecosystem services into their decision-making"

5 Key challenges and responses

Although there are compelling drivers for valuing water, various hurdles exist. These make valuation somewhat challenging to perform, but they also intensify the need to develop a simple, consistent approach for businesses to value water².

1) Confusion over terminology

Assessing the true value of water requires understanding a complex set of jargon. Many basic terms are often confused and the volume of terminology is daunting.

Response: It is important to understand key terms, in particular the difference between value, cost and price (see box 3 and figure 2). As highlighted previously, the price paid for water usage rarely reflects its true value or the full cost of supplying it. The call for valuing water is partly because of discrepancies between the three terms: value, cost and price. In a corporate context, water-related valuation studies tend to either focus on valuing and enhancing values or on valuing and reducing costs.

Box 3 - Definitions of value, cost and price

VALUE

This is the importance, worth or usefulness of something. Money is generally seen as the best universal measure of value, but it is not always possible or desirable to express all values in monetary terms. Monetary values are often based on how much an individual is willing to pay for something. The market price for environmental goods like water indicates their financial value, but rarely reflects the full cost of supplying water or the full amount people would be willing to pay for it (i.e. they may have additional non-market societal value for it too).

COST

This is the value that must be given up to acquire, obtain or achieve something. In the case of water, this is often incorrectly considered to be just the amount of money paid to obtain the water, which may include a market price for water usage or the financial cost of water abstraction, treatment and delivery. However, the full cost of water should also include the societal cost of environmental damages impacting others from the loss of plants and animals from rivers drying up, and the forfeiting of potential uses of water by other stakeholders.

PRICE

This is the amount of money expected, required or given in payment for something. Water usage has a price (i.e. a market price to purchase tap or bottled water), but the price paid rarely reflects the actual value that individuals or businesses hold for it, and the price rarely includes the full cost of supply (i.e. what is given up to obtain it).

ILLUSTRATIVE EXAMPLE - PUMA has constructed an environmental profit and loss account (E P&L) that details the use of water in producing sportlifestyle products along its whole value chain. PUMA estimated the *value* of water in each watershed based on the loss in value (i.e. cost incurred) to stakeholders, such as from freshwater replenishment and ecosystem maintenance. The average value of this loss came to around € 0.80/m³ water, which was included in the E P&L as the societal cost for each m³ of water consumed in the supply chain. This cost is effectively a shadow price for water, which alerts PUMA to societal losses, but for which they currently do not pay.

2) Complex and dynamic hydrological cycle

The hydrological cycle has many different interacting components such as rainfall, river flows, groundwater, glaciers and cloud formation. The dynamic nature of the cycle is exacerbated by normal and abnormal seasonality, climate change, and El Niño and La Niña events, which can all cause extreme and sometimes difficult to predict localized and periodic droughts and floods. The dependence of all ecosystems on water and the critical role ecosystems can play in regulating water flows and purifying water adds a further layer of complexity.

Response: When assessing water risks and opportunities and valuing water, it is important to consider relevant aspects of the hydrological cycle and hydrological pathways. An appropriate time scale should be adopted for the assessment, and possible alternative climate change scenarios taken into account. Sensitivity analysis can help anticipate potential implications of fluctuations in use availability, droughts and floods and changes to the price of water.

² All these issues will be explored in more details in WBCSD's *Water valuation: introduction to concepts and techniques for business*, to be published in 2013.

3) Water quantity and quality issues

Unlike a metric ton of carbon, which has a uniform global value, the value of one cubic meter of water depends on its supply, demand and quality within a specific watershed. Water quantity also affects water quality, for example in relation to waste dilution and natural assimilation capacities. Water quality also influences the type of abstraction use possible and affects other in-situ values associated with water bodies. In addition, poor water quality can impact human health relating to sanitation, poisons, diseases and parasites, resulting in societal costs. Uncertainties around associated contaminant thresholds and tipping points, especially for highly polluted lakes, can further complicate matters.

Response: When assessing business water risks and opportunities, it is important to take into account both water quantity and quality issues. Although it can sometimes be useful and appropriate to give water an average societal value, it is important to bear in mind that water will have different values, costs and prices per cubic meter depending on its scarcity, quality and competing uses in relevant watersheds.

4) Abstraction, in-stream and water-related habitat values

Water-related values can be split into three main categories (as highlighted in figure 3) which are all interrelated.

Off-stream value (or water usage value) is the value of the services provided by water when it is taken from a water body (e.g. for domestic, agricultural and industry use).

In-stream value relates to the diverse set of values associated with water in situ (i.e. in water bodies themselves), and include angling, transport, hydropower, enhanced property values and conservation values (e.g. enjoyment gained from knowing species exist for future generations).

Water-related habitat values include values associated with water-related ecosystem functions provided by habitats. This includes, for example, the natural regulation of water flows, control of flooding, and purification of water provided by vegetated habitats and soils, in particular forests and wetland habitats.



Figure 2– Sample watershed showing off-stream, in-stream and water-related habitat values

Off-stream values

- 1 Agriculture use
- 2 Industry use
- 3 Domestic & municipality use

In-stream values

- 1 Hydroelectricity from dam
- 2 Property values enhanced when adjacent to water well above flood risk
- 3 Waste assimilation of discharged effluents
- 4 Transport & recreational boating
- 5 Game fishing
- 6 Property values decline in flood risk areas
- 7 Conservation (non use) value (e.g. of salmon or water itself)

Water-related habitat values

- 1 Trees regulate flow of water reducing flooding
- 2 Wetland filters and slows flow of water
- 3 Vegetation and soil filter water producing clean groundwater

- Water abstraction →
- Water transfer →
- Effluent discharge →

Response: It is important to take into account the full range of water values relevant to any context being assessed and any trade-offs between them. For example, too much abstraction could reduce the remaining in-stream values enjoyed by other stakeholders, and habitat destruction could lead to increased run-off and flooding and poorer water quality.

5) Different stakeholder perspectives

Water provides a multitude of stakeholder groups with various competing uses and values. These have been referred to as value perspectives, which are shaped by value drivers (Moss et al, 2003). Furthermore, different decisions may require different emphasis on the aspect of water being valued. For example: businesses and banks tend to be most interested in financial values and generating profits; governments are typically interested in economic growth, jobs and societal values; while non-governmental organizations (NGOs) may be more concerned with the day-to-day survival of local and indigenous populations and maintaining spiritual and biodiversity values.

Response: It is essential to recognize the full range of stakeholders that use water or are affected in some way by its use or impacts on it. Equally important is to consider the full range of different types of value that water provides to those stakeholders, and to bear in mind that some values (e.g. spiritual and intrinsic values) cannot effectively be converted to monetary values.

6) Ethical issues

The different values of water also raise ethical issues. Some of these have fundamental implications for valuing and more specifically charging for water use and the affordability of water services. These also link to human health, poverty alleviation and international development issues associated with water.

Response: Ethical issues surrounding water, including access to water and setting water prices, can be complex and discussions around such issues should be guided by water values, adequate and reliable infrastructure, sustainable service delivery, affordability and equity. The purpose of valuing water is not to commoditize it, but to better understand the value its use provides to different stakeholders, assist resource allocation, incentivize more careful use, and help raise revenues to invest in the sustainable provision of all forms of water-related services, including clean

and safe water for human use. For example, many of these issues have been recognized and addressed by the recent work of the UN Human Rights Council in relation to the human right to access to safe drinking water and sanitation.

7) Difficulties in valuation

Valuing water is complex. A multitude of different values linked to water exist, but few have a market value of their own, so various valuation techniques have to be used. Although many water valuation guides exist, none cater specifically to businesses.

Response: The approach to valuation does not need to be monetary, and in some cases generalized estimates or approximations are adequate. Qualitative and quantitative approaches may also be sufficient depending on the nature of the problem and of the decision to be made. The forthcoming WBCSD *Water Valuation: An introduction to concepts and techniques* publication will help fill the gap.

8) Lack of incentives to value externalities

Because many water-related values have no ties to market value, impacts (positive or negative) may not be taken into account by businesses (i.e. they are externalities). These are societal costs or benefits that are not internalized by a business and as such do not directly affect its bottom line. Expending resources to value such externalities may appear either academic or a risk in that businesses may ultimately end up paying more for them.

Response: Many initiatives and policy-makers are currently seeking to find ways to internalize these externalities through regulations, taxes and other methods, so it is in a company's own interest to understand and adapt to this situation. Furthermore, Rio+20's call for improved integrated reporting and increasing the commitment from businesses to better account for their triple bottom line (e.g. WBCSD's Reporting and Investment Project) will add to the peer pressure. Business strategies to deal with internalization include passing on costs to consumers, adopting water-efficient technologies, and locating operations where water is less scarce. In time, those companies and products using less water and reducing impacts on water quality will gain advantage over their competitors.

6 Applications for water valuation in business decision-making

Companies can undertake water-related valuation to provide better data and understanding to inform the various decisions that businesses increasingly need to make. An indicative range of such applications is identified below, with examples given from the 21 business water valuation case studies reviewed. Summaries of these are available on the WBCSD website at www.wbcd.org.

1) Option (investment) appraisals

Valuing water, and indeed other water-related ecosystem services can help evaluate trade-offs to inform the selection of the preferred option and level of investment. This includes evaluation of natural infrastructure, such as managed wetlands. **Veolia**, **Hitachi** and **South Australia Water** have used valuation to inform investment projects relating to biofuel land management options in Germany, a desalination plant in the Maldives, and catchment management actions in Australia, respectively.

2) Water use efficiency

Valuation can be used to value the nature and extent of benefits associated with more efficient water use, recycling and wastewater treatment. **EDF** assessed the monetary value of water savings resulting from reduced abstraction for agricultural irrigation in a valley in France so that they could implement water reductions and reimburse farmers accordingly. This allowed EDF to optimize other multipurpose uses, including hydroelectric power generation, and to increase the environmental flow.

3) Water allocation and shared value

Water valuation can inform the theoretical optimum allocation of water among stakeholder groups and can help determine the nature and extent to which associated stakeholder values are impacted by company actions. **The Dow Chemical Company** is using valuation in a study in the US to help understand how the value of water for different stakeholders will be affected by alternative scenarios. **Veolia** assessed alternative biofuel and land-use management options to determine the best option from both a financial and societal value perspective.

4) Pricing of water usage/services and products:

Valuation can assist with informing an appropriate pricing policy for water usage and other water services, as well as for products that entail significant water consumption. This can, for example, be based on what users are willing to pay. **Yorkshire Water** and **ITT** have both undertaken valuation questionnaires targeting the public and businesses to determine how much they are willing to pay for improved service levels in relation to water provision in the UK and US respectively.

5) Damage and compensation assessments

Valuation can help inform a suitable and fair price (or action) to compensate stakeholders affected by loss of water volume and quality as a result of company impacts. A number of situations exist where companies have faced, or are facing, significant water-related compensation claims where valuation could inform appropriate levels of payment, not least by evaluating all potential sources of abstraction and contamination.

6) Sustainable financing options

Water-related valuation can help inform suitable pricing policies to ensure long-term finances are in place and to provide incentives for behavior aimed at environmental improvements (i.e. payments for ecosystem services). **Veolia** used valuation to assess the willingness to pay of visitors and the general public to contribute towards more environmentally desirable water and land-use options at a site in Germany.

7) Conservation actions and offsetting

Valuation of water and associated ecosystem services can help assess benefits from conservation actions, for example related to biodiversity offsetting. As part of a study to evaluate potential biodiversity offset credits from a mining-related forest protection scheme in Madagascar, **Rio Tinto** estimated the value of water regulation and supply benefits provided by the forest habitat in addition to carbon sequestration benefits.

8) Reporting performance

Water-related valuation can help enhance the level and usefulness of information provided externally within company accounts and reports. **PUMA** developed an environmental profit and loss account (E P&L) that complements the annual financial report. It includes the estimated societal costs of various environmental impacts, including water use, for their whole supply chain.

7 The business case for water valuation

There are numerous business case arguments for companies to engage in water valuation. Based on the review of 21 business water-related valuation studies, five broad business case arguments have been identified.

The knowledge, understanding and outcomes gained by undertaking such valuations can create numerous business benefits, many of which are interrelated. For example, enhancing reputation can lead to increased revenues, and managing risks generally tends to reduce costs. Most business water valuation studies appear to have several associated business case arguments to justify their undertaking. For more details about the valuation studies, see the summaries available on the WBCSD website at www.wbcسد.org.

1) Enhance decision-making

Undertaking water-related valuation studies generally enhances decision-making. This is because it improves the sustainability of decisions, and the process of undertaking such valuation studies informs mindsets, behavior and actions, enhances awareness and encourages collaboration.

Improve sustainable decision-making

All water-related valuation studies improve the sustainability of decisions made by companies. This is because the aim of valuation is usually to ensure that broad environmental, social and economic issues and trade-offs are considered, integrated and made more comparable. **Hitachi** assessed the value of different environmental impacts associated with constructing and operating a desalination water supply plant in the Maldives. The approach enhanced project sustainability by considering key environmental impacts from an economic value perspective for different stakeholders at the planning stage.

Inform mindsets, behavior and actions

The process of undertaking water-related valuation studies enhances the awareness of internal company staff at all levels, as well as that of stakeholders, in relation to the different values businesses and stakeholders hold towards water and the impacts and benefits that company activities and decisions may have. **Aggregates Industries UK**, a subsidiary of **Holcim**, undertook a valuation study in relation to a rehabilitation plan for a proposed quarry extension in the United Kingdom that involved creating a lake and wetland. The valuation process itself helped inform stakeholders and regulators and gain consensus on the preferred rehabilitation option. It also raised awareness within **Holcim** of the value of using a valuation approach to assess the overall benefits of company action and legal responsibilities.

Enhance collaboration

Undertaking water-related valuation often involves bringing together different experts from within a company to share views and information, which can improve business results in several ways. **Esporão SA** used valuation to improve water efficiency in their wine production in Portugal and found that the productive teamwork involved was a key additional benefit. **Anglo American** undertook a study that assessed the financial costs associated with various sustainability issues at some of their operational sites, including saving water, and identified collaboration among staff as a significant benefit arising from the study.

2) Maintain and enhance revenues

Water-related valuation studies can help ensure that revenues are maintained and enhanced in a number of ways.

Maintain license to operate

Water valuation studies can help highlight for society and local communities the role businesses play, and to demonstrate to what extent companies are being responsible with their operations, thereby maintaining their license to operate and revenues. **Holcim's** valuation study concluded that using ecosystem valuation to inform decision-making would help the company maintain its license to operate at this and other sites. **EDP** used valuation to underline the enhancement of local uses of water, such as tourism, recreational fishing, farming and water supply, by one of its hydropower systems, thereby reinforcing its social license to operate at the site.

Evaluate new revenue streams

Studies that involve valuing water-related ecosystem services, particularly when evaluating an individual's willingness to pay for environmental improvements, can help evaluate potential new revenue streams, such as payments for ecosystem services. **Veolia** conducted a valuation study that included a willingness to pay questionnaire exploring water reuse and biofuel-related land management options for a site in Germany. The results demonstrated potential new revenue streams from visitor and customer payments at **Veolia** land holdings around the world.

Improve pricing

Valuation studies, particularly willingness to pay questionnaires, are ideal for providing businesses and governments with relevant information to inform water pricing strategies. This may relate either to the pricing of water services or company products with a strong association with water. **Yorkshire Water** conducted a survey that determined the price that public and business customers were willing to pay for different levels of service, including security of water supply, and the quality of river, drinking and bathing waters. The valuation provided useful information to inform pricing strategies and appropriate levels of company investment in the target region within the UK.

Justify demand for products

In certain situations valuation can be used to help justify expenditure on certain activities or the need for certain products. **ITT** undertook a willingness to pay survey targeted at the public and agricultural and industrial businesses in the US. **ITT** determined that the public was prepared to pay on average an additional US\$ 6.20 per month, representing US\$ 5.4 billion a year extra, on water infrastructure. This is significant in a context where political underpricing of water services over many years has led to a serious deterioration in water and wastewater infrastructure – a product that **ITT** (now **Xylem**) provides.

Focus product development

Water-related valuation can be used to help improve product development, for example by designing specifically to reduce the water needed to make or use a product or determining the potential value of different costs and benefits associated with using a water-related product or process. **Hitachi** assessed the potential financial and societal values that could be gained by farmers and society in the US and France from using a precision agriculture IT solution based on a geographic information system (GIS). Their study provided useful information as to which environmental parameters, including water and nitrogen, should be targeted for the two countries to assist in further product design and marketing.

3) Reduce costs

Water-related valuation can be used to help reduce company costs in a number of ways. There are also obvious links with arguments for reducing risks, which typically lead to reduced costs.

Justify infrastructure investments

Valuation should play a key role in helping to justify investments in infrastructure, including the use of natural or green infrastructure as an alternative to man-made interventions. This may not only reduce costs, but also lead to additional societal benefits. **Cook Composites and Polymers** used valuation to compare constructing a natural wetland storm water protection scheme to renovating a man-made system in Houston, USA. The valuation demonstrated clear financial savings and local community benefits from habitat creation. **South Australia Water** used valuation to show it is more cost-effective to implement natural water regulation controls by creating sediment ponds and wetlands than to construct a conventional water treatment plant in a watershed in Australia.

Enhance investment planning

Water-related valuation can help inform investment planning in many ways, in particular by helping to compare trade-offs, but also by revealing cost savings and externality benefits. **Lafarge** experimented with valuation to see how it could be used to inform the mining design and reclamation options for a quarry in Michigan, USA. The company identified significant potential benefits that could stem from designing the reclamation to reduce erosion and nutrient run-off.

Improve operational efficiency

Valuation can help identify and quantify cost savings from improved operational efficiency throughout the value chain. For example, this may be in terms of water use or associated energy use by using alternative and innovative processes. **Minera Escondida Limitada (BHP Billiton)** used a financial cost based approach to identify the most cost-effective projects to reduce water consumption at a mine in the Atacama Desert, Chile. **Anglo American** also used a financial cost based approach to identify potential savings from using less water at some of their operational sites.

Inform social and environmental liabilities and insurance premiums

Companies can undertake valuation to help eliminate potentially harmful outcomes and to ensure that any necessary compensation payments, or associated insurance premiums, are set at an appropriate and fair level, which may save costs.

4) Manage risks

Water valuation is ideal to help evaluate the nature and extent of potential risks associated with, for example, environmental changes relating to resource depletion and climate change, changing stakeholder opinions, and implications of new regulations and environmental markets.

Secure supplies

Water-related valuation can be used to highlight regions or sites where the security of water supply may be compromised due to overuse or from ecosystem degradation. This can then help to justify existing or alternative water resource allocation arrangements or enhanced watershed management practices and the optimal societal use of water. **Mondi** explored the volumes used and price paid for water by different users in a catchment in South Africa. This is being used to inform Mondi's forest plantation water use and broader watershed management to help ensure adequate future supplies for the company.

Assess risks

Linked to securing supplies, water valuation can be used to assess and manage a broader range of potential water-related risks. In South Africa, **Kraft Foods** developed a risk and opportunity ecosystem services tool in conjunction with **Tsb Sugar**, a potential long-term sugar supplier. The tool helped evaluate several water-related risks and associated management actions relating to floods and droughts exacerbated by climate change, payments for ecosystem services and increased water prices.

Maintain license to operate

The use of valuation can help identify and manage risks, thereby helping to maintain a company's license to operate. A collaborative network of companies operating in the Canadian oil sands is investigating the potential of applying water valuation concepts to assist in meeting the challenge of responsible energy development.

5) Enhance reputation

Water-related valuation can be used to help enhance brand value and reputation in a number of ways that can in turn lead to increased revenues, reduced costs and potentially an increased share price.

Enhance transparency

Valuation enables the provision of greater transparency to shareholders and stakeholders in relation to the actual impacts a company is causing, therefore engendering greater trust. **PUMA's** E P&L, as mentioned previously, is a good example.

Demonstrate shared value

Valuation offers an ideal way to evaluate and potentially demonstrate that a company is creating shared value (i.e. generating net societal value for stakeholders in addition to generating financial value for their shareholders; see Nestlé's 2011 *Creating Shared Value* report). **Antofagasta** is developing a valuation tool to both assess ecosystem risks and opportunities and to evaluate whether their mining operations and projects in Chile give rise to a net environmental value (including water impacts), and if not, what they need to do to ensure net environmental value is created.

Demonstrate leadership in sustainability

Given the embryonic status of environmental valuation within a business context and its potential to enhance sustainability, companies that embrace and help mainstream water valuation are seen as sustainability leaders. **The Dow Chemical Company** has set out on a mission to develop approaches to environmental valuation over a five-year period that can be used by itself and other companies. **PUMA** has also been widely recognized for the leadership it has provided with its E P&L.



8 When should businesses undertake water valuation?

Valuing water in a business context relates either to a particular water issue or to a more general environmental or sustainability context that includes a water-related issue. Either way, the need to undertake valuation to inform decision-making should follow the screening questions in the 2011 WBCSD *Guide to Corporate Ecosystem Valuation* (CEV) (WBCSD 2011a).

The screening process in the Guide states that if valuation is not mandatory, then it is only worthwhile undertaking valuation “if potentially significant business risks or opportunities are at stake”, and “if knowing the value of associated water impacts and dependencies to the company and different stakeholders will aid decision-making.”

Economic valuation is not always essential to inform company decisions relating to water management. In its 2012 *Water for Business* publication, the WBCSD and its partners (WBCSD, 2012) review numerous potentially relevant water management initiatives and tools developed for the private sector that may be preferable. This includes, for example, the *Global Water Tool* (WBCSD, 2011b), which provides a quantitative assessment approach. Another approach is *Aqua Gauge* (Ceres et al, 2012), which helps companies develop comprehensive water stewardship strategies that integrate water issues from the boardroom level down to the supplier factory or farm field.

“Economic valuation is not always essential to inform company decisions relating to water management”

A company may decide to undertake water-related valuation for any of the potential applications or business case benefits set out in this document. The advantage of valuation (whether qualitative, quantitative or monetary) is the added dimension of information in terms of understanding the nature and extent of different values gained or lost with respect to the various stakeholders. Flexibility in terms of how valuation is undertaken also allows it to be used in conjunction with other water management tools.

9 What happens after valuation?

Undertaking a valuation study is not an end point in itself. It is important to ascertain how the results can best be used both internally within a company and externally, working with stakeholders and regulators. Furthermore, it is important to find ways to link and embed valuation approaches within company processes (see the WBCSD *Guide to CEV*, 2011a).

In summary, it is important to note that valuation is only an additional tool – albeit a powerful one – to help decision-makers reach more informed decisions. Other approaches to assess and integrate sustainability thinking within company decisions exist and will continue to develop. It is up to each business to decide on the appropriate course of action it should take to best manage its water and other societal impacts.

Acronyms

EU	European Union
CBD	Convention on Biological Diversity
CEV	corporate ecosystem valuation
E P&L	environmental profit and loss account
EU	European Union
GEMI	Global Environmental Management Initiative
GIS	geographic information system
IPCC	Intergovernmental Panel on Climate Change
IRBM	integrated river basin management
IRRC	Investor Responsibility Research Center
m ³	cubic meter
MA	Millennium Ecosystem Assessment
NGO	non-governmental organization
NOAA	National Oceanic and Atmospheric Administration
OECD	Organisation for Economic Co-operation and Development
OJEC	Official Journal of the European Commission
TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UNCSD	United Nations Conference on Sustainable Development
UNEP	United Nations Environment Programme
UNEP FI	United Nations Environment Programme Finance Initiative
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

Definitions

Benefits (or value) transfer approach

An economic valuation approach in which estimates obtained by whatever method in one context are used to estimate values in a different context (MA, 2005).

Contaminant

A contaminant is any physical, chemical, biological or radiologic substance or matter that has an adverse effect on air, water, land/soil or biota. The term is frequently used synonymously with pollutant (OECD, 2007).

Cost

The amount or value of that which must be given up to acquire, obtain or achieve something. (Based on BusinessDictionary.com)

Corporate Ecosystem Valuation (CEV)

A process to make better-informed business decisions by explicitly valuing both ecosystem degradation and the benefits provided by ecosystem services (WBCSD, 2011a).

Economic value

Values measured at their “real” cost or benefit to the economy, usually omitting transfer payments and valuing all items at their opportunity cost to society (Emerton & Bos, 2004). The term economic value is also sometimes loosely used to encompass both financial (private) values and societal values.

Ecosystem services

The benefits that people gain from the environment. These include provisioning, regulating, cultural and supporting services (MA, 2005).

Environmental costs

The costs (or value) of damage imposed on the environment and ecosystems that affects human well-being (synonymous to societal and externality cost). In the context of water valuation, environmental costs may be water-related (e.g. related to water pollution) or non-water-related (e.g. the societal cost of greenhouse gas emissions).

Environmental externalities

Environmental externalities include externalities to ecosystems and ecosystem services, but they also include impacts upon people, buildings and infrastructure and other economic activities (e.g. from air emissions) (WBCSD, 2011a).

Externality

A consequence of an action that affects someone other than the agent undertaking that action and for which the agent is neither compensated nor penalized through the markets. Externalities can be positive or negative (MA, 2005).

Financial value

The importance, worth or usefulness of something that is measured in terms of market prices; sometimes referred to as private values.

Financial cost

The total amount of money (i.e. price) paid by an entity to acquire something. For water services this includes the costs of providing and administering these services (e.g. operation, maintenance and capital costs) (Wateco, 2003); also referred to as private costs.

Full cost pricing

In relation to charging for water usage (and recovering costs for water services), this means setting a price that reflects both the financial costs and societal costs of obtaining it, the latter including resource and environmental costs (based on the EU Water Framework Directive) (EU, 2012; OJEC, 2000).

Natural capital

An economic metaphor for the limited stocks of physical and biological resources found on Earth (MA, 2005).

Non-use value

The value individuals derive from knowing that environmental features are maintained (e.g. pristine habitats and iconic species) even though they do not directly or indirectly use them (WBCSD, 2011a).

Price

The amount of money expected, required or given in payment for something (OxfordDictionaries.com).

Intrinsic value

The value of someone or something in and for itself, irrespective of its utility for someone else (MA, 2005).

Resource cost

The cost of foregone opportunities that other users suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (e.g. linked to the over-abstraction of groundwater) (Wateco, 2003).

Shadow price

Prices used in economic analysis, when market price is felt to be a poor estimate of real economic value (Emerton & Bos, 2004).

Shared value

For the purpose of this document, this is defined in this context as a company generating net societal value to stakeholders in addition to generating financial value for their shareholders.

Societal costs

The cost to society of an activity, which comprises resource (opportunity) costs and environmental damages.

Societal value

The importance, worth or usefulness of something accruing to individuals and society that does not have a market price. Impacts to societal values are typically referred to as externalities.

Subsidy

Current unrequited payments that governments make to enterprises or individuals on the basis of the levels of their production activities or the quantities or values of the goods or services that they produce, sell, consume or import (based on OECD, 2007).

Sustainable cost recovery

The setting of a mix of tariffs, taxes and transfers to facilitate long-term investment planning that ensures affordability to all categories of users and financial sustainability to service providers (based on OECD, 2009).

Tariff

A water tariff (also called water rate or charge) is a price assigned to water supplied by a water utility through a piped network to its customers. It also applies to water supplied for irrigation from canals and other transfer systems. Water tariffs tend not to be charged for water itself, but to recover the costs of water storage and transport, as well as billing and collection (based on Wikipedia).

Tax

A compulsory contribution to state revenue, levied by the government on workers' income and business profits, or added to the cost of some goods, services and transactions (OxfordDictionaries.com).

Transfer

A transaction in which one institutional unit provides a good, service or asset to another unit without receiving from the latter any good, service or asset in return as counterpart (OECD, 2007).

Value

The importance, worth, or usefulness of something (based on OxfordDictionaries.com).

Valuation

An estimation of the worth of something, often in monetary terms (based on OxfordDictionaries.com).

Water-related valuation

The assessment of values (and/or prices and costs), whether qualitatively, quantitatively or monetarily associated with changes in quantity and/or quality of water and related ecosystem services.

Water services

All services that provide, for households, public institutions or any economic activity, (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater, and/or(b) wastewater collection and treatment facilities that subsequently discharge into surface water (EU WFD, 2000).

Water usage

For the purposes of this document, water usage refers to water that has been abstracted from surface or groundwater for use by, for example, agriculture, industry, energy production and households (i.e. water usage gives rise to off-stream values).

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Acknowledgements

Written by James Spurgeon, Sustain Value
Independent consultant on ecosystem and sustainability valuation

[A large number of WBCSD members and external experts were consulted for comments and guidance.](#)

Water Project Leadership Group Members

Pathway Leader

Veolia Water Mathieu Tolian

Pathway members

GDF SUEZ Elsa Favrot
Holcim Meg Garakani
Petrobras Carlos Gonzales, Bruna Stein
PwC Lauren Koopman, Jennifer Möller-Gulland, Matthias Retter, Gary Sharkey
Rio Tinto Kristina Ringwood
Shell Alfio Mianzan
Siemens Jochen Schweitzer
Suncor Brian Doucette, Kathleen Gardiner-Manning, Prit Kotecha
Xylem Leff Bennett

Water Project Working Group members

BCSD Portugal Mafalda Evangelista
ERM Jerome Rathle
Hitachi Ayako Kohno
Statoil David McKenna

Experts stakeholders

Alberta Water SMART Kim Sturgess
AquaFed Jack Moss
Global Nature Fund Tobias Hartmann
IUCN Nathalie Olsen
Trucost Alastair MacGregor
UNEP Nicolas Bertrand

WBCSD Water Project Team members

Violaine Berger
Anne-Léonore Boffi
Joppe Cramwinckel
Tatiana Fedotova

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World Business Council for Sustainable Development

4, chemin de Conches, CH-1231 Conches-Geneva, Switzerland, Tel: +41 (0)22 839 31 00, E-mail: info@wbcsd.org
1500 K Street NW, Suite 850, Washington, DC 20005, US, Tel: +1 202 383 9505, E-mail: washington@wbcsd.org

www.wbcsd.org