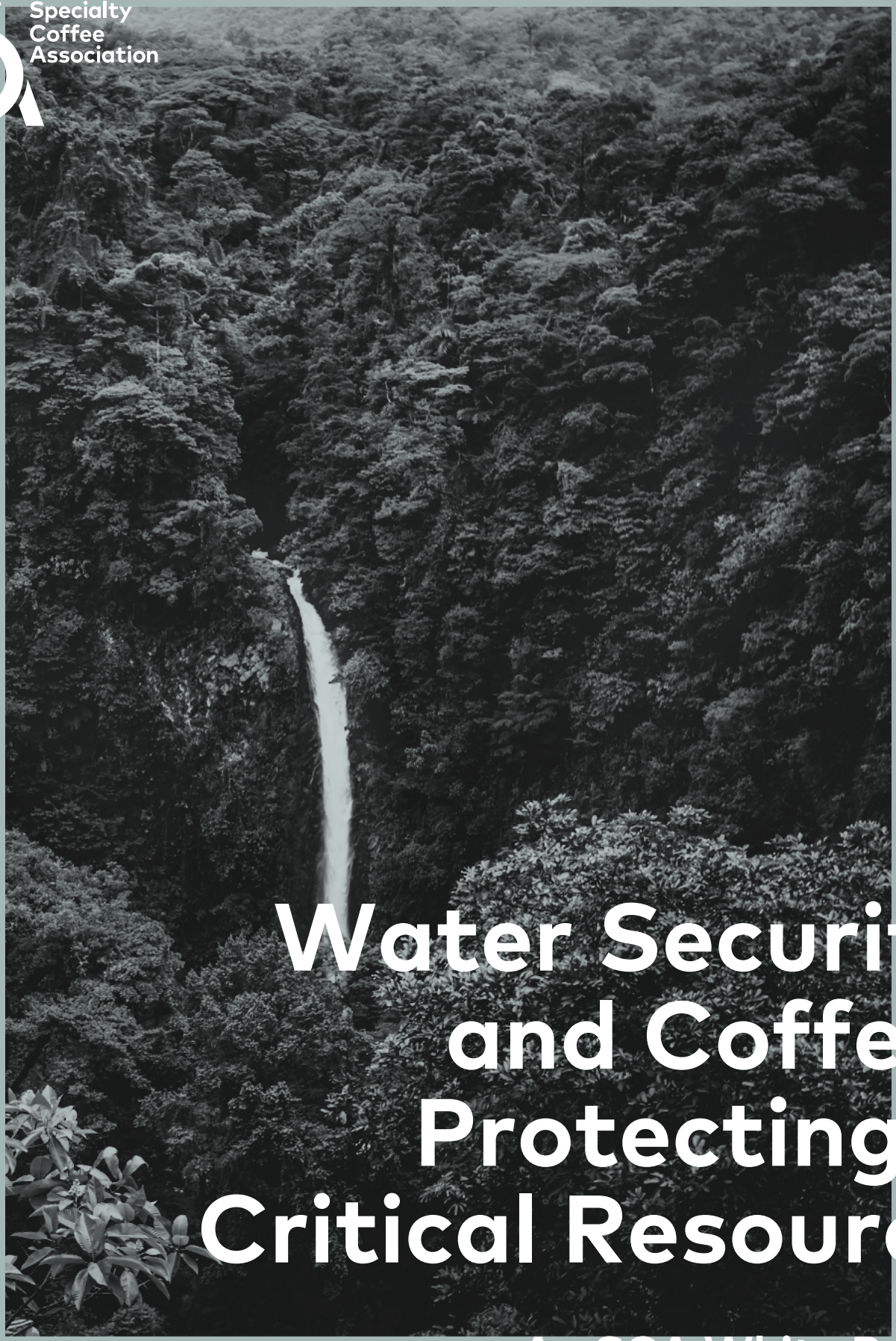
Specialty Coffee Association



Water Security and Coffee: Protecting a Critical Resource

An SCA White Paper

Introduction

The story of the SCA white papers begins with the Millennium Development Goals (MDGs) ratified by the United Nations in the year 2000. These eight goals were designed to serve as a global, collective agenda for sustainability, and they were simultaneously ambitious and broad—for example, "Eradicate Extreme Poverty and Hunger" was number one. The Specialty Coffee Association of America became an official signatory of the MDGs in 2005 and the organization enlisted the support of the volunteer leaders in its Sustainability Committee, which later became the Sustainability Council, to realize the potential of its commitment. In 2012, the Council embarked upon a project to write a series of papers on these global sustainability themes directed at the membership of the association and the broader coffee community. Each of these critical issue briefs, or white papers, would frame an issue, explain the relevance of the issue to coffee, and offer case studies and recommendations on the role of industry actors ranging from coffee producers to baristas, and even coffee drinkers.

Between 2012 and 2016, volunteers collaborated to write papers on five themes: food security, gender equality, farmworker inclusion, water security, and climate change. The SCAA published each paper upon its completion and they have been available as free, downloadable resources ever since, so it's not surprising to find references to them across the specialty coffee industry—from articles to lectures at events. The launch of the Sustainability Center within the unified Specialty Coffee Association in 2017 presented an opportunity to share the knowledge contained within these papers with a larger and more diverse audience, so in 2018 we are republishing the papers. The second edition of each paper will correct errors to the first and, where relevant, reflect changes in nomenclature (e.g., the name of a company or a place, or the title of an individual). Here in the introduction, we will comment on the evolution of the coffee industry's thinking and actions on the issue discussed in the paper.

While all the white papers were written by volunteers, the *Blueprint for Water Security in the Coffeelands* stands apart for having been written by a team of volunteers who all arrived to the coffee industry by way of the subject they were writing about (in this case, water), as opposed to looking at the subject from the position of a coffee buyer or a barista first and foremost. That breadth of experience leads to this paper having the most case studies from outside of the coffee industry and the largest number of citations, which link to studies that offer further reading. There's a lot of information available about water, and its importance to our survival—none of us would survive beyond 72 hours without it—could form the basis for arguing that every human on earth should be more concerned about water scarcity than any other global issue. But it's probably not the case, at least for those of us who get clean water from taps in our homes and pay comparatively small fees for that invaluable privilege. Most coffee farmers, on the other hand, don't share the privilege of choosing the timing and quantity of water they receive. At the field level, coffee plants may receive too little rain water, or too much, or even just the right amount at the wrong point in the harvest, and those increasingly common irregularities have economic and social implications as well as environmental ones. Meanwhile, at the community level, the availability of potable water may be limited by the demands of coffee processing and its quality affected by poor water treatment.

Since the paper's original publication in 2016, the global water crisis has continued to worsen as a result of climate change and population pressure and, in 2018, two-thirds of the global population experiences water scarcity for at least one month per year. But we can simultaneously recognize macro trends and also celebrate innovation and leadership, including by the organizations profiled in this paper. From the Water Fund in Quito, Ecuador and Blue Harvest in Central America to Nestle's project in Vietnam and Root Capital's Clean Tech Finance in East Africa, we find inspiring examples of approaches to water scarcity that are positively impacting local communities and ecosystems. And while these projects and collaborations are based on local needs and rooted in and around the coffee industry, the recommendations that accompany them mirror global objectives – in fact, in 2018 the UN's High Level Panel on Water published a paper of its own this year that focuses on three major themes: investing in data; integrating agendas across political and sectoral lines; and building cooperation at the global level.

The UN replaced its eight Millennium Development Goals with 17 Sustainable Development Goals (SDGs) in 2015. The SDGs are more specific than the previous set of goals, but progress is predicated on recognizing their interdependence. We cannot hope to solve for water insecurity on a farm or in a community without understanding the economic and social factors that contribute to it as well as the environmental ones, nor can we address any farm or community, anywhere in the world, in isolation. In our events, our education, and our research, the Specialty Coffee Association will continue to support and promote work being done by industry stakeholders to advance water security and we will continue to share our own progress.

Thank you for downloading this paper, working towards water security in specialty coffee wherever you are, and for supporting the SCA's commitment to make coffee better.

Kim Elena Ionescu
Chief Sustainability Officer
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Summary

We face a global water crisis. Rapid economic development combined with exponential population growth over the past century are increasing demands on water resources, while environmental degradation threatens water supplies. As a result, water scarcity has risen to the top of the list of global social and economic risks. Poor people are disproportionately affected by water scarcity, which has already emerged—often hand-in-hand with other effects of a changing climate—as a source of conflict in coffee-growing regions around the world.

The way coffee is produced and processed can either be part of the solution to the water crisis or it can be part of the problem.

How does coffee production and processing contribute to the water crisis? Deforestation to expand land devoted to coffee farming degrades natural resources, reduces biodiversity, and accelerates climate change. Full-sun farming and poor soil management practices reduce soil moisture, slow the recharge of aquifers, and accelerate erosion, runoff, and flooding, all of which increases the sedimentation of surface waters. Excessive and inappropriate use of agrochemicals on farms contaminate water resources on which downstream communities depend. Inefficient water use in most wet mills divert large volumes of water from streams and then return wastewater—usually untreated—into streams, rivers, and lakes.

Methodology & Rationale

This paper, developed by volunteers for the Sustainability Center of the Specialty Coffee Association, with the support of allied non-profit organizations, focuses on improving water security in countries where specialty coffee is grown and is designed to support action by those specialty coffee industry stakeholders committed to increasing water security on and around coffee farms.

It draws on a trove of secondary literature, original research conducted by SCA members, interviews, and focus group discussions involving a broad range of coffee industry actors, including roasters, certifiers, auditors, and non-profits and academics working in coffee.

The paper frames the global water crisis, defines key terms related to water resources at origin, explores the connections between coffee production, processing, and water stewardship, highlights ongoing efforts by industry leaders for responsible water stewardship, and provides recommendations for action and further research. *Water Security and Coffee: Protecting a Critical Resource* is part of a series of issue briefs published by the SCA to inform members of the specialty coffee community on threats to the future of the industry and help them contribute to actions that make the coffee trade more sustainable.

Understanding the Issue

Water security has become a major concern in recent years as countries across the globe struggle to meet increasing water demand in the face of a finite supply. "The world's demand for fresh water is growing so fast that, by 2030, agriculture, industry, and expanding cities on three continents will face such scarce supplies that the confrontation could disrupt economic development and cause ruinous political instability," the U.S. State Department's 2012 National Security Assessment concluded.[1] For the same reasons, every year since 2012 the World Economic Forum has rated water crises within the top 3 global risks in terms of impact on society and economic development.[2]

Worldwide more than 700 million people lack access to safe water and fully two-thirds of the world's population faces severe water scarcity at least one month of the year.[3,4] Only 10 percent of wastewater is treated globally,[5]and more than 3 million people (mostly children) die each year due to preventable water-borne disease.[6]

Lack of access to clean water disproportionally affects the poor and limits economic opportunity: it poses a threat to human health, it perpetuates cycles of poverty, and it deepens social and economic inequality. There is a dramatic gap between direct household consumption in rich, industrialized countries like the United States, where people use an average of 100 gallons (380 liters) of water per person per day,[7] and poor, water-insecure countries where the average individual may use as little as five gallons (20 liters) per day.[8]

Population growth and the accompanying increase in agricultural production, energy consumption, and industrial production are together accelerating the demand for water at an exponential rate.[9] Over the past century, the world population quadrupled while water use increased seven-fold.[10]

As the demand for water increases, water supplies are under pressure. In nearly every region of the world, water is being used, wasted, and polluted at a scale that threatens human health and economic development—for ourselves and for future generations. In the pursuit of economic development, "We have ignored water" and "neglected our water supplies and water systems."[11] Threats to water resources are evidenced by the reduction in base flows in streams and rivers, over-extraction of aquifers, and contamination of surface and groundwater.

The availability of water is further reduced by climate change, which is increasing the risk of extreme weather events, such as severe storms and droughts. At the UN Convention on Climate Change in Paris in 2015 (COP21) [12], 140 countries highlighted water management in their national climate adaptation plans, and 300 governments and organizations signed a Paris Pact on Water. [13]

Agriculture has come under particularly intense scrutiny as a sector of our economy that uses more water than any other and is a leading water polluter. [14] Food production has doubled worldwide over the past generation, but the amount of water extracted for agriculture—70 percent of all water extraction worldwide [15]—has tripled during the same period. [16] A landmark study on agriculture and water states:

Understanding the Issue

(continued)

"Real changes are needed in the way in which water is governed and used if transient or long-term crises are to be averted."[17]

Water scarcity and declining water quality have generated supply risk, reputational risk, and regulatory risk for buyers of agricultural products. The coffee industry is no exception. Going forward, the definition of sustainability for the specialty coffee industry must ensure that coffee production and processing do not threaten local water security.

How the water crisis affects the coffee industry (and how the coffee industry affects the water crisis)

The entire coffee process, from seed to cup, depends on water. Coffee plants require it to grow, coffee mills require it for the wet milling process, and retailers and consumers use water to brew the final cup. A study conducted by the Water Footprint Network estimates that it takes 140 liters (37 gallons) of water to produce a single cup of coffee.[18] Coffee is a water-intensive product.

Coffee production & water resources

Where coffee is grown, it often dominates rural landscapes. Coffee farms small and large shape the ecology of entire regions—vegetation, streams, and even roads are influenced by coffee production practices. In terms of land-use options, coffee agroforestry systems are arguably the best agricultural system for watershed health; only natural forests are more effective at regulating the water cycle. However there is a broad spectrum of how coffee is managed on farms and the differences between good coffee production and processing practices and bad ones have major implications for water resources.[19]

Shade-Grown Coffee

When coffee is grown in the shade of a forest canopy, coffee farms can mimic natural forests and generate significant water-resource benefits, including regulation of the water cycle, increased rate of recharge of underground aquifers, and protection of surface water such as streams, rivers and lakes on which downstream water users rely. When farmers grow coffee under a diverse, multi-story canopy, the combination of deep and broad root systems of forest trees with the more shallow root systems of coffee and other plants improves the ability of watersheds to absorb water, minimize soil erosion, and capture four times the carbon stocks of soils in full-sun systems. These benefits lead to good watershed health. Well-managed coffee farms can maintain constant cover over soils, particularly when ground-cover is used, which improves soil structure, adds organic material and retains soil moisture.[20]

Non-Shade Coffee

Alternatively, when coffee is grown in full exposure to the sun, a lot of the benefits of shade grown agroforestry systems are lost. Full-sun farming and poor soil management practices degrade soils and accelerate erosion, runoff, flooding, and sedimentation of water sources. They reduce the rate at which aquifers are recharged, and when agrochemicals are used excessively on these farms, they contaminate water resources on which downstream communities depend. Because this production system results in higher coffee volume on a per-hectare basis and market incentives for agroforestry systems are lacking, full-sun coffee is commonly proposed as a solution to low farm profitability.

Irrigated Coffee

Specialty coffee is sourced with increasing frequency from irrigated plantations, particularly in Brazil and Vietnam. On large commercial farms, irrigated coffee is typically a monoculture, lacking the type of vegetative diversity of agroforestry systems, or even rain-fed non-shade coffee. It should be clear that irrigation is almost always "supplemental irrigation"—even on irrigated farms, some (or most) water is still supplied by rainfall. Irrigation systems supplement water during the driest stretches of the year. As a consequence, the water-smart practices for rain-fed systems described below also apply to irrigated systems.

Climate change

Climate change is affecting coffee production by raising temperatures and changing the patterns of rainfall distribution.[21] Coffee plants require 600-1000 mm of rainfall per year for healthy growth and when rainfall levels are below 600 mm—during droughts, for example—coffee productivity and quality are adversely affected as plants lack the energy and nutrients to produce fruit. [22] Even the right amount of rain at the wrong time, such as during flowering, may leave the plant alive but render it unable to produce fruit at harvest time. Similarly, as temperatures increase with climate change, coffee can lose its quality or productivity. [23]

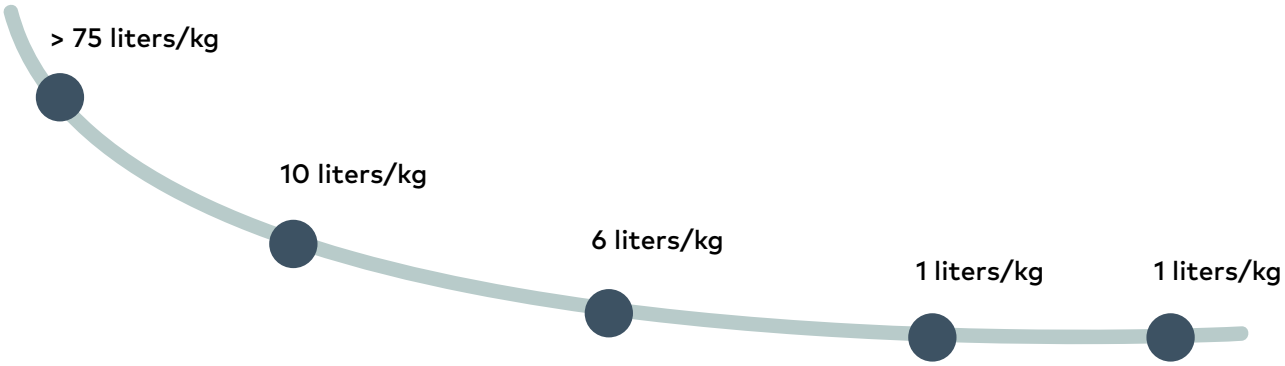
Climate change is projected to intensify storm events and provoke more frequent and intense droughts, leading one specialty coffee professional to suggest that "drought is the new frost."[24] These shocks affect producers directly through the impact on production and indirectly through their contribution to increased price volatility.

Coffee milling & water resources

The wet-milling process affects water security in two ways—through the water it extracts or diverts from local water sources and the wastewater it releases back into these sources. The amount of water used depends on what processing practice farmers apply to their coffee, while the contaminant load of coffee wastewater depends on the quality of treatment processes.

Water Use

The graphic below shows the approximate amount of water used in different types of milling practices, with traditional wet milling using up to hundreds of liters of water per kg of parchment and naturally processed coffees using negligible amounts of water.



Traditional Wet Mill

Intensive water use for conveyance, floating, depulping, fermentation, and washing.

Improved Wet Mill

Can include one or more of the following measure to reduce water use: dry, gravity-based conveyance; water recycling; mechanical demucilaging.

Ecological Wet Mill

Coffee conveyed mechanically, mechanical removal of mucilage. If there is no fermentation or washing after demucilaging, then water use is even less.

Pulp Natural/ Honey

Cherry skin mechanically removed; seed dried in mucilage which is mechanically removed through hulling. No fermentation or washing.

Natural Process

Coffee cherry is sun dried.

Wastewater Treatment

The wet milling process is one of the leading contaminants of local water sources in coffee-growing communities.[25] In many coffee mills, wastewater (sometimes with the pulp) is dumped directly into natural waterways with little or no treatment. The viscous wastewater from coffee mills is referred to in Spanish as "aguas mieles," or "honey waters."

The bacteria that have the ability to consume the sugars and pectin in this contaminated water require oxygen for the chemical reactions to break down the organic matter. Biochemical oxygen demand, or BOD, represents the amount of oxygen required to completely neutralize the contamination. The high BOD required to purify the coffee wastewater can often exceed the oxygen dissolved in the rivers and streams. The net result is an anaerobic effect that utilizes the available oxygen in the purification process, over-produces bacteria harmful to aquatic life and people downstream who rely on surface water for domestic use. In the worst cases, coffee mills can cause "dead zones" in rivers, and can be similar to raw sewage in terms of its impact on water quality.

In most cases, coffee wastewater is released untreated into streams and rivers. Expert estimates suggest that as little as 5% of certified mills are treating wastewater appropriately.[26] The impact on water quality downstream from coffee mills during harvest is significant.

Wastewater coffee treatment technologies are well-tested and proven. A full wastewater treatment process involves three separate steps: (1) sedimentation, (2) filtration and (3) treatment.

In the first step, effluent from the coffee process cascades through a series of beveled tanks, which serve to separate liquid from solids. By the time the water reaches the final tank, most of the large solids are separated from the acidic wastewater.

Filters provide another step in the process, separating small solids from wastewater. Filters can be built from locally available materials (including gravel and sand), allowing millers to filter wastewater at a relatively low cost.

After filtration, wastewater is treated—usually with lye or agricultural lime, a readily available and inexpensive additive—to raise the pH (i.e., neutralize the acidity) so the wastewater can be released into stream or groundwater minimizing the impact on water quality and aquatic life.

Investment in improved water resource management has economic benefits for coffee production—the solid waste matter concentrated through the sedimentation and filtration processes is a nutrient-rich ingredient in organic compost, and it is also possible to generate biogas from this waste matter. Those returns on investments made in management take time, however, and treatment technologies are expensive—prohibitively expensive for smallholder farmers—meaning that collaboration and co-investment are paramount.

Framing Solutions

Water-related risks in coffee supply chains can rarely be dealt with independently by industry. Sustainable solutions at a scale that is meaningful require collaboration among multiple stakeholders across not only value chains but entire sectors. Managing water resources, sometimes known as "water governance," is inherently "a political process, because it deals with reallocating water, the allocation of financial resources, and the implementation of environmental goals."[27] Actors whose economic activities rely on and in turn affect water quantity and water quality, include but are not limited to: industry groups representing specific economic interests that generate water demand (and may adversely affect water quality), policymakers whose mandate includes stewardship of water resources, local governments charged with enforcing water-related laws, environmental groups promoting conservation, and other civil society organizations.

Lasting solutions to water security require sustained and coordinated efforts and must be supported by clear incentives. The following six recommendations are focused on what industry can do to contribute to increased water security in the coffeelands.

Recommendation No. 1

Know the Source

The starting point for engaging on water security is learning about water resources in the specific landscapes where you are sourcing coffee. Find out from your supply chain partners (growers, cooperatives, exporters, coffee institutes, etc.) about water resources in coffee-growing landscapes. Enlist local research institutions and water-focused non-profits in these efforts. If you don't already include questions on water resources in your sourcing questionnaire, include them. There are resources to support you in this effort, and companies in other industries in the beverage sector that have developed approaches to mapping water resources and water-related supply chain risk that can be replicated in coffee.

Case Example:

Water Fund—Quito, Ecuador

Several large beverage companies are investing in water stewardship programs called "Water Funds," mechanisms for catalyzing joint private sector and public sector investments to restore and protect water supplies.[28] One widely celebrated example is the Water Fund established for the city of Quito, Ecuador, known by its Spanish-language acronym FONAG.[29]

The Nature Conservancy collaborated with a group of local and multinational companies and local public utilities to conduct a risk assessment on the sources of Quito's water supply. When the process identified a series of threats, local stakeholders responded by creating FONAG in 2000. Its operations are funded primarily by major water users in the Quito area, including the municipal water utility, a prominent beverage bottler, and a hydroelectric company that provides energy to the city. FONAG works to ensure the provision of a sufficient quantity of water of good quality by supporting actions directed at protecting water resources. Over the past 15 years, FONAG has improved the city's water supply through the management and protection of over 65,000 hectares of land.

Recommendation No. 2

Promote Water-Smart Farming Practices

Water-smart agricultural practices are those that use water efficiently and minimize impacts to downstream water quality. They are good for coffee production and good for water resources: good coffee management leads to good water management. Below are a few key practices that have proven to have the biggest impacts for improving water resources management on coffee farms.[30] These practices are focused primarily on coffee agroforestry systems, but they are also critical for irrigated systems.

Plant on Contours

Planting coffee trees along contours (across hillslopes) and not across contours (up-and-down the hill-slope) is one of the easiest and most effective ways to improve water management. The goal is to slow the speed of water as it moves down slope to increase infiltration and soil moisture. Vegetation (coffee plants, banana trees, shrubs, and cover crops) planted on contours create natural water-breaks that disrupt and slow the speed of water, increasing water infiltration into the soil and to the roots. Slowing down water also controls soil erosion, which also improves soil fertility by holding soil nutrients, organic matter, and fertilizer in place.

Micro-terraces

Small terraces at the base of each coffee tree are very effective at capturing water (from rain or irrigation) and sediment that run down hillsides. Hundreds or thousands of these micro-terraces across a coffee landscape can have a tremendous benefit of slowing runoff, reducing erosion, increasing soil moisture, and improving aquifer recharge.

Manage soil to manage water

Soil restoration plays a critical role in improving watershed functions in coffee-dominated watersheds. One of the primary indicators of healthy soil is the amount of soil organic matter. Few agricultural practices have a greater impact on farm productivity, resilience to disease and drought, and improving downstream water flows than soil restoration.

Maximize vegetative cover

Vegetative cover above ground and on the soil surface is effective at absorbing rainfall. Shade and vegetation over and on the soil reduces evaporation of water, increases soil moisture, and improves water infiltration into soil subsurface. Even a few forest trees on a farm contribute.

Water smart irrigation

On irrigated farms, it is critical that farm managers understand how much water they are using, how to avoid over-irrigation and how to use water more efficiently. Given the rise of irrigated coffee production, this is a critical area for research, development, and training.

Case Example:

Blue Harvest—Central America

The Blue Harvest program is improving farmer livelihoods and protecting water resources at origin. It is designed to help build a robust and resilient coffee supply chain while improving the lives of the people impacted by the coffee sector at origin through improved water resource management. Blue Harvest is jointly funded by industry (Keurig Dr Pepper[31]) and multilateral organizations (Inter-American Development Bank), led by an international NGO (Catholic Relief Services) and implemented by a network of local partners (NGOs, cooperatives, and local governments) working in seven coffee-growing regions in Central America covering 3,500 hectares of coffee land. The program provides technical assistance to coffee farmers located within critical watersheds where coffee production and processing impact drinking water supplies of rural and urban communities.

On the farm, technical teams promote "best agricultural practices" that restore soils, improve water management, and increase water recharge to improve base blows of springs and streams that are the sources for drinking water. Beyond the farm, Blue Harvest also works at the landscape level on water governance, strengthening the capacity of local actors to manage their water resources and protect drinking water sources. This work includes coordination with local governments, water boards, coffee growers and cooperatives, and other local stakeholders. Blue Harvest will improve water quality and availability for 150,000 people in and downstream from coffee communities.

Recommendation No. 3

Support Water-Smart Processing

Two actions at the mill can reduce the impact of coffee processing on water resources: reducing water use and treating wastewater before it returns to streams and rivers. Often, mills start first with treatment solutions, investing a lot of money in infrastructure and labor to treat more wastewater than necessary. By first reducing the amount of water used, you can save a lot in the costs to treat water.[32] One major obstacle to improving coffee processing is that many coffee producers, millers, buyers, and roasters believe that using more water results in higher coffee quality. Research and field evidence demonstrate, however, that more efficient water management can deliver improvements in quality and profitability.[33] There is also an ongoing discussion within the industry on the role of natural coffees in the specialty sector, which require negligible amounts of water to process.[34]

Currently there is little pressure to change milling practices and few incentives to make the necessary investments in technology, infrastructure, and training. The following highlights a few areas for action:

Reduce, reuse, recycle.

Water-saving technologies are readily available, and proven, but still not widely adopted. These include: gravity-based conveyance that reduces or completely eliminates reliance on water for transporting cherry; closed-circuit systems that recycle and reuse water for washing that has been used for conveyance, floating and/or depulping; and mechanical demucilagers that eliminate the need for fermentation and washing.

Treat wastewater

After minimizing the amount of water used in the milling process, wastewater should be treated based on the three steps described earlier to remove organic solids and neutralize acidity.

Measure, report & commit to continuous improvement on water usage

Only by measuring the amount of water used can mill operators begin to identify ways to introduce efficiencies and reduce water use. Track the amount of water used in milling in your supply chain and the quality of river water downstream from the mills. Start with just one or two growers or farmer organizations per supply chain. Report your results, benchmark your performance against best practices in the industry, then commit to steady improvements in your own performance.

Case Example:

Water Efficiency—Vietnam

In one region of Vietnam that represents an important source of Robusta coffee for Nestlé, 100% of coffee production is irrigated. Often, too irrigated. Over-pumping of water for irrigation in the region was not just unsustainable but also threatening future production: research has suggested that producers can decrease the amount of water used in coffee production without decreasing yields.

To address the issue, Nestlé partnered with government to teach farmers on a small scale how to reduce water use. Utilizing a simple technology to estimate flow, farmers have reduced the amount of water they are using by up to 70%.

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The company has argued that "water is everyone's business," and this early success suggests the message is resonating. Its own interest in securing supply over the long-term is served by rationing water use. But coffee farming families and communities have also responded positively to the initiative because water they don't use to irrigate is available for household use.

Nestlé has partnered with the Swiss Agency for Development and Cooperative on a five-year effort to scale this pilot. Together with local government and other local stakeholders, they will reach 50,000 farmers—10% of all coffee farmers in Vietnam.

Recommendation No. 4

Create Incentives for Water-Smart Practices

Introduce clear incentives for supply chain partners to adopt water-smart farming and milling practices—not just because they will contribute to increased water security in the coffeelands, but because they will also go a long way to helping your company secure long-term supply by making production more resilient at the farm level.

Water performance monitoring

At the farm level, certifications monitor compliance with some water resource management practices. Buyers committed to water stewardship and water security should consider location-specific environmental scorecards that go beyond adoption of practices and actually report on performance, i.e. impacts on drinking water. This would create clear incentives when tied directly to commercial decisions on volumes, prices, and other terms of purchase.

Standards

Corporate standards and third-party certifications common in the specialty market—Fair Trade, Rainforest Alliance and Utz Certified—have some requirements for improved water resource management on the farm and at the mill, but these are mostly voluntary and few producers or millers apply them. The impact of these standards on water security could be significantly improved by: making water resource management requirements clearer, setting the protection of sources of drinking water as a required standard, and pairing water standards with farm- or mill-level water risk assessments.

Financing and Co-Investing

Limited access to finance for water-smart milling practices is among the leading challenges to improving water use in the milling process. Every actor in the specialty coffee value chain earns a premium from certified, specialty coffee, which consumers pay with the understanding that these coffees are better for the environment. However, currently coffee producers and millers share the burden of the cost of adopting better practices and technologies, but usually earn a relatively smaller share of the price premium. Other actors in the value chain should proactively co-invest or help improve access to affordable financing for water-smart practices.

Case Example No. 1

Wet Mill Upgrade—Diriamba, Nicaragua

The largest wet mill in Nicaragua is located near the city of Diriamba and operated by CISA Exportadora, part of the Mercon Group. In collaboration with UTZ/Rainforest Alliance and Aceres Consultores, and with support from the Dutch government, the Netherlands Development Organization SNV, and Solidaridad, CISA/Mercon upgraded the mill as part of the Cleaner Production initiative of the Energy from Coffee Waste in Central America project. The measure was designed to reduce contamination while producing clean fuel from biogas.

Mill operators were trained on how to use water more efficiently, and equipment was upgraded to recycle water used in the depulping process and transport coffee mechanically through the mill. Solids were removed using sieves and pH was regulated using simple anaerobic reactors, or sealed tanks. The project generated four exceptional outcomes: (1) water use was reduced by nearly 50 percent, from 15 to 8 liters per kg parchment; (2) water contamination was reduced by 80%; (3) biogas was produced for energy use at the mill and (4) the profitability improved thanks to reductions in operating costs achieved by the upgrades.

Case Example No. 2

Clean Tech Finance East Africa

Since 1999, Root Capital has disbursed over $900 million in loans that have served over 5 million people. Its 599 borrowers include dozens of leading coffee cooperatives supplying members of the SCA.

In 2002, the organization began offering credit for "triple-win" technologies that generate positive economic, social and environmental returns, including solar panels, irrigation systems, biodigestors, water-efficient coffee mills, and small-scale hydro and wind turbines for alternative energy generation. In 2012, Root Capital launched a Climate Smart Agriculture initiative in part to expand adoption of these and other technologies.

Beyond the capital required for these investments, Root Capital has found that limited access to information and specialized expertise are other obstacles to adoption of technologies that can increase incomes, save money or generate environmental benefits. So it leverages its global network of collaborators to give borrowers more than just credit for clean technology "hardware." They also facilitate the provision of the "software"—knowledge and skills—that clients need to manage their new hardware well. Since most of Root Capital's clean technology clients in the coffee industry are already borrowing from Root Capital to finance the fulfillment of their contracts to buyers, the organization can simply bundle clean tech payments into their trade finance obligations, streamlining loan repayment processes and lowering risk.

In cases in which new technology is not likely to help clients generate the kinds of increases in income necessary to repay their loans, Root Capital will partner with nonprofits to secure subsidies for its clean tech credits. When it financed the purchase of solar panels for nearly 100 smallholder coffee growers in Nicaragua, for example, it partnered with an international NGO that offered a 25-30% subsidy on each panel purchased and organized household-level technical assistance.

But some coffee-focused technology more than pays for itself, like water-efficient wet mills, whose purchase Root Capital has financed mostly in East Africa. In one case, a client reported a new community-level mill helped it reduce losses and improve quality so much that it fetched prices twice as high as the ones it was getting for coffee its members processed at home with traditional technology. Even after deducting the operating and financing costs, the client reported being able to pay their member farmers 70% higher prices for their coffee than it could previously.

Recommendation No. 5

Engage Consumers About Water Through Their Coffee

Coffee is an exceptional way to build consumer awareness about water resources. A growing number of coffee companies are supporting and investing in water stewardship, but there is ample room for specialty coffee companies to do more and to say more, either individually, or, even better, collectively, through joint communications in the marketplace and strategic partnerships at origin.

The Equal Exchange Biosphere Reserve series includes the "8 Rivers" project, which showcases UNESCO recognized rivers in coffee-growing regions and supports local community efforts to manage and protect natural resources.[35]

TOMS Coffee partners with Water for People, an NGO, to invest in water projects in developing countries. It tells consumers that each bag of coffee provides 140 liters of safe drinking water for a family overseas.[36]

Recommendation No. 6

At the Industry Level—Strategic collaboration

To achieve lasting impact at scale, industry leaders may need to partner at origin with companies they compete with in the marketplace to map shared water-related risks and identify common interests.[37] They will certainly need to work beyond the farm level and engage with a broader range of actors who affect water availability and water quality in coffee-growing landscapes and regions, including public-sector actors whose mandate includes water stewardship. The CEO Water Mandate, an initiative focused on corporate water governance, puts it this way:

"Companies seeking to manage water-related business risks can and should contribute to improved water management and governance that is also in the public interest. If done responsibly, integrating private sector action into global policy frameworks and local implementation practices makes it possible for companies to contribute considerable resources and expertise to the achievement of the Sustainable Development Goals."[38]

For resources on corporate water governance and tools to support private-sector engagement around water security, visit the CEO Water Mandate website at ceowatermandate.org.

Case Example

Pre-Competitive Collaboration—The Coalition for Coffee Communities

The Coalition for Coffee Communities is an industry platform whose members are committed to pre-competitive collaboration at origin and coordinating their efforts in particular regions to optimize social, environmental, and economic outcomes. The platform is intended to improve the efficiency of corporate investments at origin and to influence policy to positively affect coffee communities. The organization's members are looking at how the different investments they each are making in their individual supply chains can lead to collective action to address gaps; where supply chain programs are not enough develop landscape strategies and pool resources to address needs/assessment outcomes; and how to engage on policy.

The CCC began as a partnership of coffee companies to eradicate hunger in coffee growing communities and is expanding its focus to other critical issues, including water resources and climate change adaptation.

Glossary

Water Security
The availability and accessibility of an acceptable quantity and quality of water for health, livelihoods, ecosystems and production. [39]

Water Access
Access to water is the measure of people's ability to obtain and use safe, drinkable water. The World Health Organization uses basic criteria to define "access" including the type of sources (piped water supply, tap stand, well, etc.), distance to water sources, the time required to get water, the cost to get water, and the dependability of that source. [40]

Water Availability
Water availability is the measure of water within a geographic area, and is often reported as volumes of water (cubic meters, for example) per person. Water scarcity is often defined by a lack of water availability. This does not measure the ability of people to actually obtain and use that water.

Water Scarcity
An excess of water demand over available supply. [41] Absolute water scarcity is when water availability is less 500 cubic meters per person per year.[42]

Water Crisis
A complex set of adverse and interrelated economic, environmental and social impacts—including water-related conflict—of acute or sustained periods of water scarcity and/or contamination. The sum of water crises occurring today and projected for the future throughout the world today make up the "Global Water Crisis".

Blue Water
Freshwater flowing overland in streams and lakes, and within underground aquifers. This is the water we divert and pump for domestic supply, industry, irrigation, and other uses.

Green Water
Water that cycles through soils and plants. This represents the precipitation (rainfall) that produces forests, forage, and crops in natural landscapes and farms.[43]

Water Balance (Water Accounting)
A way of accounting all the water within a geographic area.[44]
For example, in a very basic balance, all the water that comes into a region as precipitation (P) leaves that region as evaporation (E), transpiration (T), or stream flows (Q) : [P = E + T + Q]

Water Footprint
Measures all the water that goes into producing, processing, shipping and consuming goods. Used to inform business and individual impacts on water, water risks, and water management decisions.[45]

Water Governance
The range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services. [46]

Water Smart Agriculture
An approach to farming that balances water availability, access, and use across the range of water sources, according to principles of socioeconomic, environmental, and technical sustainability; [47] the concept includes a blend of "best-fit" water management practices that increase water availability, water access, and the effectiveness, efficiency, and equity of water distribution and use. [48]

Watershed
A watershed is a basin whose boundaries are defined by highpoints and ridgelines that descend into lower elevations and valleys and named for the body of water into which it drains. The watershed is commonly the unit of organization for territorial or landscape-level approaches.

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