

# PRODUCT WATER FOOTPRINT ASSESSMENTS

PRACTICAL APPLICATION IN CORPORATE WATER STEWARDSHIP

SEPTEMBER 2010

PRESENTED BY:

*Coca-Cola*

The Nature  
Conservancy 



# Water = Life

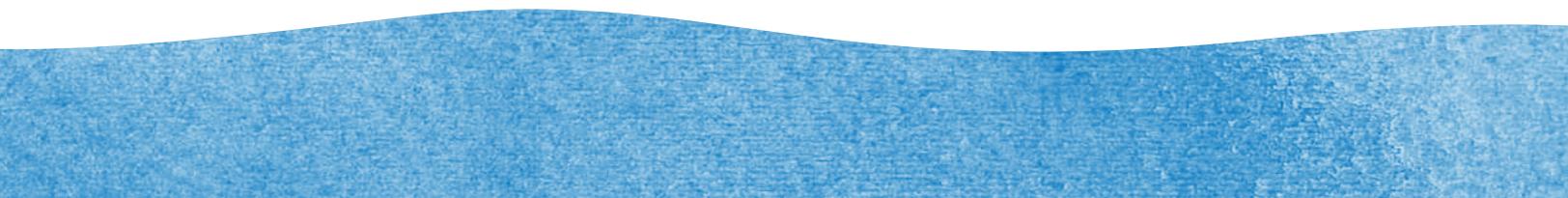
## *But did you know...*

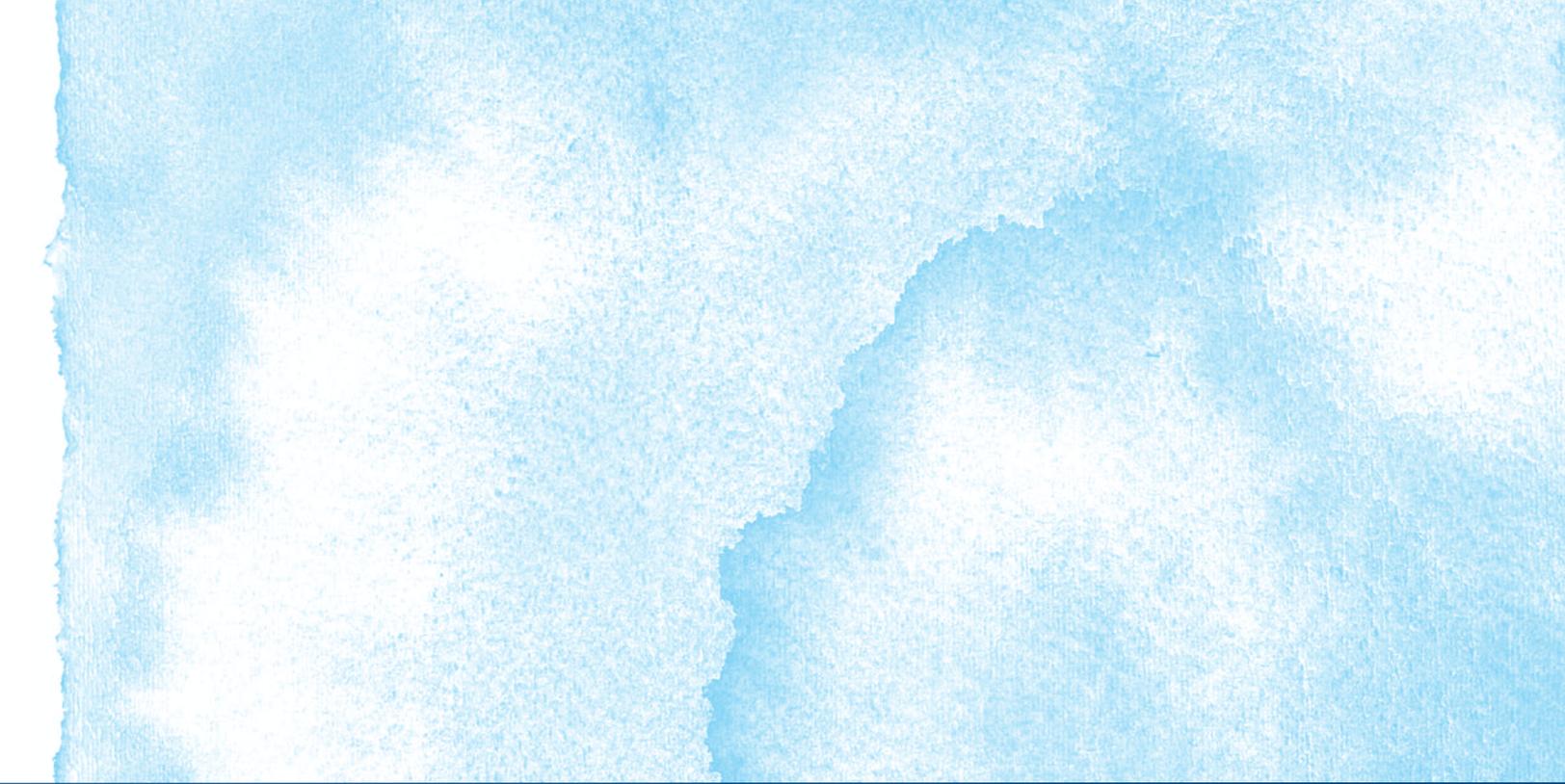
- Water covers about 70% of the Earth's surface.
  - Most of this water is undrinkable because 97% is salt water.
  - Only 1% of water is found in rivers and streams.
  - Approximately 1 billion people do not have access to safe drinking water.
  - About 6,000 children die every day from diseases associated with lack of access to safe drinking water.
  - Most of the cities where large numbers of people live without taps and toilets have plentiful water supplies.
  - Freshwater fish and other aquatic animals are considerably more imperiled than those that live on land or in the oceans.
  - It takes 1,000 times more water to grow food for an individual than to meet that persons' needs for drinking.
  - Irrigation increases yields for most crops by 100 to 400%.
  - About 70% of freshwater withdrawals are used for irrigation.
  - Water withdrawals for agriculture, assuming no gains in efficiency of use, are expected to increase by 45% by 2030.
  - The Earth's water is finite, but it is infinitely renewable.
- 



## ACKNOWLEDGEMENTS

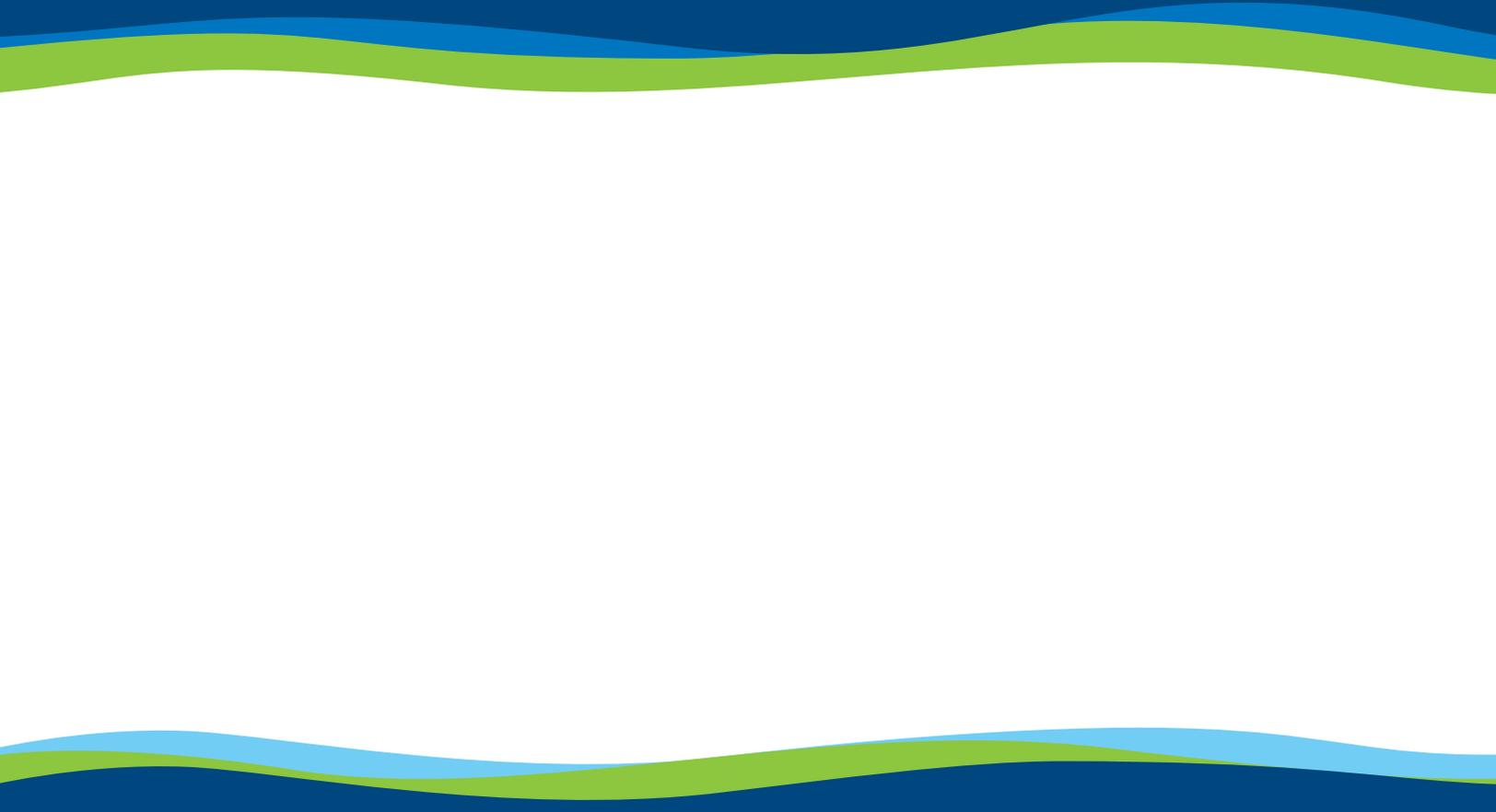
This report is the result of collaboration between **The Nature Conservancy** and **The Coca-Cola Company**. It also represents the product of significant contributions of individuals from a number of other organizations:

- The **Water Footprint Network** provided support for pilot study efforts and guidance through publication of the *Water Footprint Manual*.
  - **Coca-Cola Enterprises Inc. (CCE)** was a key partner for the Coca-Cola® water footprint pilot study, providing significant data and other resources.
  - Researchers at the **Twente Water Centre, University of Twente, The Netherlands** conducted the technical work for the Coca-Cola water footprint pilot study.
  - **Denkstatt**, in cooperation with the **Institute for Water Quality, Resources and Waste Management at the Vienna University of Technology**, conducted the beet sugar water footprint pilot study.
  - **LimnoTech** conducted the orange juice water footprint pilot studies and contributed technical expertise and writing support for this report.
- 

A watercolor-style background in shades of light blue and white, with a torn paper edge effect on the left side.

WHEN THE WELL'S DRY,  
WE KNOW THE WORTH OF WATER.

— Benjamin Franklin

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# WATER IS A FINITE RESOURCE, BUT IT IS INFINITELY RENEWABLE.

When properly managed, even large volumes of water use can be sustainable in locations where the resource is sufficient to support the use. The impacts of a water use need to be assessed in the context of all water uses in the watershed in order to define cumulative impacts, shared risks and appropriate response strategies.

Traditionally, calculations of how much water a business uses have been based on the quantities used directly in producing that company's products. In recent years, businesses have been encouraged to look at their water use more comprehensively and investigate the water used throughout their supply chains. Together with The Nature Conservancy ("the Conservancy"), The Coca-Cola Company ("the Company") has been one of the companies leading the way on developing a "water footprint assessment" methodology through active participation in the Water Footprint Network.

A product water footprint is the total volume of freshwater consumed, directly and indirectly, to produce a product. A full water footprint assessment considers the impacts of this water consumption, as well as appropriate response strategies to minimize those impacts.

Water footprinting and carbon footprinting are very different assessments. With carbon footprints, one can compare similar products (if the same boundaries and methodology are used) knowing that lower carbon (or zero carbon) is better. On the other hand, water footprints help identify where water is used in the production of a product and what type of water is used. Water is local and thus water footprint numbers must be considered in the context of the local watershed. The number associated with a water footprint is not the end game, but rather a starting point to addressing the sustainability of the water source.

This report, prepared by The Nature Conservancy and The Coca-Cola Company, examines the concept of product water footprinting and its practical application for addressing the growing challenges related to freshwater. Three water footprint assessments were conducted for the Company:

- Coca-Cola<sup>1</sup> in a 0.5 liter PET bottle produced by Coca-Cola Enterprises Inc. (CCE) in the Netherlands;
- Beet sugar supplied to Coca-Cola bottling plants in Europe; and
- Minute Maid® orange juice and Simply Orange® produced for the North American market.

Water footprint assessments can be helpful in supporting corporate water stewardship efforts by providing a tool to measure and understand water use throughout the supply chain. They can

<sup>1</sup> Coca-Cola refers to the product brand.

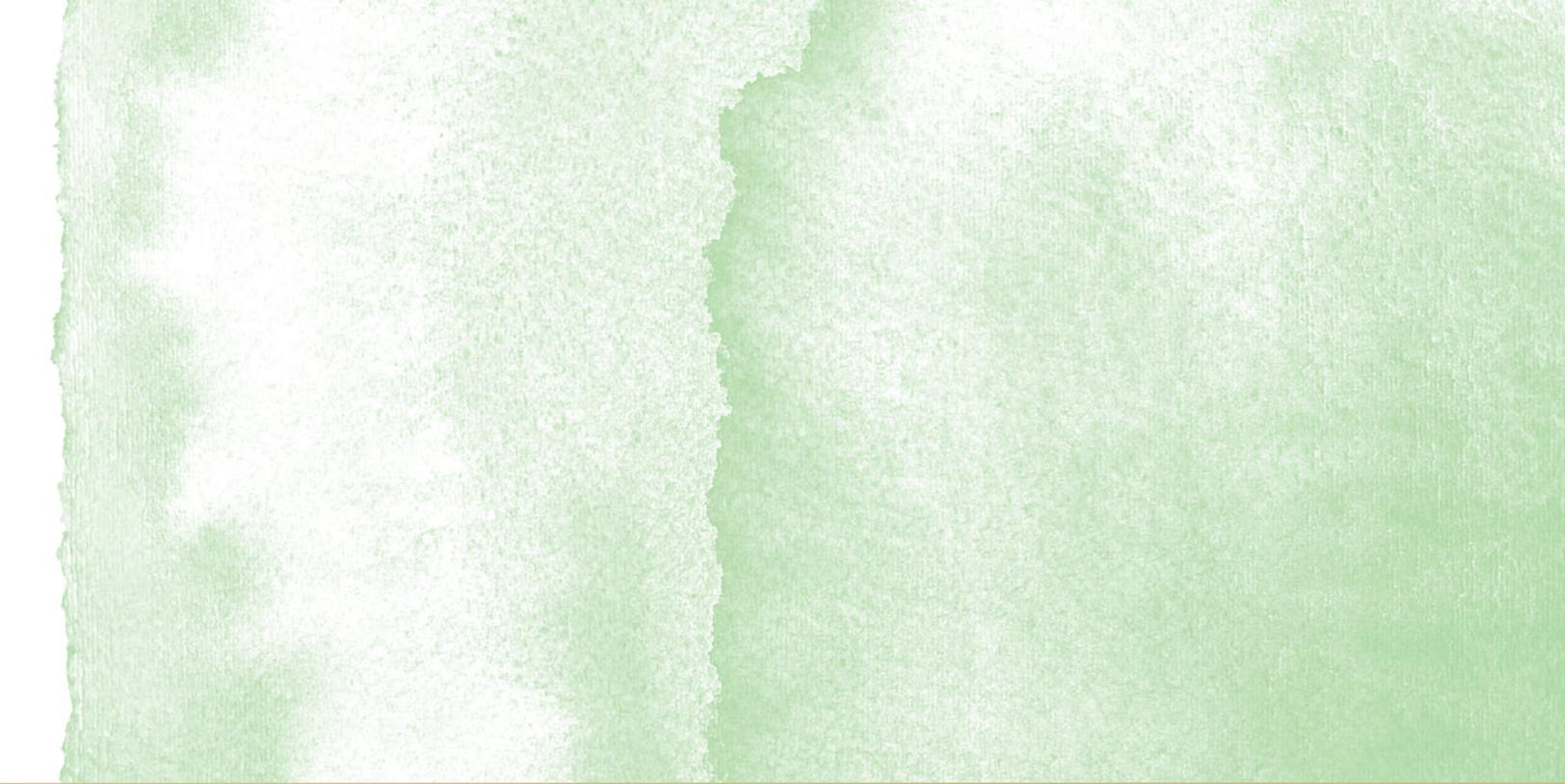
provide valuable insight into the largest components and locations of water consumption, the potential effects on local watersheds, and future water availability to serve the collective needs of communities, nature, producers, suppliers and companies. In this way, water footprint assessments can contribute to an increased understanding of a business' water-related risks and vulnerabilities.



General observations and implications for product water footprinting follow:

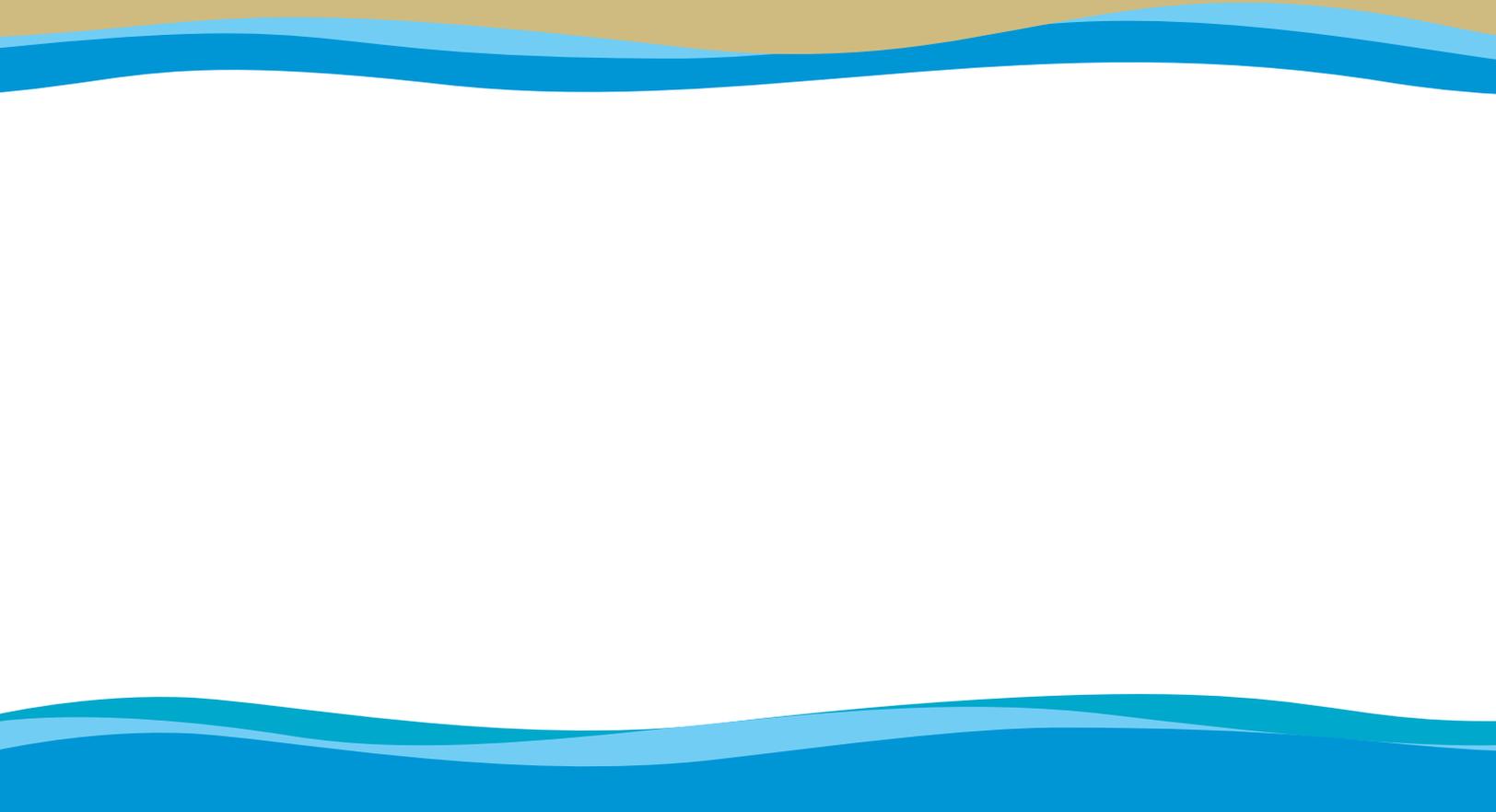
- The value of product water footprinting is its ability to disaggregate water use by component (i.e., direct and indirect use; green, blue and grey). It is important to keep the components of a water footprint separate so that impacts can be assessed in the context of the local watersheds where the water is being sourced.
- The largest portion of the product water footprints assessed as part of these pilot studies come from the field, not the factory. The Coca-Cola Company sees significant opportunity to engage more directly with its agricultural suppliers in advancing sustainable water use. Guided in part by these assessments, the Company is focusing its initial efforts on sustainable sourcing of sugar cane and oranges.
- While the operational water footprint associated with production was found to be a very small percentage of the total water footprint, it remains important for businesses to manage their direct/operational impacts on local water resources. This is especially true with regard to wastewater treatment.
- To really gain an understanding of whether water use is having an impact, the volume of water consumption must be considered with the cumulative effect of all uses of the shared water resource.
- While water footprints are an excellent tool for companies to begin to understand their water use, care must be taken when communicating about water footprint assessments. Numeric water footprints on labels do not provide information needed to make informed choices among products.

Water footprinting is helping The Coca-Cola Company refine its approach to global water stewardship. The pilot studies have verified the importance of examining direct and indirect water use separately. The Company is focusing first on operational water use by taking action to use water more efficiently and treat all manufacturing wastewater. The studies also affirmed the Company's efforts to understand the health of watersheds everywhere it operates. Importantly, water footprinting provides compelling support for the need to engage more directly with suppliers, governments and other stakeholders on responsible water stewardship.



TO PROTECT YOUR RIVERS,  
PROTECT YOUR MOUNTAINS.

— Emperor Yu of China, 1600 B.C.



**“People use lots of water for drinking, cooking and washing, but even more for producing things such as food, paper, cotton clothes, etc. The water footprint is an indicator of water use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business.”**

*Water Footprint Manual: State of the Art 2009*<sup>2</sup>

Water footprinting is a young science, and the methods for calculating water footprints are evolving through the efforts of the Water Footprint Network (WFN)<sup>3</sup> and various other initiatives. The Nature Conservancy and The Coca-Cola Company are actively engaged in efforts to test the practical application of the water footprint methodology and explore opportunities for improvement. Both organizations have engaged in separate initiatives related to water stewardship and water footprinting and have collaborated on projects of mutual interest.

Over the past two years, the Coca-Cola system<sup>4</sup> has undertaken three water footprint pilot studies to assess the practical application of the methods to its products. Together with The Nature Conservancy and the consulting firm LimnoTech, the Coca-Cola system also has been exploring and quantifying the benefits of watershed restoration actions to restore and sustain adequate water supplies for the full range of beneficial uses.<sup>5</sup> Because water-related impacts are local in nature, efforts to reduce or eliminate adverse impacts are best implemented in the watersheds in which the impacts are occurring.

The Nature Conservancy is drawn to this collaboration because it is committed to helping build solutions to the world’s water problems so there will always be enough for people and nature. Helping corporations find better and more responsible ways of using water is an essential step on the pathway to water sustainability. Two simple facts drive The Nature Conservancy’s interest:

- Tremendous opportunities exist to improve the way water is used and managed, and thereby alleviate water scarcity problems that affect both people and nature. Fostering such improvements is a high priority for the Conservancy, because unsustainable water use is a leading cause of declines in freshwater biodiversity.
- Corporations can provide leadership in implementing sustainable water practices. These improved water practices make good sense for businesses and can bring substantial benefits to freshwater ecosystems.

The Company is drawn to this collaboration because it recognizes that engaging external partners is essential to its commitment to have a positive impact on the water challenges facing communities and nature. The Conservancy brings focused expertise in freshwater conservation science and an in-depth understanding of the interrelationships between healthy ecosystems and the communities they sustain. Through the collaboration, both organizations are able to leverage their strengths to address water challenges locally, at a global scale.

<sup>2</sup> Hoekstra, Arjen Y., A. Chapagain, M. Aldaya, and M. Mekonnen. 2009. *Water Footprint Manual: State of the Art 2009*. Published by the Water Footprint Network.

<sup>3</sup> [www.waterfootprint.org](http://www.waterfootprint.org)

<sup>4</sup> The “Coca-Cola system” refers to both The Coca-Cola Company (also referred to as “the Company” in this report) and its more than 300 bottling partners.

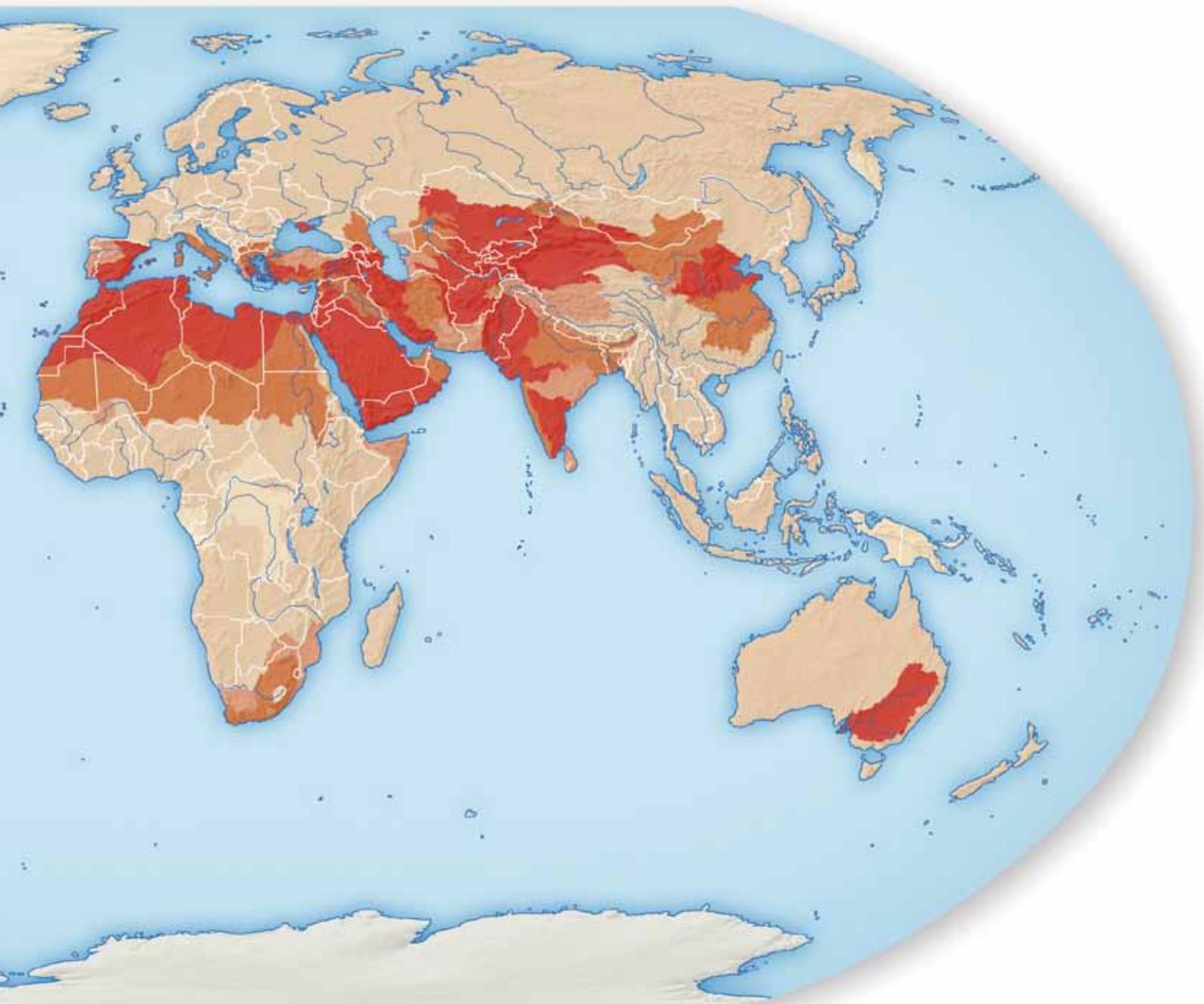
<sup>5</sup> LimnoTech and The Nature Conservancy. 2010. *Quantifying Watershed Restoration Benefits in Community Water Partnership Projects*.

*Maps such as this one show the degree of stress for different regions based on the ratio of water use to water availability (water replenished naturally by precipitation and snow melt). Water stress indices are calculated in different ways, as discussed later in this report.*



## 1.1 OBJECTIVES OF THIS REPORT

This report was prepared for water resource managers, water footprint practitioners, partners of the Water Footprint Network and others interested in how water footprinting can help inform a company's water stewardship program. The purpose is to share lessons learned and observations related to water footprint assessments and their practical application. The Nature Conservancy and The Coca-Cola Company hope that the information shared in this document will make a positive contribution to the ongoing development of the water footprint assessment methodology and its application.



*Map from The Atlas of Global Conservation (University of California Press, 2010).  
For more information, please go to: The Nature Conservancy, [www.nature.org/atlas](http://www.nature.org/atlas).*

## 1.2 GLOBAL FRESHWATER CHALLENGES

Water is the core of our being. Two-thirds of the human body is made up of water, and we must continually replenish it. Analogous to losing oil in an automobile, being down only a few quarts of water can be fatal. But it takes a lot more than drinking water to keep us healthy. We need water for cooking and bathing. We need water to grow food and generate electricity, to produce the clothes on our backs and the countless other goods we use in our daily lives.

There would be enough water to support all of humanity, now and for decades to come, if it were evenly distributed around the globe and delivered from the skies at a constant rate. At a global scale, we consume less than 10% of all the water that replenishes rivers, lakes and aquifers each year.



But all too often, rain comes as a deluge or not at all, making its capture and storage elusive. It also is not distributed evenly. The Atacama Desert in northern Chile may go for more than 20 years without rain, whereas Mt. Waialeale on Kauai in the Hawaiian Islands averages more than 12 meters of rain a year. Perhaps most importantly, the growth of our global population has not followed the rain.

These facts of life explain the patchiness of water scarcity and abundance. Today, nearly 1 billion people lack access to clean water. If current water consumption patterns continue, two-thirds of the world's population will live in water-stressed conditions by 2025.

The highly variable tapestry of water scarcity and the conflicts, impacts and risks that derive from it must ultimately be addressed in local watersheds. Governance policies at various geopolitical levels can certainly influence how water is used, but the great spatial variability in water availability and use, along with other influences on hydrologic systems, including local land use, demand that any assessment of potential impacts, risks and sustainability of water use be framed by the physical bounds of the watershed.

This explains the recent trend within the Water Footprint Network toward a focus on evaluating the consequences of water footprints in local watersheds. Ongoing calculations of the water footprints of individual products or whole nations have increased awareness that water is consumed throughout the supply chain in the production of all consumer goods. This information will continue to serve an important role in informing public policy around water use and management. Within the corporate world, water footprints enable a greater understanding of the volume of water embedded in products, the potential effects on local watersheds caused by the water use and the probabilities of future water availability to serve the collective needs of the company, communities and nature. Not understanding the collective impacts of water use on the local watersheds can increase risks to the business. As discussed later in this report, both the Conservancy and the Company have embraced and continue to support this important evolution in water footprinting.

From a corporate perspective, growing water scarcity and the need to use water in business operations and supply chains pose risks of various types. These business risks can be viewed from two perspectives: one looks at "upstream" risks, and the other focuses on "downstream" risks.



Upstream business risks are generally centered on the question of whether or not a company can expect to have sufficient supplies of clean water in the future to support its business. This area of risk can be influenced by increasing competition for water resources, growing water scarcity, drought, climate change, water source contamination, infrastructure failure, poorly managed water allocation systems, ineffective public sector management capacity, insufficient water resource management policy and other factors. Downstream business risks stem from the fact that a company's water use and wastewater treatment practices may impact other water users and stakeholders.

Water-related risks must be addressed within the context of the local watersheds. It is important to consider the impact of a company's water use in conjunction with the impacts from all water users in the watershed, as impacts are cumulative. The risk of water scarcity and/or poor quality is not only a business risk, but a risk shared with the community and other users. Efficiency improvements are important, but the most appropriate response actions may not always involve reduction of the water footprint (sometimes a reduction of a water footprint is not possible). In many cases, policy and regulatory engagement to support improved management of the shared resource may be a more appropriate response.

When water resources are adversely affected by the cumulative impacts from multiple uses, whether those impacts are a result of a company's use, real or perceived, it can affect that company's social license to operate. It also may trigger regulatory responses from governments. These social and political reactions can lead to increased water acquisition and treatment costs, reduced water supply, more stringent wastewater treatment requirements, riskier infrastructure planning and capital investments and potential reputation damage. In rare cases, the business may be shut down by the local government or may otherwise no longer be viable and voluntarily shut down.

The Conservancy and the Company have been collaborating on an exploration of various approaches and tools for assessing and managing water-related risk. We are learning as we go. This report summarizes some of our early findings.

### **1.3 THE NATURE CONSERVANCY'S FRESHWATER CONSERVATION GOALS**

The Nature Conservancy is an international non-governmental organization dedicated to the conservation of biological diversity. The Conservancy's mission is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. The Conservancy's on-the-ground conservation work is carried out in all 50 states in the U.S. and in more than 30 other countries, and it is supported by approximately one million individual members. The Nature Conservancy has protected more than 47 million hectares of land and hundreds of rivers and lakes around the world.

While the Conservancy's mission is focused on sustaining the Earth's diversity of plants and animals, the organization's broader contribution to society is in the protection of the life support systems of our planet – we cannot protect the diversity of life on this planet, including human life, without protecting the ecosystems that sustain us all. Natural ecosystems provide humanity with clean water, food and fiber. Natural resources derived from ecosystems support major sectors of our economy, whether in the form of fisheries that sustain coastal communities or through tourism economies that rely so heavily upon nature-based recreation. Healthy natural ecosystems perform an array of valuable services with substantial economic values, including purifying our water supplies, sequestering carbon and helping to regulate the climate and hydrologic cycles of our planet.

Through its work on more than 600 freshwater projects around the world, the Conservancy has learned what it takes to make rivers and lakes healthy and keep them healthy. The organization has deep roots in communities around the world, bringing resources, expertise and tools that empower people to protect waters that sustain families, livelihoods and ways of life. Especially for the world's poor, partnering with them to preserve their natural sources of water, food and other necessities helps preserve their cultures, their economic potential and their power of self-determination. Some of these freshwater projects focus on iconic waters that are the lifeblood of nations, like the Great Lakes and Yangtze River. Some are lesser known, yet are hubs of innovation, like the Penobscot River in Maine, which is a proving ground for solutions that can accelerate and improve protection of rivers and lakes around the world.

The Conservancy understands that to reach its goals, the organization must also equip people with better ways to use the water resources nature gives us. Doing so benefits not only the Conservancy's freshwater projects, it also creates a ripple-effect that benefits countless other rivers and lakes around the world. Therefore, a key aspect of the Conservancy's work is giving leaders in government and business pragmatic alternatives to wasteful and destructive ways of using rivers and lakes. The Conservancy's commitment to the advancement of water footprinting supports these objectives.

Through its work in watersheds around the world and collaborations with governments, corporations and local communities, the Conservancy expects that by 2015, it will bring enhanced protection and restoration to more than 1.5 million kilometers of river and improved water, food and electricity security to more than 200 million people.

## 1.4 THE COCA-COLA COMPANY'S WATER STEWARDSHIP GOALS

Water is a key ingredient in all of the Company's products. It is essential to the Company's operations and the well-being of the communities and ecosystems where the Company operates. In response to the very real and growing vulnerability of the freshwater that sustains the business, the Company's aim is to establish a truly water-sustainable business on a global scale through a commitment to water stewardship.

The Company's water stewardship journey began with a focus on water use in its own operations, where it has greater influence. In 2005, the Company conducted global water risk assessments to gain a better understanding of the potential water risks facing the business, local communities and ecosystems. This led to the establishment of the Company's water stewardship framework, which focuses on plant performance, watershed protection, sustainable communities and raising global awareness and action around water challenges (Figure 1).

Risk assessments were updated in 2008, and a system-wide requirement went into effect that all Coca-Cola system bottling plants evaluate the sustainability of the water resources used to produce their beverages, as well as the sustainability of the water resources used by the surrounding community. These evaluations include detailed assessments of the vulnerabilities associated with quantity and quality of local water resources, and they result in the development of source water protection plans in partnership with civil society and governments. All plants are required to complete this process and be actively implementing their protection plans by 2013. These source water protection plans address critical water challenges at a watershed level, from hydrological vulnerabilities to local government management capacity.



**Figure 1. The Coca-Cola Company's Water Stewardship Framework**

In addition, the Company set an aspirational goal in 2007 to safely return to communities and nature an amount of water equivalent to what is used in all of its beverages and their production. The formulation of this target came from dialogue with the international water stakeholder community and set metrics for water stewardship.

The Company has set targets to guide its water stewardship in three areas:

- **REDUCE** the Company's water use ratio while growing the unit case volume, with a target to improve water efficiency by 20% over 2004 levels by 2012. By 2009, the Company had achieved a 12.6% improvement over the 2004 baseline.<sup>6</sup>
- **RECYCLE** the water used in operations by returning treated process water to the environment at a level that supports aquatic life by the end of 2010. In 2009, 89% of Coca-Cola system facilities (approximately 95% of reported volume) were in compliance with the Company's wastewater treatment standards.<sup>6</sup>
- **REPLENISH** the water used in finished beverages by participating in locally relevant projects that support communities and nature, and meet and maintain this goal by 2020. Estimates are that by the end of 2009, the Company was replenishing approximately 22% of the water used in its finished beverages through the support of some 250 community water programs in approximately 70 countries.<sup>6,7,8,9</sup>

The Company, recognizing that water use in agriculture is a significant component of the water footprint, has established a sustainable agriculture program. The strategy extends beyond water resources and considers environmental impacts, social implications and economic pressures. The Company's approach to sustainable agriculture is multi-dimensional and founded on principles to uphold workplace rights, protect the environment and help build sustainable communities.

<sup>6</sup> Supporting documents can be found on The Coca-Cola Company's website: [www.thecoca-colacompany.com/citizenship/community\\_initiatives.html](http://www.thecoca-colacompany.com/citizenship/community_initiatives.html).

<sup>7</sup> The Coca-Cola Company. 2010. Replenish Report.

<sup>8</sup> LimnoTech and The Nature Conservancy. 2010. Quantifying Watershed Restoration Benefits in Community Water Partnership Projects.

<sup>9</sup> Global Environment & Technology Foundation with Dr. Albert Wright. 2009. Quantifying Water Access Benefits in Community Water Partnership Projects.

Water footprint assessments can be helpful in supporting these water stewardship efforts by providing a tool for understanding and measuring water use throughout the Coca-Cola system's direct operations and its supply chain. The Company has been actively involved in the exploration of the concept of water footprinting for several years, and it was instrumental in forming the Water Footprint Working Group (WFWG) that commissioned several early studies addressing water footprints and water offsets. The WFWG evolved into the Water Footprint Network (WFN) in 2008, and the Company continues to be an active member of and an integral contributor to the development process.

The Company also is engaged in activities of the Beverage Industry Environmental Roundtable (BIER), a coalition of global beverage companies working together to drive continuous improvement in water conservation and resource protection. The Company is a member of a working group of BIER that is developing sector-specific guidelines for calculating the water footprint of a beverage product or enterprise.

In addition, The Coca-Cola Company became one of the first companies to commit to the United Nations Global Compact's CEO Water Mandate. This program is designed to help companies better manage water use in their direct operations and throughout their supply chains. The Company is an active participant in three work streams on: Responsible Business Engagement with Water Policy and Management, Water and Human Rights, and Corporate Water Disclosure.

## 1.5 THE WATER FOOTPRINT CONCEPT

Water footprinting builds on the concept of "virtual water," which refers to the water "embedded" in a product; that is, water that is consumed in direct operations and throughout the supply chain. A water footprint of a product considers both direct (operational) and indirect (supply chain) water use. It also refers to where and when the water was used. A water footprint has three components:

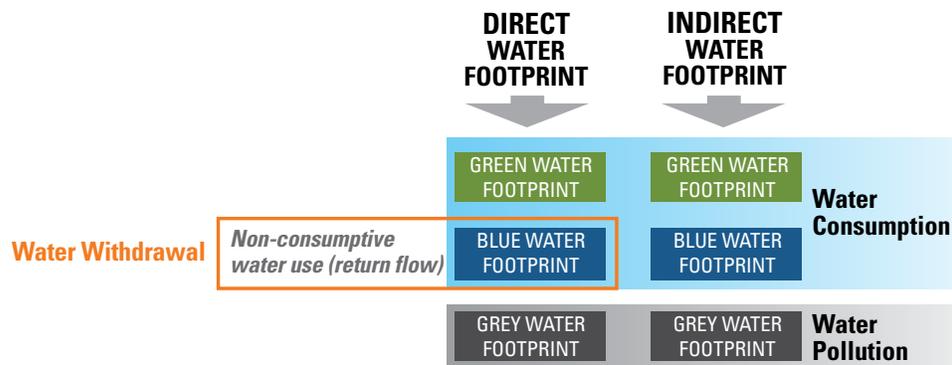
- The **green water footprint** refers to consumption of green water resources (rainwater stored in the soil as moisture);
- The **blue water footprint** refers to consumption of blue water resources (surface and ground water);
- The **grey water footprint** refers to pollution and is defined as the volume of freshwater that is required to assimilate the load of pollutants based on existing ambient water quality standards.

The term "consumption" with respect to green water refers to rainwater lost to the atmosphere from the land surface when it is taken up and transpired by plants ("evapotranspiration"), plus rainwater incorporated into the harvested crop. The term "consumption" with respect to blue water refers to surface water or groundwater that is evapotranspired, incorporated into a product, returned to a different watershed or returned during a different time period. Together, the green and blue water footprints make up the "consumptive" water footprint. This water is not available downstream for other uses.

Grey water results from green or blue water that is not consumed. For instance, when rain (green water) falls on agricultural land and then runs off the field, it may carry eroded soil or chemicals, such as fertilizers, into an adjacent water body, thereby creating grey water. When blue water is withdrawn from a river, lake or aquifer and used in manufacturing processes, it may be returned to a water body as grey water, containing more or less pollutants than the water that was originally withdrawn. The calculation of a grey water

footprint is based on the quantity of water necessary to dilute or assimilate pollutants in the grey water to such a degree that the water becomes suitable as blue water for other downstream uses. Green, blue and grey water footprints are all represented as water volumes.

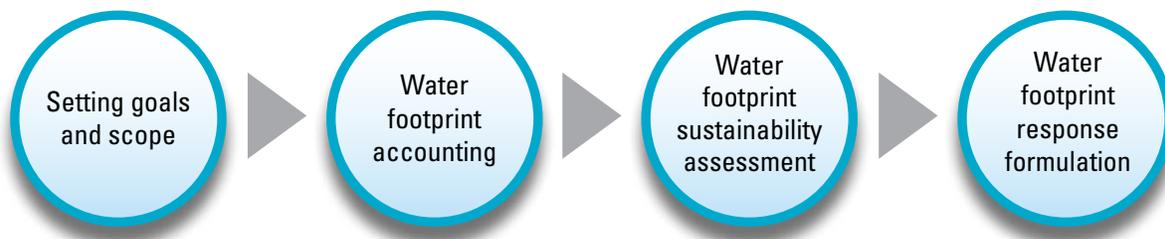
Figure 2 depicts the components of a water footprint. For a product, the direct water footprint refers to water consumed in operations. Indirect water use refers to water consumed in the supply chain to produce the materials purchased by the producer.<sup>10</sup> Both direct and indirect water footprints are comprised of green, blue and grey water footprints. Water footprint accounting differs from the traditional statistics on water use, which account only for direct blue water withdrawals and/or non-consumptive water use (return flow).



**Figure 2. Components of a Water Footprint**

Source: *Water Footprint Manual* (2009)

The Water Footprint Network has developed methods for calculating water footprints, and it has begun to formulate approaches for assessing their potential impacts and designing response strategies. These methods are documented in the *Water Footprint Manual*. As described in the manual and shown in Figure 3, a water footprint assessment is conducted through four phases.



**Figure 3. Phases of a Water Footprint Assessment**

Source: *Water Footprint Manual* (2009)

During the first phase, the scope of the assessment is defined based on goals and objectives. Water footprint accounting is conducted during Phase 2. The sustainability<sup>11</sup> of the water footprint is evaluated during Phase 3, and response actions to mitigate impacts are formulated during Phase 4.

Three water footprint assessment pilot studies for the Coca-Cola system's products are described in the following section.

<sup>10</sup> The end use water footprint, water used by a retailer and/or consumer, may also be relevant to some product water footprints (e.g., soaps, detergents).

<sup>11</sup> This phase was named "Impacts Assessment" at the time of the three pilot studies discussed in Section 2.



WE FORGET THAT THE WATER  
CYCLE AND THE LIFE CYCLE ARE ONE.

— Jacques Cousteau

The three pilot studies described in this section were conducted from 2008 to 2010 following the methodology of the Water Footprint Network. The studies were undertaken early in the water footprint development process with the intent to test the methodology, inform the science and help increase understanding of the water footprint concept.

The first water footprint assessment focused on the Company's most popular sparkling beverage, Coca-Cola. A key finding of this study was that the water footprint of sugar is a significant component of the total water footprint. Based on this result, the second study examined the water footprint of refined sugar from sugar beets supplied to the Coca-Cola system's European bottling plants. The third pilot study explored the water footprint of two orange juice products produced for the North American market to better understand water use throughout the supply chain for a non-sparkling beverage.

## 2.1 WATER FOOTPRINT OF 0.5 LITER COCA-COLA® IN PET BOTTLE

A logical choice for the first water footprint assessment was the Company's signature drink, Coca-Cola. The study was conducted by researchers at the University of Twente in the Netherlands in collaboration with Coca-Cola Enterprises Inc. (CCE) and Coca-Cola Europe. The product selected for study was a 0.5 liter PET-bottle of Coca-Cola produced at CCE's Dongen bottling plant in the Netherlands. The specific product selected for this pilot study was driven by the researchers' proximity to and familiarity with the local industries and the support of the local bottler and business unit.

### Water Footprint Accounting

A water footprint of Coca-Cola is the sum of indirect water use in the supply chain plus direct operational water use (Figure 4).

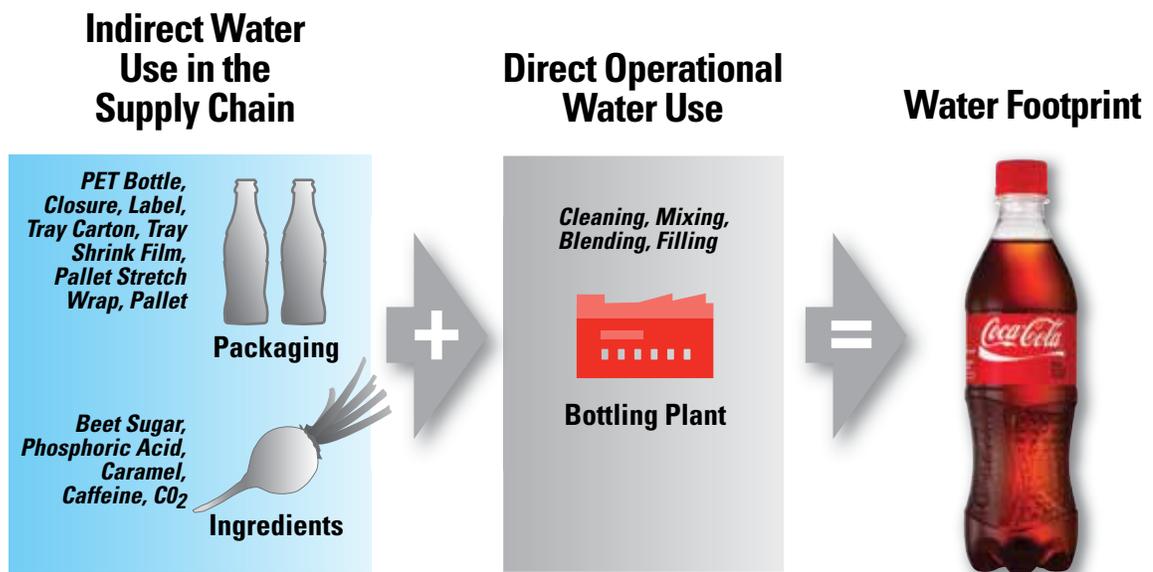
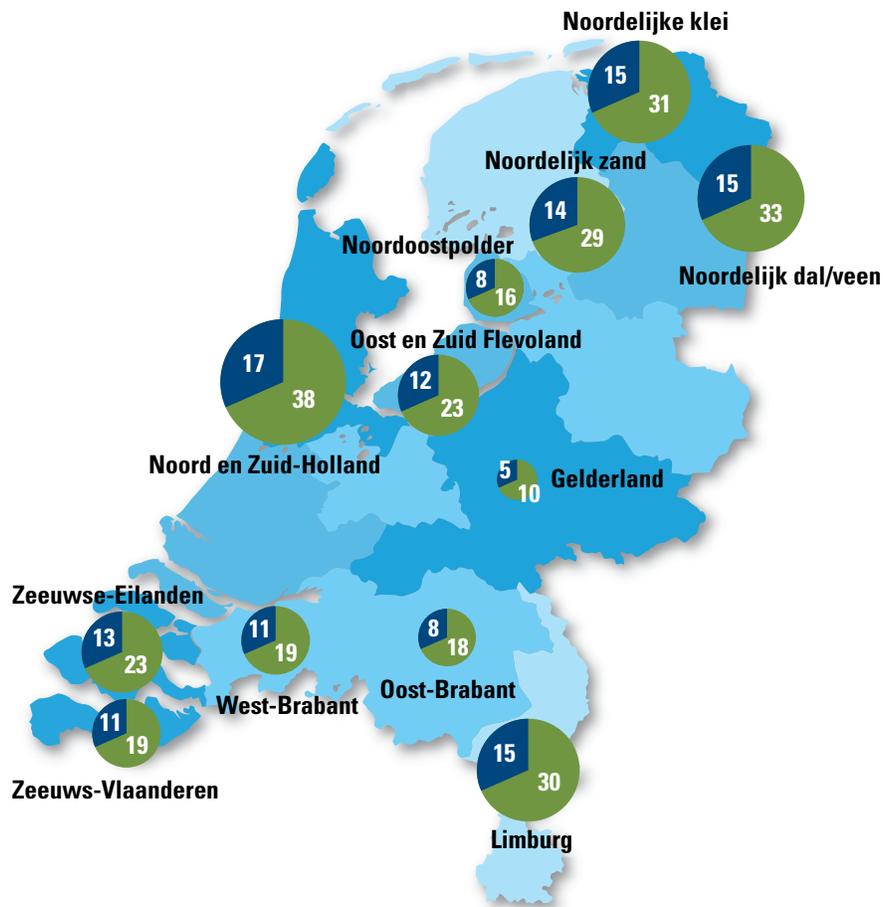


Figure 4. Indirect and Direct Water Footprint Components

The accounting process began with water used in the supply chain to produce ingredients and other components (e.g., bottles, labels, packing materials). Ingredients include sugar made from sugar beets grown in the Netherlands, carbon dioxide (CO<sub>2</sub>), caramel, phosphoric acid and caffeine. The names and quantities of ingredients in natural flavorings are trade secrets and were not included in the assessment, but the absence of these data should not impact the case study or related conclusions because the water footprints associated with such natural flavoring are not expected to be material in nature.<sup>12</sup> The supply chain water footprint also includes overhead, which accounts for water used to produce the energy that powers the plants, building materials, office paper, vehicles, fuel and other items not directly related to operations.

Water used in operations consists of the water incorporated into the product as an ingredient and water used in production processes. Throughout the Coca-Cola system, the process water is treated to rigorous standards before it is reused inside a plant or returned to communities and nature.

The estimates are that the green water footprint of the 0.5 liter Coca-Cola beverage is 15 liters, the blue water footprint is 8 liters and the grey water footprint is 12 liters. The green and blue (consumptive) water footprints are primarily associated with sugar beet production. The sugar beets are largely rainfed (green), and some external (blue) water supply is required for irrigation. The blue plus green water footprints for Dutch sugar beets from different regions are shown in Figure 5. Green water makes up approximately two-thirds of the consumptive water footprint.



**Figure 5. Consumptive Water Footprints for Dutch Sugar Beets**

<sup>12</sup> Natural flavorings reported in a recent report titled "A Pilot in Corporate Water Footprint Accounting and Impact Assessment: The Water Footprint of a Sugar-Containing Carbonated Beverage" (Ercin, et al. 2009. UNESCO-IHE Institute for Water Education, Value of Water Research Report Series No. 39) are not based on appropriate assumptions for Coca-Cola.

The grey water footprint is associated with the supply chain. A portion of the nitrogen applied as fertilizer to the sugar beet fields is released to receiving waters. Cooling water associated with PET bottle production results in a thermal load, which is considered in the grey water component.

The operational water footprint (0.4 liters) is entirely blue water, representing water added as an ingredient. The overhead water footprint associated with operations (water used for domestic purposes in the Dongen plant) was determined to be zero because all wastewater is treated in a public wastewater treatment plant and returned to the environment.<sup>13</sup> The supply chain overhead water footprint was also calculated and found to be negligible. The overall results, including all components, are shown in Figure 6.<sup>14</sup>

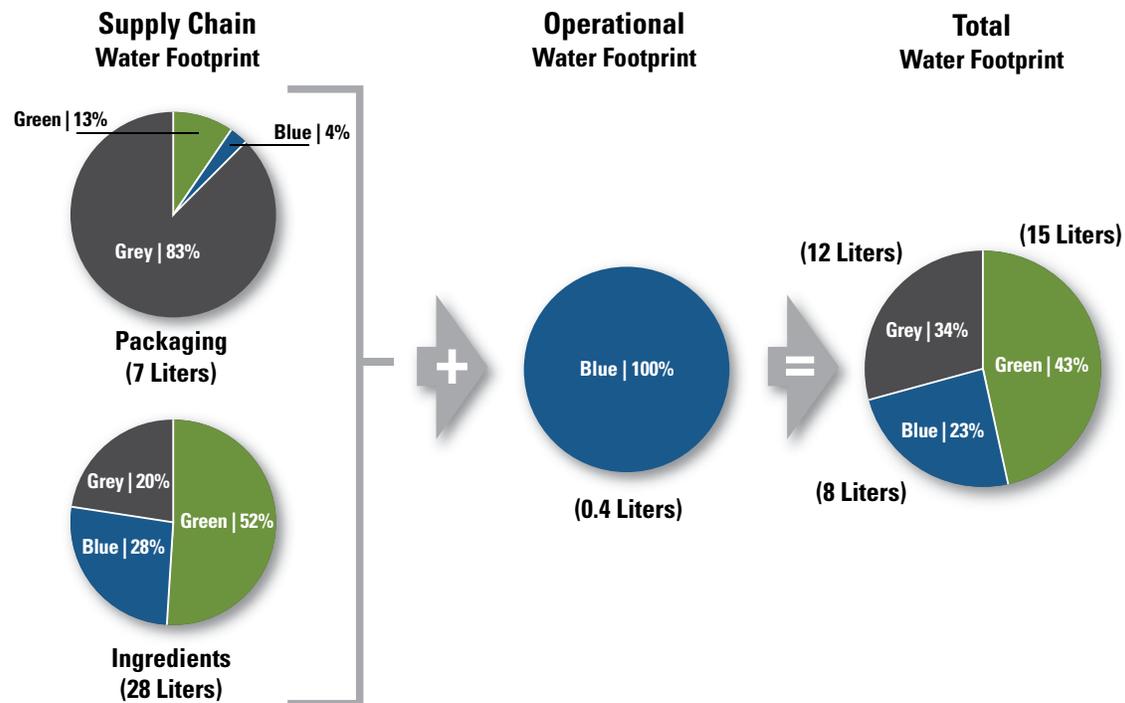


Figure 6. Water Footprint of a 0.5 liter of Coca-Cola® in Dongen, the Netherlands

## Impacts Assessment

To assess potential impacts from these water footprints, the researchers focused on the largest component: sugar beets grown in the Netherlands. Dutch sugar beets are grown in a region of relative water abundance, and the crops are primarily rain-fed. The need for external water supply is low, so the use of blue water is minimal. For these reasons, there appears to be no significant adverse impacts of green and blue water use associated with sugar beets.

<sup>13</sup> The grey water footprint methodology is evolving; these results reflect the approach at the time of this study.

<sup>14</sup> A subsequent more detailed study of the sugar beet water footprint (described in section 2.2 of this report) indicates that in fact the blue water footprint is much smaller, reflecting actual low irrigation water use in the Netherlands.



In terms of grey water, if the applied rates of nutrients are higher than the uptake of the crop, excess fertilizers can runoff and lead to eutrophication, the enrichment of surface waters with nutrients that promote excessive growth of algae. Potential consequences include fish kills and degradation of the water quality of recreational surface waters such as swimming areas. Nitrate leaching from farmland can also contaminate drinking water supplies. The average fertilizer application rate in the Netherlands is one of the lowest among the European sugar beet producing countries<sup>15</sup>, and the government regulates fertilizer application<sup>16</sup>, minimizing the risk of excessive application. Nevertheless, according to the Netherlands Environmental Assessment Agency<sup>17</sup>, eutrophication is a concern in the Netherlands. The impacts assessment indicated that there may be a need to engage with governments and other stakeholders to discuss better management measures to address this issue.

### ***What was learned from the Coca-Cola water footprint study?***

- **More than two-thirds of the total water footprint of a 0.5 liter PET bottle of Coca-Cola from the Netherlands comes from blue and green water used in the supply chain to grow sugar beets.** Nearly half of the total water footprint is rainwater (green) used by sugar beets in this water-rich temperate climate. Blue water accounts for approximately one-quarter of the total water footprint.<sup>18</sup>
- **Approximately one-third of the total water footprint is grey water associated with the supply chain.** Some nitrogen associated with fertilizer used on sugar beet fields is released to the environment. The grey water footprint also is associated with cooling water for PET production, which results in a thermal load.

<sup>15</sup> FAO (Food and Agriculture Organization). 2008. FERTISTAT Database - Fertilizer use by crop statistics database.

<sup>16</sup> International Institute for Beet Research (IIRB). 2004. Sugar beet in Europe: An environmentally friendly crop for sustainable plant production systems.

<sup>17</sup> Netherlands Environmental Assessment Agency. 2008. Environmental Pressure in the Netherlands, Eutrophication Theme: Introduction and Policy.

<sup>18</sup> A subsequent, more detailed study of the sugar beet water footprint (described in section 2.2 of this report) indicates that in fact, the blue water footprint is much smaller, reflecting actual low irrigation water use in the Netherlands.

- **The operational water footprint comprises only about 1% of the total water footprint.** The operational water footprint is all blue and represents water added as an ingredient. The operational grey water footprint is zero, because the wastewater is treated to meet or exceed wastewater treatment standards. Under The Coca-Cola Company's "Recycle" commitment, all plants will attain local and the Company's rigorous global treatment standards.
- **The overhead water footprint for the products evaluated is negligible.** This was one of the first studies to quantify the overhead water footprint of a product. Prior to the study, there was recognition that the overhead component is a part of the overall water footprint of a product, but it was unclear how relevant it was.

### *What are the implications for the Coca-Cola system?*

- **The results of this pilot study suggest that a closer look at the water footprints of sugar produced from sugar beets, as well as other sweeteners supplied to the Coca-Cola system across Europe, is warranted.** The sugar beet pilot study described in the following section was conducted with the intent to increase understanding of water use associated with sugar beets produced in Europe.
- **This study highlighted the need to look at the components of water footprints separately, because an aggregated number can hide the importance of reducing the direct water footprint.** The Coca-Cola system will continue to focus on improving water efficiency and ensuring that all process water is treated to rigorous wastewater treatment standards within direct operations. These actions have a positive impact on the water footprint.
- **Beyond sugar beets, the Company has established a sustainable agriculture program.** This pilot study reaffirmed the importance of including agricultural ingredients in a water footprint. The Company is actively engaged with World Wildlife Fund (WWF) and others in the Better Sugarcane Initiative (BSI), a multi-stakeholder initiative working to develop a certification for sustainably sourced sugarcane.

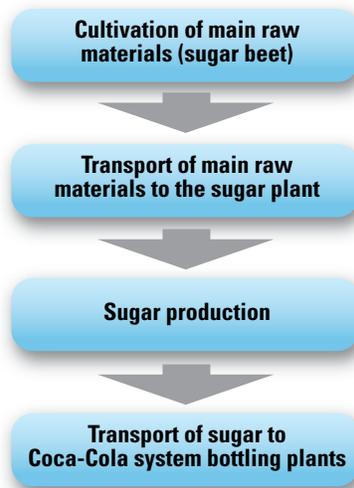
## **2.2 WATER FOOTPRINT OF BEET SUGAR SUPPLIED TO THE COCA-COLA SYSTEM'S EUROPEAN BOTTLING PLANTS**

Based on the results of the first water footprint assessment of a 0.5 liter PET bottle of Coca-Cola in the Netherlands, Coca-Cola Europe was interested in examining the water footprint and associated impacts for natural sweeteners supplied to its 112 European bottling plants. This ongoing analysis is being conducted by denkstatt in cooperation with the Institute for Water Quality, Resources and Waste Management at the Vienna University of Technology.

To date, the water footprint accounting for sugar beets has been completed. Work on sugar cane and high fructose corn syrup (HFCS) is underway. Approximately 70% of refined sugar purchased for the Coca-Cola system in Europe is from sugar beets grown in 19 European countries.

## Water Footprint Accounting

All relevant activities that use water in the production of beet sugar were addressed in the accounting process, as shown in Figure 7. Raw beets are processed at sugar beet refining factories into several products, including beet pulp, molasses and sucrose.



**Figure 7. Beet Sugar Water Footprint Calculation Stages**

The methodology outlined in the *Water Footprint Manual* was followed with some modifications. In particular, the blue water footprint was calculated not as the difference between the crop water requirement (CWR) and green water, but rather through site-specific data provided by the sugar companies. The results indicate that less water is actually applied for irrigation than projected, a finding consistent with irrigation strategies focused on maintaining consistent harvests rather than maximum yields.

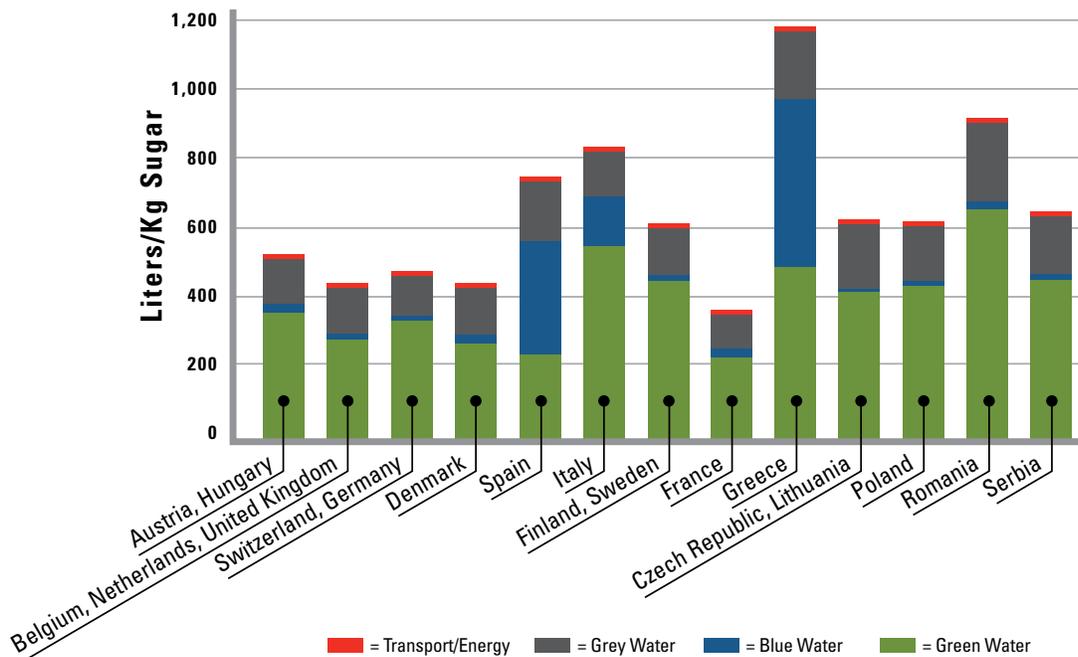


*European sugar beets are generally grown in water-rich temperate climates using mainly green water from rain.*

The grey water footprint for sugar beets was calculated based on the pollutant load divided by the maximum acceptable concentration for nitrogen, considered an indicator of the impact of fertilizer on water quality.<sup>19</sup> It was assumed that 10% of the applied nitrogen fertilizer leaches to groundwater. The amount of dilution water was calculated using the water standard of the U.S. Environmental Protection Agency (EPA) for nitrogen (10 mg/liter)<sup>20</sup>, which is well within the range of acceptable ground/drinking water requirements

<sup>19</sup> Aldaya, M.M. and A.Y. Hoekstra. 2010. The Water Needed to Have Italians Eat Pasta and Pizza. *Agricultural Systems*. 103: 351-360.

<sup>20</sup> National Primary Drinking Water Regulations. Code of Federal Regulations (CFR) Title 40; Part 141.



**Figure 8. Water Footprints of Beet Sugar Across Growing Regions**

for Europe minus an assumed natural background concentration. For sugar refineries, European Union Best Available Technique (BAT) emission values for the food industry<sup>21</sup> were used to compute the grey water footprint.

The average green water footprint for sugar from sugar beets across all regions of Europe is estimated to be 375 liters/kg sugar, or 67% of the total water footprint. The average blue water footprint is 54 liters/kg, or 10% of the total. The average grey water footprint is 128 liters/kg, comprising 23% of the total water footprint. The magnitude and color composition of the water footprint depends on the sourcing region, as shown in Figure 8. The results in the figure are clustered according to climate. The amount of water required by sugar beets is highest in Greece, Romania, Italy and Spain. Three of these countries have significantly larger blue water footprints (associated with irrigation) than the other growing regions.

This study also evaluated the water consequences of using the land for agricultural purposes as compared to natural forest. This can inform the impacts assessment, because it provides information on the evapotranspiration demand from native vegetation if the sugar beet crops were not cultivated. The natural vegetation around the sugar production areas is mostly forest, but the researchers determined that the standard approach for water footprint calculations (Penman-Monteith<sup>22</sup>) is not suitable for forests because transpiration and interception evaporation cannot be defined appropriately. In order to conduct the calculation, the standard grass surface<sup>23</sup> was used as a reference rather than the natural vegetation. This is a conservative assumption, because the water demand for forests is higher than for grasslands. The results suggest that use of the land for growing sugar beets consumes less water than would be consumed by natural vegetation.

The water footprint of sugar from beets grown in the Netherlands (in combination with Belgium and the UK) is approximately 12% lower than the estimate made for the Coca-Cola water footprint study. The larger estimate assumes that the difference between crop water requirement and availability of green water is covered by irrigation (blue water). Instead, the inputs used for the sugar study are based on actual irrigation

<sup>21</sup> European Commission. 2006. Integrated Pollution Prevention and Control: Reference Document on Best Available Techniques in the Food, Drink and Milk Industries.

<sup>22</sup> Allen, R. G., L. S. Pereira, et al. 1998. Crop evapotranspiration - Guidelines for computing crop water requirements. FAO Irrigation and drainage paper 56.

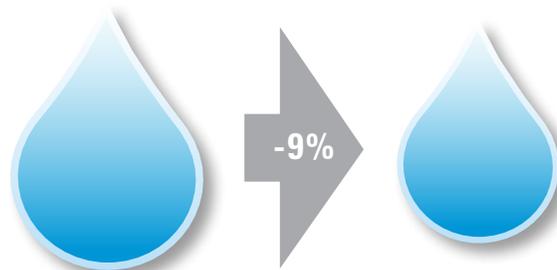
<sup>23</sup> Ibid.

data obtained from the sugar industry, which indicated that almost no blue water is used to produce beet sugar in the Netherlands. The blue water component was found to comprise less than 1% of the total water footprint of Dutch sugar beets, compared to the 28% estimate from the Coca-Cola study.

When the lower estimates from the beet sugar study are used to compute the water footprint of a 0.5 liter PET bottle of Coca-Cola produced in the Netherlands, the blue water footprint decreases from 8 liters to 1 liter, and the total water footprint decreases by 9%. These results highlight the importance of obtaining site-specific data where possible. As Figure 8 indicates, the water footprint of this product will be highly dependent on the location where the sugar is sourced.

### Why did the water footprint of Coca-Cola decrease?

The water footprint of Coca-Cola described in Section 2.1 was recalculated based on the refined water footprint estimates from the sugar beet pilot study. The resulting total water footprint was found to be smaller than the original estimate, and the blue (irrigation) water footprint decreased significantly. The difference is due to the robustness of the inputs. For the sugar beet water footprint study, completed questionnaires were received from 65 European sugar plants that supply the Coca-Cola system. Questionnaires requested detailed information on sugar beet cultivation and sugar factory operations. In contrast, the original estimates were based on public datasets, and it was assumed that the difference between the crop water requirement and the availability of green water was covered by irrigation (blue water). The more robust dataset indicated that is not the case and that less irrigation water is actually applied.



### Uncertainty Assessment

This pilot study identified a challenge associated with grey water from sugar refineries: apart from a standard for nitrogen, there is no common receiving water standard for the beet-growing countries in Europe. The researchers explored the sensitivity of the grey water footprint calculation based on three different water quality standards. This exercise showed that the type of treatment has a significant impact on the grey water footprint, as expected. For sugar factories with low levels of treatment (i.e., mechanical or no treatment), the choice of standard was found to have a very significant influence on the result. For sugar plants with adequate treatment, the choice of standard was found to have lesser influence on the grey water footprint. This exercise demonstrates the sensitivity of the grey water footprint calculation to the choice of standard.

### *What was learned from the beet sugar water footprint study?*

- **The water footprint associated with beet cultivation is the largest component of the total water footprint of beet sugar.** On average across the growing regions, the water footprint of the beet crops makes up 97% of the total water footprint of beet sugar.
- **European sugar beets are generally grown in water-rich temperate climates using mainly green water.** Most EU countries use very little irrigation (blue) water to grow sugar beets, with some noted exceptions in the Mediterranean region.
- **Differences in the consumptive (green plus blue) water footprint between countries can be more than three-fold.** The total consumptive water footprints range from 279 liters/kg (France) to 974 liters/kg (Greece). The countries with the largest consumptive water footprint have high evapotranspiration rates and/or low yields.
- **Grey water footprints in the sugar beet supply chain come mainly from the field, not the factory.** However, sugar plants in some countries have large grey water footprints due to low levels of wastewater treatment. Almost three-quarters of the water footprint for sugar factories is grey.
- **The use of supplier-based data provides a more realistic picture of water use in the supply chain compared to footprints based on public data.** Public data are based on assumptions, whereas supplier data are based on actual performance. Actual crop management practices for sugar beets grown in Europe utilized less irrigation water than indicated by public data. This is because periods of soil moisture deficit during the last months of growth are allowed in order to optimize yields.
- **In the cultivation areas, natural vegetation uses as much as or more green water than sugar beets.** The replacement of natural vegetation with sugar beet crops appears to result in lower water consumption.

### *What are the implications for the Coca-Cola system?*

- **Sugar beets grown in the Netherlands are a water-efficient crop.** This local source is grown in a water-rich temperate climate using mainly green water.
- **There is a wide variation in the water footprint of sugar beets grown in different regions.** There may be opportunities in some growing regions for better use of water resources associated with water supply for beet cultivation. The analysis also highlights potential opportunities to address poor wastewater treatment and associated water quality problems for some sugar processing plants.
- **The findings of this pilot study helped define future actions related to supply chain sustainability.** The Company has now initiated further work in Europe to trial a water footprint sustainability assessment covering environmental, social and economic impacts for refined sugar made from sugar beets. The Company is engaging with selected European stakeholders, including beet sugar suppliers, for consultation and advice during the project.

## 2.3 WATER FOOTPRINT OF ORANGE JUICE PRODUCTS

The Coca-Cola Company is the world's largest producer of juice and juice drinks, with 100 brands of juice and 1,100 juice products sold in 145 countries. Having recently completed a water footprint of the Company's signature sparkling beverage (Coca-Cola) and a water footprint of a key sweetener (sugar beets), the Company also wanted to explore the water footprint of a juice beverage. Two orange juice products produced for the North American market were selected for the water footprint pilot study:

- Simply Orange (not from concentrate) in 59 oz. PET carafe
- Minute Maid Original (reconstituted from concentrate) in 64 oz. fiber-based board gable-top carton

The calculations consider all water consumed in growing oranges and water consumed in processing and packaging the final orange juice products (Figure 9). The oranges for Simply Orange are grown in Florida and the state of Sao Paulo, Brazil. The oranges for Minute Maid Original are grown primarily in Florida and Costa Rica. The processing of oranges into juice or concentrate occurs in the regions where the oranges are grown. The percent of oranges sourced from each region varies by year, and different sourcing scenarios were evaluated to reflect this variability. Both products are packaged in the U.S. at multiple locations. Data were not available for water use associated with manufacturing of the packaging materials in the supply chain, so only operational water use was accounted for in the packaging plants. Admittedly, these missing data may or may not materially impact the case study or the related conclusions, so future follow-up to include and reflect such data is warranted.

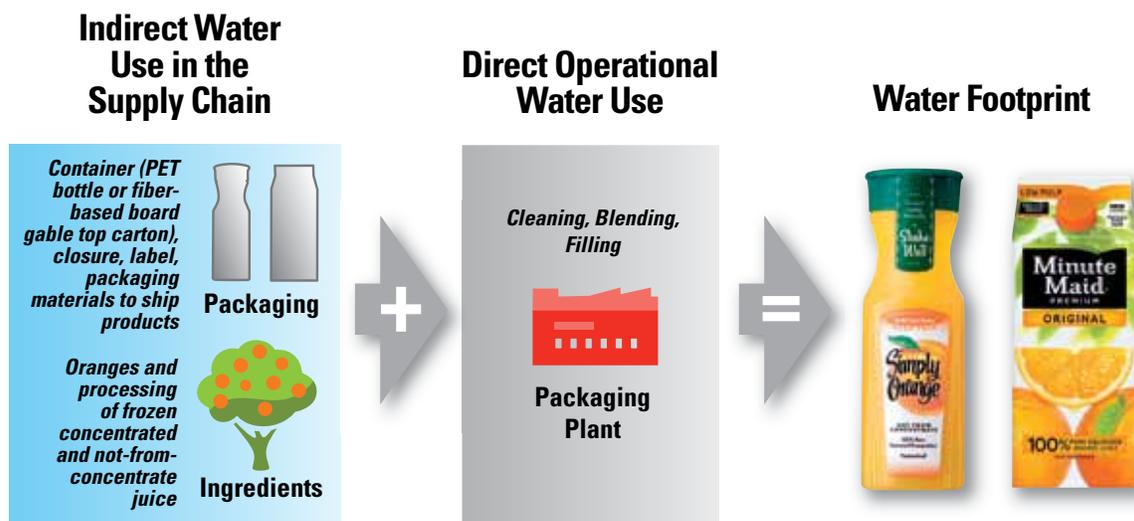
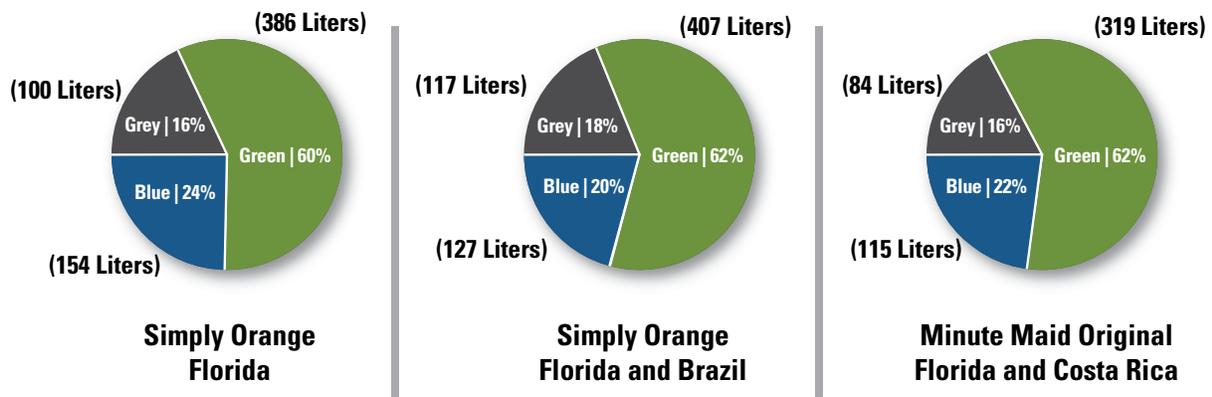


Figure 9. Indirect and Direct Water Footprint Components

### Water Footprint Accounting

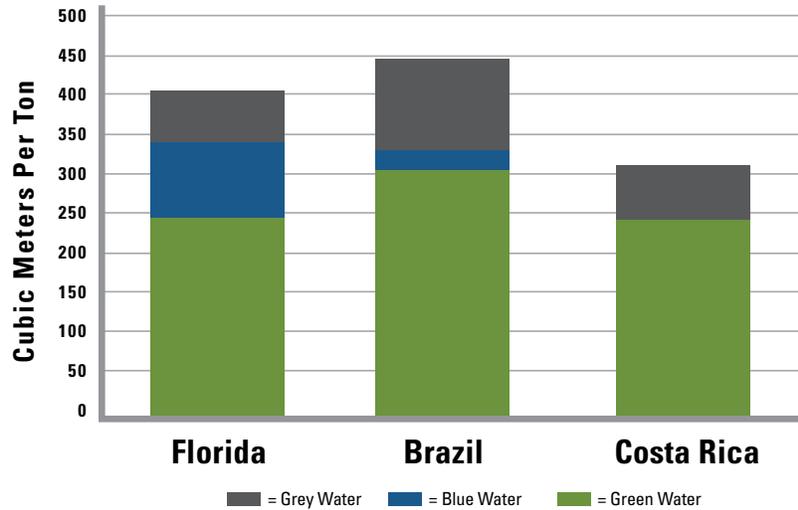
Water footprints were calculated according to the accounting method outlined in the *Water Footprint Manual* and based on available information. Public data were used for Brazil and to fill other data gaps where supplier data were not available.

The water footprint associated with orange growing makes up approximately 99% of the total water footprint for both products, and the remainder is associated with processing and packaging. The green, blue and grey water components for each product are shown in Figure 10.



**Figure 10. Water Footprint for a Liter of Orange Juice Product**

Most of the oranges are sourced from Florida, so the relative proportions of green, blue and grey water footprints for each product shown in Figure 10 are similar. The water footprint of oranges varies across growing regions, as shown in Figure 11. Based on this analysis, the total water footprint appears to be largest in Brazil. However, considering only the total water footprint can be misleading. The results show that in terms of consumptive water use (green plus blue water), Florida has the largest water footprint. Most importantly, Florida has a significantly larger blue water footprint than Brazil and Costa Rica. This is because the calculated crop water requirements are substantially greater for Florida compared to Costa Rica and Brazil. These differences reflect the higher evapotranspiration rates in Florida and explain why irrigation is a necessity in most Florida groves.



**Figure 11. Water Footprints for the Three Growing Regions**

A second and important reason for the differences in consumptive water footprint relates to the variance in crop yields between growing regions. Average crop yields for Florida are 18% greater than Costa Rica and 86% greater than crop yields in Brazil. There can be many reasons for these lower yields, including disease, lack of irrigation and/or fertilization, soil conditions, species of oranges and length of the growing season. Crop yields were identified as an area of uncertainty in the analysis, and these results illustrate why accurate crop yield information is critical to calculating water footprints.



The grey water footprint for growing oranges relates to fertilizer application and associated excess nutrients reaching surface water or groundwater supplies. Nitrogen was considered the most critical pollutant. Pollutant load information was available for Florida orange groves, and similar rates of fertilizer application were assumed for Brazil and Costa Rica in order to estimate the grey water footprint for all regions. In the absence of site-specific information for leaching rates and pollutant loads in runoff, a 10% leaching rate was assumed for all locations, as recommended in the *Water Footprint Manual*. The magnitude of the grey water footprint is strongly influenced by the crop yields that were assumed for the analysis. The larger grey water footprint shown for Brazil is a direct function of the lower yields used for Brazil, compared to yields used for Florida and Costa Rica.

### **Impacts Assessment**

This water footprint pilot differed from the other two studies in that the Company's orange juice products have large and complex supply chains. The orange groves and processing plants are spread across vast areas in numerous watersheds of three countries. For this reason, there was a need for a screening tool to help focus the impacts assessment on priority watersheds, and the utility of water stress indices for this purpose was explored as part of the study.

A variety of water stress indices have been used to reflect the scarcity of water in a region, based on various metrics that can be calculated in different ways. They can be used as indicators of locations where a closer look may be warranted. The indices are based on factors such as population and total runoff, volume of water withdrawals, and variation in precipitation.

Water stress indices were calculated for the three citrus growing regions, because it was determined during the accounting phase that the largest water footprint is associated with the orange groves. The results suggested that the green and blue water footprint impacts are potentially most significant for growing oranges in Florida. However, these indices are only indicative of potential impacts. A more detailed analysis revealed that, in general, water use associated with citrus growing in Florida is managed through the Water Management Districts' strong environmental flow and water quality protection programs, and there is little evidence of significant hydrologic impact from citrus growing in Florida. The water stress indices that were evaluated do not recognize these water resource management measures, which are designed to protect water quantity and water quality. However, water stress, climate factors and development pressures are an ongoing concern in Florida. Policy and regulatory engagement will be important to ensure the sustainability of the water resource.

## Uncertainty Assessment

Conducting water footprint assessments for products with complex supply chains requires significant data. In order to focus efforts on the key data requirements, an uncertainty assessment was conducted to highlight those factors that have the greatest influence on the water footprint. By calculating water footprints over a range of reasonable variability for selected input parameters, the uncertainty in input parameters that matter most to the calculation results can be identified. The uncertainty assessment can help in understanding what the numbers mean and how robust they are, focusing future data collection and management efforts on those factors that have the greatest influence on the water footprints.

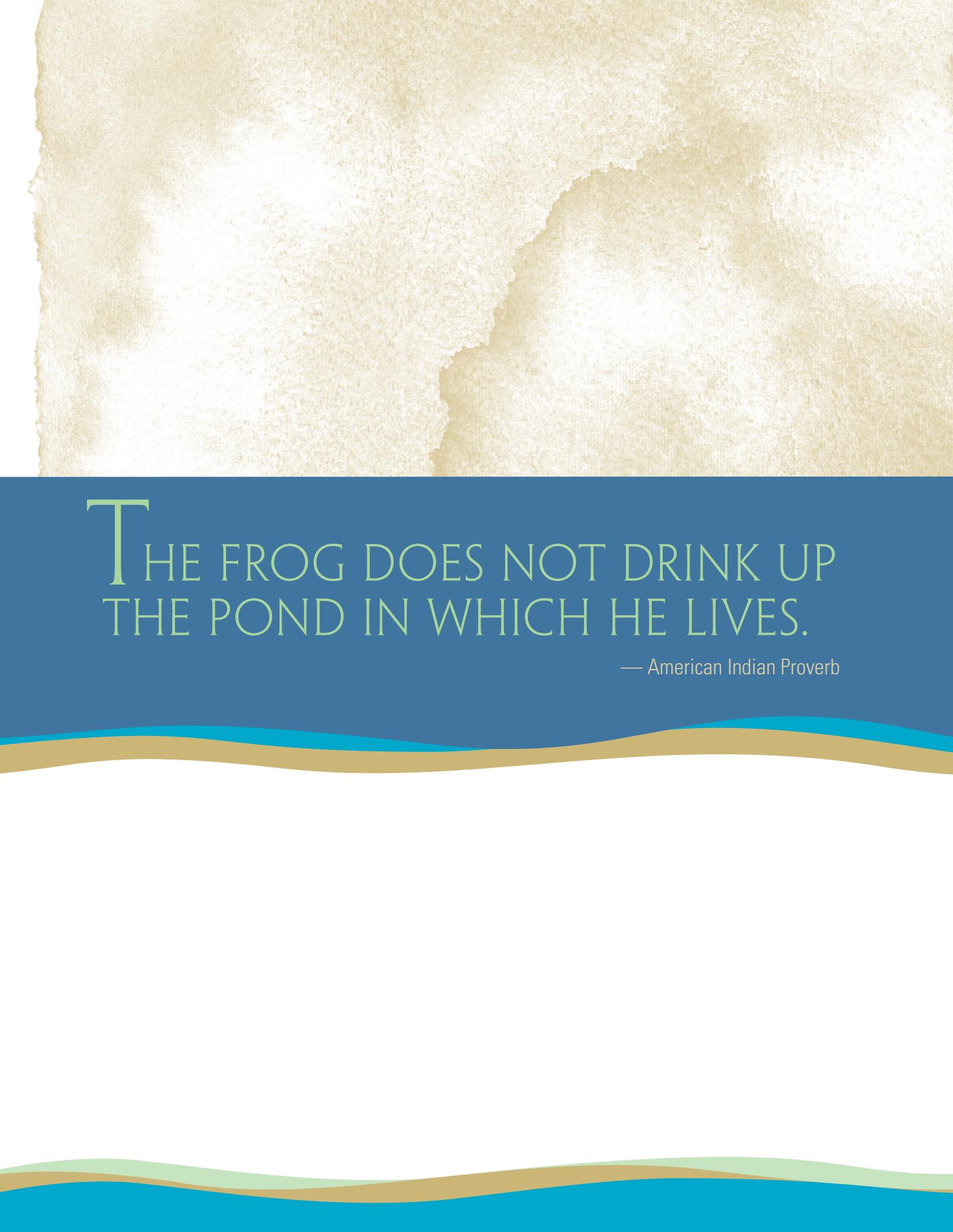
Two input parameters were identified that significantly affect the overall magnitude of the water footprints of orange juice, both related to the source crops: crop yields; and parameters for grey water associated with growing the oranges.

### *What was learned from the orange juice water footprint study?*

- **Approximately 99% of the total water footprint for both orange juice products is associated with orange growing.** The Coca-Cola system's packaging operations contribute insignificantly (<1%) to the overall water footprint. The packaging plants that were part of this pilot study have adopted significant water efficiency measures, and all process water is returned to the environment at a level that supports aquatic life.
- **Florida orange trees require approximately 70% more water than trees grown in Costa Rica and twice as much water as trees grown in Brazil.** Florida is sunnier and windier and has higher evapotranspiration rates. Florida also has less rainfall and a significantly larger blue water footprint (associated with irrigation) than Brazil and Costa Rica.
- **The calculations are highly sensitive to crop yields.** Estimated yields for Florida are 18% greater than Costa Rica and 86% greater than Brazil. The differences in the water footprint between regions reflect these differences in yields.
- **Uncertainty in the grey water calculation is large.** This component is the focus of ongoing debate, and the results may change as the methodology matures.
- **A full understanding of impacts requires an assessment of cumulative impacts on shared resources.** Water stress indices can help focus study on areas with potential impacts, but more detailed assessment is required to fully understand whether the water use is contributing to cumulative impacts in a watershed.

### *What are the implications for the Coca-Cola system?*

- **The study highlights potential opportunities for improvement related to orange growing.** The sensitivity of the water footprint calculation to crop yields suggests the need for greater understanding of the factors impacting yields across growing regions in order to take advantage of opportunities for improvement.
- **Despite tight management and controls, the greatest water-related risks may be associated with oranges sourced from Florida.** While impacts are not readily apparent in Florida, factors including water stress, competing and increasing pressures for water resources, and climate change may affect supply. Engagement with other stakeholders to help ensure that the shared water resource is managed sustainably will continue to be important.



THE FROG DOES NOT DRINK UP  
THE POND IN WHICH HE LIVES.

— American Indian Proverb

The three pilot studies described in the previous section provide insight into several important topics related to water footprinting. The primary lessons learned and observations are discussed below, organized according to the four phases of a water footprint assessment.

### 3.1 SETTING GOALS AND SCOPE

Water footprint studies can be time consuming and resource intensive, and before embarking on a study, it is important to be clear about the goals of the study. The Company invested in water footprint pilot studies for multiple reasons. Broadly speaking, the Company was interested in gaining a better understanding of the methodology and how it might support its aim to establish a truly water-sustainable business on a global scale. Together with The Nature Conservancy, there was interest in exploring the utility and practicality of the methodology for understanding water use throughout the value chain and the impacts that use may have on local watersheds. It also was anticipated that the knowledge gained through water footprint pilots might identify locations where response efforts should be directed at more sustainable agricultural practices. The potential value of water footprinting as an external communication tool was also of interest. Finally, The Nature Conservancy and the Company hope that the outcomes of the pilot studies will contribute to greater understanding of the water footprint assessment methodology.

Two perspectives related to these goals were gained through the pilot studies, as discussed in the following sections:

- Water footprint assessments can improve internal understanding of water use.
- External engagement and communications about water use can be informed by water footprint analysis.

#### ***Water footprint assessments can improve internal understanding of water use.***

The knowledge gained through the three pilot studies provides valuable insight into the largest components of water consumption in the production of the products selected for study. The assessment results demonstrate that focusing on operational water use is important, but it provides an incomplete picture of a product's full water use and impact. It is important to address freshwater use throughout the supply chain.

Water footprint accounting can provide useful knowledge and insights about water use and the green, blue and grey components. The results can also be used to help direct a company's efforts to encourage improved water stewardship in the supply chain. For example, the sugar beet pilot study indicated that some sugar processing plants have large grey water footprints due to low levels of treatment, highlighting a potential area for future engagement with suppliers. The assessment also can help identify the need for more sustainable agricultural practices related to water use by providing information on where the most water is used and where there may be the greatest potential for adverse impacts on water resources.

Water footprinting is a helpful tool to begin to identify potential water-related issues and risks. To really gain an understanding of whether water use is having an impact, the volume of water consumption must be placed in the context of the local watershed, and the cumulative effect of all uses of the shared water resource needs to be considered. The state of the science at the present time is still insufficient to address the full array of water-related impacts, but the water footprint methodology is expanding to include a more robust impacts assessment.

The Company relies on its risk assessment program to understand and manage water-related issues and risks for its direct operations. The risk assessment program has been instrumental in shaping the Company's water stewardship framework, which includes requirements for the development of Source Vulnerability Assessments and Source Water Protection Plans for all bottling facilities.

***External engagement and communications about water use can be informed by water footprint analysis.***

Discussions around water are evolving rapidly across many audiences, including policy makers, corporate investors and shareholders, NGOs, communities and others. Water is a complex resource to understand and manage, and water impacts differ fundamentally from carbon emissions, where local releases can have global impacts. When talking about a water footprint, it is important to recognize that there are varied applications of its use and to be clear about the type of water footprint involved, as well as the needs of the audience.

The value of product water footprinting is its ability to examine disaggregated water use by component; that is, by supply chain and operational use, and by green, blue and grey water. It is important to keep the components of a water footprint separate, so that they can be assessed in the context of the local watersheds where the water is being sourced. While the concept of water footprinting has successfully raised public awareness of the various dimensions of water use, consumers and many opinion leaders often focus only on the aggregated numbers, with a natural reaction that they need to be made smaller, regardless of the context. However, a product water footprint number by itself lacks important context, and this can send the wrong message that any water use is bad, which may lead to an inappropriate response strategy. A small water footprint in a drought-prone watershed may have a significant impact, while a large water footprint in a water-rich region may have little or no impact.

There is a perception by some that water footprints on product labels can be used to help consumers make product choices. While water footprints are a helpful tool for companies to begin to understand their water use, numeric water footprints on product labels do not provide the information that consumers need to make informed choices among products and consumption practices. A water footprint label would provide "a number," but it would not reflect the complexities behind it, or convey the impact that the water used to produce that product is having on the local watershed.

Care must be taken when comparing water footprints to ensure that they reflect the same scope (operational and/or supply chain). Furthermore, when site-specific data are limited, as is often the case, the use of public data sources will lead to the same water footprints for similar products. As an example, in the absence of site-specific data, orange juice produced by two companies that source from the same countries will have the same water footprint because operational water footprints are small, and any differences will be overwhelmed by the crop water footprint.

The water certification program under development by the Alliance for Water Stewardship (AWS)<sup>24</sup> and discussed in Section 4.2 holds promise as a more effective and appropriate communication tool. This program will recognize companies contributing to sustainable water practices and operating in healthy watersheds. Both The Nature Conservancy and The Coca-Cola Company are participating in the activities of the AWS.

<sup>24</sup> [www.allianceforwaterstewardship.org](http://www.allianceforwaterstewardship.org)

## 3.2 WATER FOOTPRINT ACCOUNTING

The core of the water footprint assessment is accounting. During this phase, the supply chain is mapped out, relevant data are collected, and the colors of the water footprint are calculated. In general and across all three pilot studies, the accounting process provided an increased understanding of the green, blue and grey components of the water footprint. The primary lessons learned and observations related to the accounting phase are discussed below:

- Supplier information is critical to conducting a water footprint assessment;
- The water footprints for the products studied come mainly from the field, not the factory;
- The spatial and temporal resolution of the blue water footprint is critical;
- Water footprints are highly sensitive to just a few input parameters;
- Further development and standardization of the methodology for calculating the grey water footprint is needed; and
- The overhead water footprint was found to be an insignificant component of the product water footprints.

### ***Supplier information is critical to conducting a water footprint assessment.***

Water footprint accounting requires a significant amount of data. Many of the Company's products are produced through complex supply chains involving numerous growers, processors and bottlers spread across multiple continents. Consequently, no one person has access to all of the required data. It can be extremely difficult to map the supply chain to the field level, due to the fact that certain ingredients are purchased from distributors or cooperatives that stockpile products from hundreds of farms. Further complication derives from the fact that the locations of water use or farming can change, meaning that the flow of materials is ever-changing. This challenge was addressed in the orange juice water footprint assessment by selecting representative farms and plants for analysis. While data needs were still substantial, this helped focus the analysis.

For agriculturally-derived products, most of the data required for an assessment resides with suppliers. This information may be considered confidential for competitive reasons or because of concerns about comparison within their industry. For example, crop yields, which can have a significant impact on the magnitude of the water footprint, also have implications for supplier sales and pricing strategies. Specific information about internal processes at manufacturing plants may also be considered proprietary. Some suppliers were willing to share information with the third party that conducted the water footprint assessment after a confidentiality agreement had been signed. Other suppliers expressed more willingness to work together through an industry association to develop a water footprint for a region. In either case, getting the needed data is time-consuming and may increase project costs. This factor can also limit the level of information detail that can be shared.

When it is not possible to acquire site-specific data, regional averages from global datasets may be the only available source of information. For example, in the absence of data for the citrus-growing region of Brazil, data were obtained from readily-available datasets.<sup>25,26,27</sup> This raises the question of whether all water footprints will look the same for similar agriculturally-derived products when site-specific data are unavailable and inputs are drawn from the same global databases.

<sup>25</sup> Food and Agriculture Organization (FAO). 2009. FAOSTAT Database. Food and Agriculture Organization. Rome. <http://faostat.fao.org>

<sup>26</sup> FAO, 2009. CLIMWAT 2.0 model, Rome. [www.fao.org/nr/water/infores\\_databases\\_climwat.html](http://www.fao.org/nr/water/infores_databases_climwat.html)

<sup>27</sup> USDA (United States Department of Agriculture) Foreign Agricultural Service. 2008. GAIN Report No. BR 8021. Brazil Citrus Annual 2008. December 19, 2008. <http://www.fas.usda.gov/gainfiles/200812/146306943.pdf>



***The water footprints for the products studied come mainly from the field, not the factory.***

The results of the three pilot studies reveal that the green, blue and grey water footprints for Coca-Cola, European sugar beets and orange juice come mainly from the field. The largest contributor to the blue water footprint is irrigation water used to grow the crops. The grey water footprint stems primarily from fertilizer and pesticide use, with some grey water associated with the manufacturing of packaging materials. This general finding, with respect to the ratio of operational to supply-chain water footprints and the relative importance of ingredients, packaging and overhead, can likely be extended to other similar agriculturally-derived products.

These results highlight the importance of including the full supply chain in a water footprint assessment. For agriculturally-derived products, companies with a comprehensive operational water use management program in place may be able to focus their efforts on encouraging more sustainable practices for key crops in the supply chain.

***The spatial and temporal resolution of the blue water footprint is critical.***

To accurately assess the potential for impacts, it is important to understand how water scarcity in a watershed varies throughout the year and its relationship to the crop water needs/use. The blue water footprint is commonly presented as a single number that can mask important spatial and temporal considerations. For instance, to develop appropriate response strategies, it will be necessary to understand whether the blue water is coming from and being discharged to a river, lake, aquifer or multiple sources. The variability of the blue water footprint is also obscured when only an annual average number is presented. Particularly for agricultural products or ingredients, water use can vary considerably over the course of a year, as can water availability. In sum, the value of water footprinting for impact and risk assessments will increase greatly when footprint components are disaggregated by water source. Further, understanding the seasonality of water use and availability helps provide a basis for developing appropriate response strategies.

***Water footprints are highly sensitive to just a few input parameters.***

Sensitivity analyses were conducted as part of two of the three pilot studies to identify the uncertainty in input parameters that matter most to the calculation results. A sensitivity analysis that calculates water

footprints over a range of reasonable variability for select input parameters can be used to focus future data collection and/or management efforts on those factors that have the greatest influence on the water footprints.

Crop yield was found to be the single most important parameter affecting the water footprint calculations. Yields can vary widely from year to year, as a result of climate, disease, species of oranges and other factors that introduce year-to-year variability. Yields also are considered confidential by suppliers, as previously noted, and publicly-available averages can introduce large uncertainty into the results. The sensitivity analyses also indicated that changes in input data for the grey water footprint can have a significant effect on the water footprint results. Data on fertilizer application and leaching and runoff rates for growing operations were not generally available for the pilot studies, so simplifying assumptions were made. Therefore, the grey water components related to the runoff and infiltration of pesticides and fertilizers are highly uncertain. The choice of water quality standard for grey water footprint calculations related to operations can also have a significant impact on the results, as demonstrated by the sensitivity analysis conducted as part of the sugar beet study.

### ***Further development and standardization of the methodology for calculating the grey water footprint is needed.***

A technical working group of the Water Footprint Network is currently focusing on this topic, and the Company is actively engaged in the process. Important questions are being explored, including the place of the grey water footprint in water footprint accounting, the selection of natural and maximum contaminant concentrations for the calculation, the empirical formulas used to determine leaching and runoff, and pollutant impacts in receiving water bodies. The findings of this technical working group will be addressed in the 2010 revised version of the *Water Footprint Manual*.

Where screening calculations using the WFN method indicate that the grey water footprint of a product is large and may be having an impact, further evaluation using location-specific water quality studies and data is recommended to confirm (or refute) the preliminary conclusions and to develop a better understanding of localized water quality impacts and the effectiveness of possible management practices in reducing impacts.

### ***The overhead water footprint was found to be an insignificant component of the product water footprints.***

Overhead in the supply chain includes water consumption associated with concrete and steel used in buildings, energy production, vehicles, office supplies and other materials. Operational overhead includes domestic water use (e.g., for cleaning, toilets, kitchen use, gardens). Overhead was found to be a very small component of the total water footprint in the pilot studies where it was addressed. Both supply chain and operational overhead were computed as part of the pilot study for a 0.5 liter bottle of Coca-Cola and found to be a negligible component of the total water footprint. For the sugar beet pilot study, the water footprint related to fuel consumption for agricultural machinery and energy consumption in the factories was included in the analysis, as well as transport from the field to the sugar factories and from the sugar factories to the bottling plants. These components were found to be negligible compared to the total water footprints. Energy use was excluded from the orange juice study because biofuel, biomass combustion and hydropower were not identified sources of energy for the representative facilities.<sup>28</sup> Information on domestic water use at the Florida processing plant was available and was calculated, but it was determined to be insignificant. Discussions with others in the water footprint community suggest that these findings may apply to agriculturally-derived products in general.

<sup>28</sup> The recommendation in the *Water Footprint Manual* is that the water footprint of energy should be accounted for if the energy is sourced from biofuels or from electricity from biomass combustion or hydropower because those forms of energy have a relatively large water footprint per unit of energy.

### 3.3 WATER FOOTPRINT SUSTAINABILITY ASSESSMENT

Water is a finite resource, but it is infinitely renewable. When properly managed, even large volumes of water use can be sustainable in locations where the resource is sufficient to support the use. The impacts of water use need to be assessed in the context of all water uses in the watershed in order to define cumulative impacts, shared risks and appropriate response strategies. Improved efficiencies and wastewater treatment are important where possible, but impacts can also be addressed through policy and regulatory engagement to support improved management of the shared water resource.

Methods for identifying impacts of water footprints on water resources are evolving and the subject of much attention. A Sustainability Assessment Workgroup of the Water Footprint Network (hereafter, WFN workgroup) is currently focusing on this topic. The Nature Conservancy and The Coca-Cola Company are active participants, drawing from considerable real-world experience in watershed protection and restoration. Two key recommendations are discussed below:

- Impacts should be screened at multiple levels of spatial and temporal resolution.
- The boundaries of an impact assessment need to be clearly defined.

#### ***Impacts should be screened at multiple levels of spatial and temporal resolution.***

As discussed earlier, a product water footprint analysis enables one to trace water throughout the supply chain to the local watershed. However, for product water footprints with highly complex supply chains, it can be overwhelming to assess every single watershed. Therefore, it is necessary to be able to screen this information to determine where a company should focus its efforts and further research. Recent discussions within the WFN workgroup suggest that a three-step process for assessing potential risks can help maximize the efficiency of screening efforts.

At the coarsest level, a global screening exercise can be conducted using indicators of stress and vulnerability at the river basin level to prioritize areas for deeper analysis. The World Business Council on Sustainable Development has developed a *Global Water Tool*<sup>29</sup> that is appropriate for such high-level global screening. As this and similar global tools are improved with finer-scale river basin delineation, month-by-month water scarcity analysis, and additional indicators of water stress and sustainability, they will become ever-more useful for impact and risk screening. The *Water Footprint Assessment Tool*, now under development by the Water Footprint Network, is expected to provide such enhanced capabilities.

The second step should be conducted at the local watershed level for watersheds prioritized in the first step. In this step, three possible indicators are examined, depending upon which water sources are influenced by the company's water consumption and pollution discharge:

- historical changes in river flow;
- changes in lake or aquifer levels; and
- violations of water quality standards.

The proposed design of the *Water Footprint Assessment Tool* will greatly facilitate assessments of these three impact indicators.

<sup>29</sup> The WBCSD's Global Water Tool is available at: <http://www.wbcd.org>.

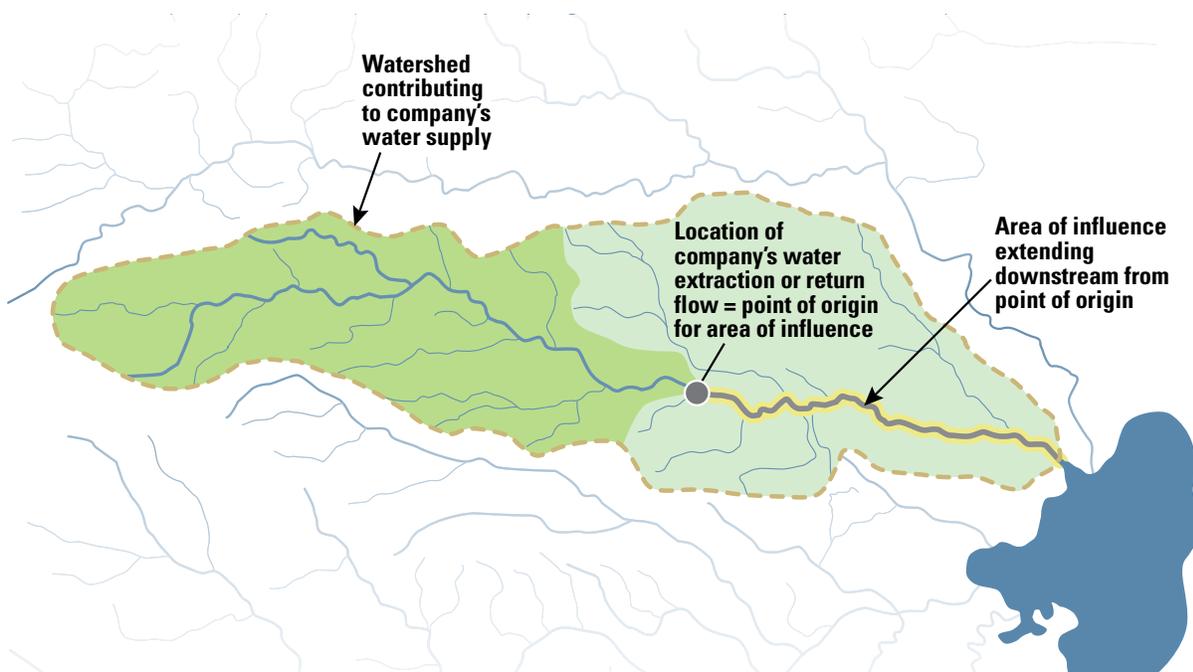
Those watersheds that appear to be adversely impacted based on these indicators will require further analysis to determine appropriate response strategies. The third step involves a site-specific assessment of not only water quantity and quality impacts, but also ecological and social impacts. Such assessment typically employs computerized hydrologic simulation models and/or multi-disciplinary teams of experts (e.g., eco-hydrology, social science and economics).

This level of detailed assessment may be done as part of a water footprint assessment or as a separate effort. As an example, The Coca-Cola Company has initiated pilot projects in partnership with World Wildlife Fund (WWF) for sustainable agricultural management practices for sugarcane. Improved practices from this and other pilot projects will inform the development of better management practices, helping to ensure a more sustainable supply chain.

***The boundaries of an impact assessment need to be clearly defined.***

The impact screening process described above is based on the premise that water-related impacts must be evaluated on a watershed basis for the reasons discussed in Section 1.2. For coarse-level impact screening, pre-determined river basin boundaries, such as those employed in the *WBCSD Global Water Tool*, may suffice, but accurate impact assessment will require more detailed analysis of the local watershed.

Draft guidance from the WFN workgroup recommends that the local watershed and “area of influence” be delineated as depicted in **Figure 12**. The point at which a company is extracting water or discharging wastewater defines a “point of origin” from which a contributing watershed can be delineated upstream of this point. The “area of influence” depicts the boundary within which potential ecological and social cumulative impacts should be assessed. While this example depicts a watershed-based assessment, similar logic can be applied to water extractions from an aquifer or lake.



**Figure 12. Conceptual Diagram of Impact Assessment Boundaries**

### 3.4 WATER FOOTPRINT RESPONSE FORMULATION

The response formulation phase addresses the question: ***What can be done about the impacts caused by a water footprint?*** Clearly, all life takes water, and it is vital for communities, industry, power generation, navigation, recreation and other purposes. Where a water use has been determined to be unsustainable, the options for addressing this challenge include: minimizing water use through improved efficiency measures and reuse of process water; treating process water so that it can be returned to the environment safely; and engaging with communities, governments and other stakeholders on effective management of the limited resource to help ensure an adequate supply of clean water for all users.

The Coca-Cola Company's water stewardship framework starts with ensuring the sustainable use of water within the watersheds where its plants are located. Specific engagement actions associated with managing a bottling facility's operational water footprint may be inside the plant or on the plant grounds, or they may address community or watershed issues. Priority for engagement is given to bottling facilities located in water-stressed regions where social and ecological impacts may be occurring. The Coca-Cola system also is taking action to ensure the sustainability of agricultural practices for its key ingredients.

Two specific observations related to response formulation from the water footprint pilots and water stewardship strategy are discussed below:

- Response actions should start with a company's own operations and include collaborative efforts to help protect the local watersheds where it operates.
- Companies that produce agriculturally-derived products need to understand water use in the supply chain and support sustainable practices.

#### ***Response actions should start with a company's own operations and include collaborative efforts to help protect the local watersheds where it operates.***

A valuable characteristic of the water footprint methodology is that it breaks out operational and supply chain water use and examines the three colors of a water footprint separately. By keeping these components separate rather than combining them into one aggregated water footprint number, operational water use and efficiency measures remain visible and are not overwhelmed by the crop water footprint. In its commitment to water stewardship, the Coca-Cola system has focused first on its global operations, meaning not only its bottling plants but also the watersheds and communities where the Coca-Cola system operates. All plants in the Coca-Cola system are required to determine the source of their water and that of the surrounding community, assess the vulnerabilities to the quality and quantity of this water, and working with civil society and governments, develop and implement a source water protection plan.

The first and most important action a company should take is to address its own water use in operations where it has direct influence. Water consumption in operations should be minimized and all process water treated to water quality standards before it is returned to the environment. For industries where production generates waste material, productive use of the waste through production of byproducts is another means of reducing the operational water footprint. As an example, all parts of an orange are used in the production of orange juice and its byproducts, and the water footprint is allocated across byproducts according to their weight and value.

Understanding any local impacts of the Coca-Cola system's water use and ensuring sustainable supplies of water for all stakeholders is integral to this effort. There may be a need for water access projects to help

provide clean and reliable sources of drinking water or restoration measures that address water quantity and water quality issues in a watershed. These types of “Replenish” activities are being implemented as part of the Coca-Cola system’s Community Water Partnership (CWP)<sup>30</sup> projects. The Conservancy and the Company have identified nine categories of actions that may be implemented as part of its CWP projects or any water stewardship program. Scientifically credible methods for quantifying the effects of these measures on water quantity (hydrological pathways and storage) and water quality have been identified and documented, and the benefits generated by these activities have been quantified to assess progress in attaining the Company’s Replenish target.

## COCA-COLA SYSTEM WATER RESOURCE SUSTAINABILITY

Coca-Cola bottling facilities worldwide are required to have formal Water Resource Sustainability programs with Source Water Protection Plans that are audited through the global governance program.

### Program Goals

- To promote and support the sustainability and supply reliability of water resources in the watersheds and communities where the Coca-Cola system operates;
- To understand and address environmental, social, political, regulatory and economic issues associated with securing sufficient freshwater to meet current and future business and local community needs; and
- To help protect product quality and safety.

Each facility is required to conduct an in-depth Source Water Vulnerability Assessment and develop and implement a Source Water Protection Plan for the business and local community water sources, if such sources are different from the plant’s source of water.

### Source Water Vulnerability Assessments

- Conduct a rigorous technical assessment of local water resource sustainability, including detailed watershed mapping and hydrologic/hydrogeologic modeling of local watershed and groundwater basin.
- Identify contributing areas, recharge areas, protection zones and threats to the availability and quality of water resources. This includes development of watershed “budgets” to understand water supply and demand, and basin inflows and outflows (including inter-basin transfers).
- Engage water resource management agencies, local communities and environmental organizations to understand community needs and local water resource management policies and regulations.
- Determine the potential impact of Coca-Cola system facilities on the availability or quality of water for the people in the local community.

### Source Water Protection Plans

- Develop and implement a plan to address challenges to local water resource sustainability; including engagement and collaboration with local communities, stakeholders and implementing partners.

<sup>30</sup> The Coca-Cola Company. 2010. Replenish Report. January.



***Companies that produce agriculturally-derived products need to understand water use in the supply chain and support sustainable practices.***

The pilot studies conducted by the Coca-Cola system and others to date have indicated that the largest component (approximately 80% or more) of the water footprint for agriculturally-derived products is associated with growing the crops. For this reason, and whether or not a water footprint assessment is conducted, it is important to consider the sustainability of agricultural inputs.

Appropriate response measures in the supply chain may be less clear than measures to address water efficiencies and wastewater in operational water use. If ingredients are sourced from a water-stressed region, a company needs to carefully examine its options and the business implications of various sourcing alternatives. Where a company can influence suppliers, important questions include whether to source from a different region or instead work to improve how the water resource is managed. These choices have social and economic implications that are important to consider along with environmental impacts.

The green water footprint can be a large component of the total water footprint, and there may be opportunities to reduce it.<sup>31</sup> While farmers have no control over the quantity of rain that falls on their land, the efficiency of the use of that water may in some cases be improved. For example, improved soil management or better cover crops may decrease evaporation. Agricultural practices that increase crop yields (for example, planting different varieties or planting trees closer together) may, in some cases, decrease the green water footprint. If productivity (tons per acre or per liter) is increased, there will be less of a need to produce elsewhere, thereby reducing the pressure on land and potentially reducing the blue water footprint for crop production. However, there are limitations to what can be done in this regard. For example, production controls may not be designed for maximum yields, as is the case for sugar beets grown in some regions of Europe. Consumer tastes will constrain the varieties of oranges grown for orange juice, and crop diseases may keep yields lower than desired.

The Coca-Cola Company is focusing on key agricultural inputs in the supply chain and taking a holistic approach. The Company's sustainable agriculture strategy extends beyond water resources and addresses the three pillars of sustainability: environmental impacts; social implications; and economic pressures. The strategy evaluates key agricultural inputs, with an initial focus on sugarcane. Sugarcane is among the group of crops noted for its substantial water consumption. The Company's approach to sustainable agriculture is multi-dimensional and founded on principles to uphold workplace rights, protect the environment, and help build sustainable communities. More information on these activities is provided in the box on the following page.

<sup>31</sup> See for example, International Water Management Institute (IWMI), 2007. *Water for Food; Water for Life. A Comprehensive Assessment of Water Management in Agriculture*. David Molden, editor.

## THE COCA-COLA COMPANY'S FRAMEWORK FOR SUSTAINABLE AGRICULTURAL INGREDIENTS

The Company's sustainable agriculture strategy focuses on agricultural commodities within the Company's supply chain. The Company's sustainable agriculture framework seeks to:

- **MITIGATE RISKS** by working with partners and suppliers to address environmental and social challenges to ingredient availability, quality and safety;
- **MEET CUSTOMER AND CONSUMER DEMANDS** for lifestyles of health and sustainability; and
- **MANAGE COSTS AND REALIZE NEW OPPORTUNITIES** by leveraging relationships with suppliers and communities.

The strategy is built on three elements:

- **PARTNER ENGAGEMENT:** Identify key partners and amplify resources in order to identify risks and opportunities within the Company's supply chain.
- **FOSTER INNOVATION:** Initiate pilot projects in key markets to address present and future challenges and create opportunities.
- **SUPPLY CHAIN SUSTAINABILITY VALIDATION:** Engage in validation mechanisms, including certification in some cases, to verify and validate applicable criteria, gain credibility and meet customer requirements.

The Company's global partnership with World Wildlife Fund (WWF) is a critical part of its sustainable agriculture strategy. The partnership team is focused on conserving freshwater and fostering better performance for targeted agriculturally-derived ingredients within the supply chain, with an initial focus on sugarcane, oranges and corn.

Currently, there are a number of sugarcane pilot projects underway in Australia, Belize, Brazil, El Salvador, Guatemala, Honduras and South Africa. As an example, the Great Barrier Reef (GBR) Sustainable Freshwater Revitalization Project (Project Catalyst) is a five-year initiative directed at innovative practices to sustainably improve the quality and quantity of freshwater across the Mackay/Whitsunday catchments, which flow directly into the Great Barrier Reef. To date, 19 cane growers have adopted improved soil, nutrient, pesticide, irrigation and storm water management on 4,800 hectares of cane production. More than 24,000 ML of runoff and drainage water has improved water quality due to these improved practices.

The partnership team is working with the Better Sugarcane Initiative (BSI) to improve the global performance of the sugarcane industry. BSI is a collaboration of sugar retailers, investors, traders, producers and NGOs committed to reducing the social and environmental impact of sugarcane production, while enhancing the economic status of farmers. The initiative works to establish standards, evaluate suppliers and set measurable goals with agriculture partners to reduce impacts to acceptable levels.



ANYONE WHO CAN SOLVE THE  
PROBLEMS OF WATER WILL BE WORTHY  
OF TWO NOBEL PRIZES — ONE FOR  
PEACE AND ONE FOR SCIENCE.

— John F. Kennedy



The water footprint pilot studies provide important insights into water use throughout the supply chain and highlight that water use associated with agricultural ingredients is the largest component of the product water footprints assessed in this report. In the years ahead, The Nature Conservancy and The Coca-Cola Company will continue to work together toward an improved understanding of water-related impacts in local watersheds, appropriate response actions to address adverse impacts, and the methods for quantifying Replenish benefits.

The Coca-Cola Company and The Nature Conservancy also will continue to engage with the Water Footprint Network and contribute to the advancement of the science of water footprinting and its practical application for businesses. Each organization also will support separate initiatives, as described in the following sections.

## **4.1 THE COCA-COLA COMPANY'S WATER STEWARDSHIP AND SUSTAINABLE AGRICULTURE STRATEGY**

The Company will continue to actively work toward its aim to establish a water-sustainable business on a global scale. The Company's water stewardship strategy will remain focused first on minimizing its operational water footprint by meeting or exceeding its water efficiency and wastewater treatment targets. Source Vulnerability Assessments and Source Water Protection Plans are being developed for each plant to identify and address local water resource issues and risks.

The Company will continue to invest in and quantify the benefits of locally relevant Replenish projects that are directed at restoring and sustaining adequate water supplies for the full range of beneficial uses. This quantification work is contributing to the Water Footprint Network's ongoing development of methodologies related to sustainability assessment and formulation of response strategies.

The Company's response to supply chain water footprint assessments will focus on key agricultural ingredients as an integral part of its sustainable agriculture program. There are significant opportunities within the global supply chain to develop and encourage more sustainable practices to benefit suppliers, customers, consumers and local watersheds. The current areas of focus include sugarcane, oranges and corn. Coca-Cola Europe will complete its study of sweeteners supplied to its European bottling plants over the next six months.

## **4.2 THE NATURE CONSERVANCY'S WATER STEWARDSHIP PROGRAM**

The Nature Conservancy is focusing on three strategies designed to drive adoption of sustainable water practices by corporations.

First, the Conservancy will continue to work with the Water Footprint Network and other partners to further develop assessment methodologies and tools to support water footprint assessments and guide companies toward appropriate and effective risk management and watershed restoration activities.

Second, the Conservancy will continue to work with individual corporations and public and private water utilities to apply new approaches and tools in the watersheds in which they operate or from which they source their supply chain ingredients. This watershed-based work enables the Conservancy to rigorously test the efficacy and practicality of various sustainability approaches and best practices for improving water flows, water quality, and ecological and social well-being. Disseminating lessons learned will be key in motivating other companies to apply the most promising approaches.

Third, the lessons learned from the Conservancy's on-the-ground, watershed-based work will feed directly into discussions about sustainability standards and certification being facilitated by the Alliance for Water Stewardship (AWS). The mission of the AWS is to promote responsible use of freshwater that is socially and economically beneficial, as well as environmentally sustainable. The AWS, working with stakeholders from around the world, is providing a platform for the development of a global water stewardship program. At the heart of this work is the development of standards and a certification program. The AWS intends to create a program that recognizes and rewards water users and managers who take major steps to minimize the impacts of their water use and management. The Conservancy, a founding partner of the AWS, believes that a well-designed certification program will motivate companies and utilities around the world to implement sustainable water practices, thereby bringing tremendous benefit to ecological health and social well-being.

### **What is the Alliance for Water Stewardship?**

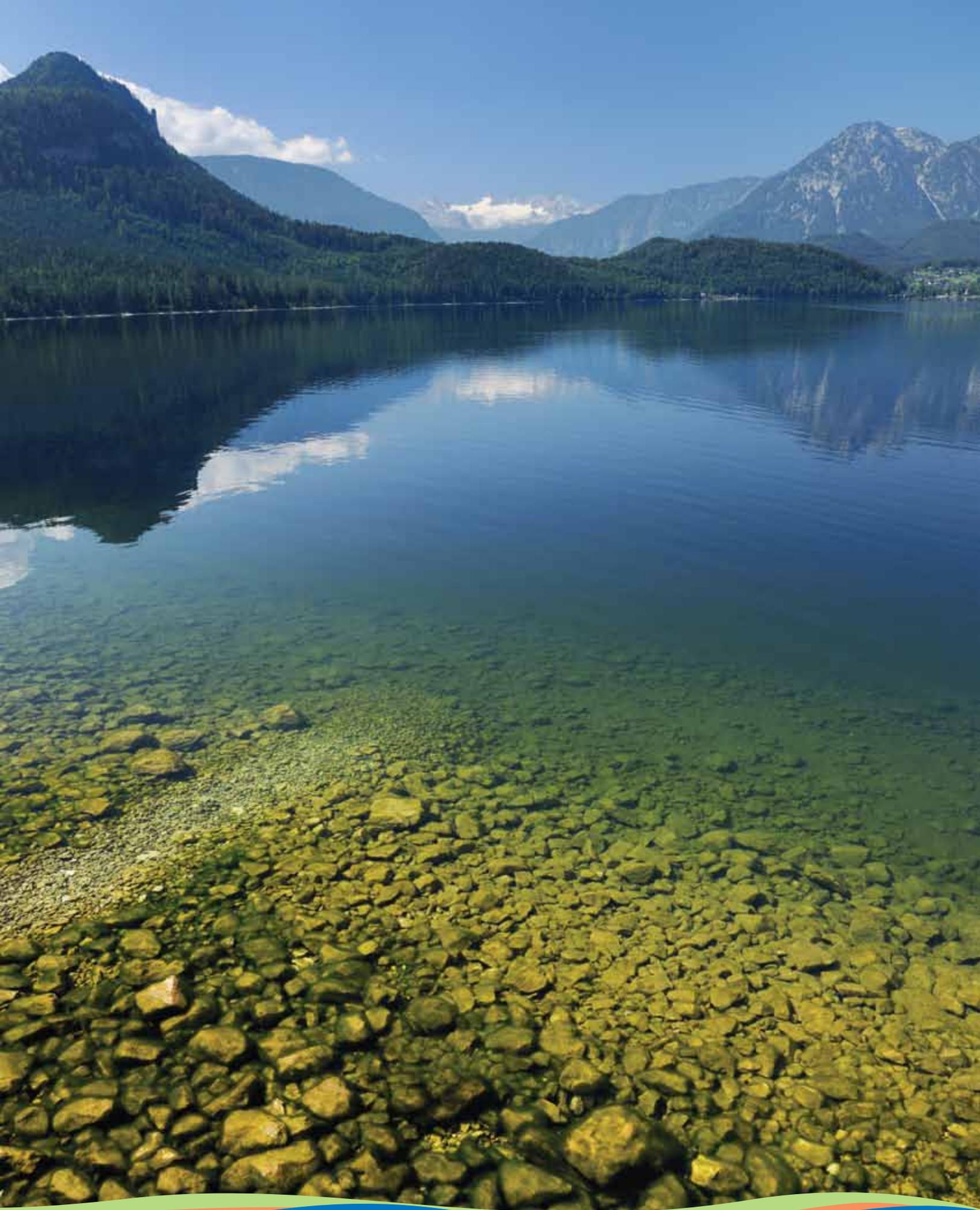
The Alliance aims to establish a global water stewardship program that will recognize and reward responsible water managers and users by creating opportunities for enhanced community standing and competitive advantage.

Over the next few years, the Alliance will work with water authorities, companies, local communities and environmentalists to establish a voluntary certification program for water managers and users based on the following:

- International standards developed through an equitable, transparent, science-based, multi-stakeholder process.
- Verification to determine whether these standards have been met.
- A global brand that allows managers, users and organizations to demonstrate their compliance with or support for water stewardship.
- Training and education to promote achievement of water stewardship.



More information can be found at: [www.allianceforwaterstewardship.org](http://www.allianceforwaterstewardship.org)





*Coca-Cola*

The Nature  
Conservancy 