



Conservation International's  
Business & Sustainability Council

# resources

The Energy | Water | Food Nexus



CONSERVATION  
INTERNATIONAL



With the world's population expected to reach over eight billion by 2030 and an increasingly prosperous middle class, Conservation International (CI) understands that one of the greatest global challenges is how to meet the growing demands for food, water and energy given our planet's increasingly limited resources. According to U.N. estimates, by 2030 we will need 30 percent more water, 45 percent more energy and 50 percent more food—and climate change will exacerbate this stress even further. Synergistic solutions to address this energy-water-food nexus will be vital to achieve our shared goals to further develop healthy sustainable societies, economies and ecosystems.

## Introduction

Anyone who cares about water, food or energy has long been aware that they are inextricably interconnected. Water is needed for almost all forms of energy production and power generation, energy is required to treat and transport water, and both water and energy are needed to produce food. The complex relationships and tradeoffs between these tightly linked systems are known as the energy-water-food nexus.

Understanding nexus challenges and opportunities—including how to optimally manage these limited resources as a tightly linked system—are key to creating a sustainable development path that will benefit all people for generations to come. At CI, we are poised to help the private sector, governments and communities understand nexus trade-offs and synergies. For example, gathering data globally and regionally that is relevant to nexus considerations and advising the private sector and governments around the protection of watersheds and natural forest critical for agriculture and downstream users such as communities or energy operators.

For forward thinking businesses, the nexus reinforces the necessity to consider risks such as price volatility, resource constraints and dwindling land as they evaluate programs such as sustainable sourcing of key commodities. Ensuring energy, water and food

security on a global level requires equal consideration of the inter-dependency among all three systems and the underlying natural capital that supports them. By doing so, businesses can identify practical, scalable and collaborative solutions and take advantage of opportunities to increase efficiencies and reduce trade offs in their supply chains and on the ground.

A nexus approach in which businesses are operating outside traditional silos to address sustainability issues is critical to building healthy sustainable societies in which economic growth and protection of Earth's natural capital—the limited stock of natural resources we vitally depend on for our prosperity, security, health and cultural traditions—is equally valued.

In this edition of *Resources*, we outline CI's take on the business case around the energy-water-food nexus, and highlight key business risks and opportunities. We present case studies on how CI and some of our corporate partners are developing strategies and implementing nexus solutions on the ground resulting in positive impacts for business and the environment. Finally, we outline emerging approaches to address nexus challenges, and how we are working with our corporate partners to share information and experiences, and to test and scale innovative solutions.



*By 2030 we will need*

**30%** MORE WATER 

**45%** MORE ENERGY 

**50%** MORE FOOD 





# The Business Case for Focusing on the Nexus

Ensuring energy, water and food security for an ever-growing population, and in the face of climate change, is fast becoming a critical risk issue for business. To better understand the nexus and the role for CI and our corporate partners, we brought together members of the Business & Sustainability Council (BSC) for our annual meeting March 6-7, 2013 in San Francisco. Hosted by Chevron, the event afforded an important opportunity to share successes, challenges and best practices, and to identify innovative solutions businesses can take with partners like CI to help address the world's energy, water and food challenges.

The U.S. drought of 2012 provides an illustrative example of nexus risks to business. The drought impacted 80 percent of U.S. farms and ranches, resulting in crop losses in excess of \$20 billion and a wide range of ripple effects. Corn crops were left withering from lack of rainfall, affecting food and livestock feed supplies and prices, as well as corn ethanol production. Numerous power plants had to scale back operations or even shut down because the water temperatures of many rivers, lakes and estuaries had increased to the point where they could not be used for cooling. Household, municipal and farm wells in the Midwest had to be extended deeper into rapidly depleting aquifers to make up for the lack of rainfall, draining groundwater supplies and demanding more electricity to run the pumps. Consumers will feel these ripple effects for years to come—over the next year alone, this impact could result in personal costs up to \$50 billion.

The research advisory group inside BSC member Rabobank noted that increasing price volatility and sourcing risks are resulting from the food and agriculture industry already stressed by supply and demand dynamics, combined with a burgeoning population, rising agricultural commodity prices, biofuel production and an increased awareness of the energy intensity of food

production. This has the biggest impact on smallholder farmers, as they are more likely to find it difficult to invest in opportunities like drip irrigation to improve water efficiency when price changes are unpredictable.

Many companies have begun to recognize the risks of the energy-water-food nexus. For these companies, finding synergies and solutions that reduce tradeoffs and take advantage of opportunities allow for:

**Reduced risk.** Resilience planning that includes longer-term, more stable agreements among the supply chain will help reduce exposure to price volatility and help companies' value chains to react to unforeseen risks.

**Improved productivity.** Better insights into resource requirements and improvement of process efficiencies with partners can generate successes in reducing or eliminating waste.

**Short-term ROI success and long-term investment planning.** By creating pilot initiatives that utilize new technologies and/or resilience planning, companies will be better prepared to make longer term investments and inform product innovation and potential industrial and social transformations.

**Enhanced brand and reputation.** Companies with ambitious corporate social responsibility targets can help their partners improve their license to operate.

**Full cost accounting of resources and improved access to capital.** In addition to better cash flows and stronger credit ratings, members can access new financing models that provide leverage from chain partners. A full cost-accounting structure that takes into account both today's prices and the prices of increasingly scarce natural resources is adjusted according to their value to the business and society.

# case studies

The private sector, often in partnership with NGO leaders like CI, is successfully addressing nexus challenges that positively impact their businesses and the environment through innovative strategies and field demonstration projects. CI is well positioned to help our corporate partners to further amplify these successes, and to share lessons learned and best practices with key stakeholders to further advance nexus solutions.



## CHEVRON

Chevron recognizes the value and importance of water as a fundamental social, environmental and economic resource. As a global company that relies on different types of water, including fresh water and recycled waste water, to meet increasing energy needs around the world, Chevron understands that sufficient access to water is critical not only for the health of its business, but also for ecosystems and the communities in which it operates. In Kern County, about 100 miles from Los Angeles and home to Chevron's largest California oil field, Chevron has been partnering with the Cawelo Water District to provide much needed water to local farmers for agricultural use. With every barrel of oil produced at the Kern River field, about 10 barrels of water are produced as well, amounting to about 700,000 gallons of water produced per day. Chevron separates the oil and water, and then treats the water for reuse. Chevron reclaims about one-third of the produced water to generate steam that is re-injected into the formation to help extract the thick, viscous oil. Chevron provides most of the remaining treated water to the Cawelo Water District, which distributes it to some 160 farmers to irrigate 45,000 acres of crops such as almonds, grapes, pistachios and citrus. This innovative solution that Chevron developed, in partnership with the Cawelo Water District, helps Kern County growers keep agriculture thriving in the region.

## THE COCA-COLA COMPANY

Coca-Cola uses water in all of its products—it is essential to the health of the company's business. Recognizing this, Coca-Cola has set an ambitious goal of safely returning to nature and communities an amount of water equal to what the company uses in its finished beverages and operations by 2020. Since 2005, Coca-Cola, in collaboration with its bottling partners, suppliers and other stakeholders, has implemented a series of technical and natural solutions in 468 community water projects in nearly 100 countries that include rainwater harvesting, drip irrigation supporting agricultural water efficiency improvements and protecting watersheds. These community water partnerships to improve watershed

health also include initiatives to help these watersheds increase resilience to climate change, and to withstand increasing pressures for water, energy and food. Coca-Cola's approach to water security also includes promoting local water resources and eliminating the energy intensive practice of treating and transporting water. This broadened approach of water within the context of food, climate and energy is critical to manage limited resources sustainably for the benefit of all.

## MONSANTO

Monsanto does not necessarily brand the work it is developing with farmers as a nexus approach, but believes these are the issues that impact their business. For example, in the Field to Market Initiative, Monsanto has worked with Walmart, McDonald's and other organizations from farm level through to retailers, to develop tools to help farmers evaluate and assess their sustainability performance. The objective is to not only raise productivity, but help farmers assess impacts of different farming practices they might employ on their farms. By doing so, farmers will be able to identify options they have to help drive greater efficiency on their farms, particularly as it relates to nitrogen and water. Practical tools that generate concrete data points can help farmers understand and evaluate possible tradeoffs between productivity, water usage and energy consumption, and help farmers tailor the appropriate sustainability solution to their particular farms. Encouraging widespread use of such tools and approaches is a key part of Monsanto's larger sustainability strategy. The company has made a sea change in its strategy—from productivity—to productivity and efficiency—to productivity and protection. However, data and a better understanding of possible solutions will be key. For now, the company is looking to define and measure the true impacts of sustainable agriculture and utilize Field to Market to design synergistic solutions that can be scaled.

Nexus challenges are being felt all across the globe, including in Brazil, where the agriculture sector has dramatically and rapidly expanded in recent decades. Since 2008, CI in partnership with Monsanto, has been

encouraging positive changes for natural habitats and biodiversity in the Northeast Corridor of the Atlantic Forest and the Jalapão/Western Bahia Corridor in the Cerrado. By engaging local farmers to implement concrete conservation actions that prevent illegal deforestation and local species extinction, and ensure compliance with legislation in the livestock and agriculture supply chain, CI and Monsanto are producing tangible and measurable results for the benefit of ecosystems and Monsanto's business model.

## SHELL

Shell has a 40-year history of using scenario planning to explore possible future landscapes and aid strategic decision-making. In its 2013 New Lens Scenario report, Shell recognized the pressures from the energy-water-food stress nexus, as each component will experience constrained supply and demand. In one scenario, natural gas will become the most important energy source globally by 2013. In the other, solar will become the top source by 2070. Both scenarios assert that CO<sub>2</sub> emissions, and their contribution to climate change, will remain a challenge.

Scenario Planning has provided Shell an opportunity to test and collaborate on a series of best practices. In British Columbia, Shell collaborated with the city of Dawson Creek to build a reclaimed water facility that virtually eliminated its need to draw on local freshwater sources for the operation of a natural-gas venture. Shell worked with the World Business Council for Sustainable Development and the University of Utrecht to develop a new methodology that can more accurately estimate the amount of water needed to generate energy from different sources—oil, gas, coal, nuclear and biofuels—using different technologies and in different locations. In Brazil, where Shell has a major sugarcane biofuels business, the company is working with local governments on water and land use issues.

A key challenge for the company will certainly be in the urban landscape. Today, 50 percent of the world's population lives in cities; this is likely to increase to 75 percent by 2050. Cities need to be more efficient in using energy and other resources, and Shell recognizes that it must work with governments, other industries and civil society to identify and deliver on solutions. To that end, Shell is collaborating with the city of Houston and other stakeholders to develop a pilot project that addresses the energy-water-food nexus, resilience and climate adaptation challenges that can be replicated and scaled in other urban centers across the Americas.

## VEOLIA WATER

Veolia Water, a leader in water and wastewater services, is an interesting company from the nexus standpoint. As a water services company, they do not manufacture anything and do not own the water they help bring to their customers, yet it is the lifeblood of their business. To tackle the nexus, Veolia has adopted a three prong approach:

**Inform.** Veolia Water seeks to raise awareness on the interplay of water, energy and food. For example, with [growingblue.com](http://growingblue.com), users are provided data and tools in which to inform decisions and find water solutions at the municipal, agricultural and industrial level.

**Perform.** The company's second largest cost is energy. Through its performance and sustainability initiatives, Veolia Water is looking to integrate and capitalize on efficiencies in energy use and resource recovery from waste water.

**Engage.** Through tools such as its Water Impact Index, decision makers can factor in three essential elements—quantity of water used, level of stress upon water resources, and overall water quality—and develop a much more detailed, holistic and inter-related understanding. Veolia Water is also working with partners to build a true value for water tool.

## VITAL SIGNS

CI recognizes the need for informed decision making through sound and real-time data. With a ground breaking grant from the Bill & Melinda Gates Foundation and in partnership with The Earth Institute at Colombia University and the Council for Scientific and Industrial Research in South Africa, CI has developed a game changing new business model called Vital Signs to help calculate the value of nature. Vital Signs is a monitoring system that provides near real-time ecological and social data and diagnostic tools to guide agricultural development decisions and monitor their outcomes. Initially launching in Ghana, Ethiopia and Tanzania, there are plans for rapid expansion to other parts of Africa and the globe. Innovative tools like Vital Signs are critical to manage and evaluate risks and tradeoffs.



# Business Risks & Opportunities

Companies that have begun to develop resource efficiencies, conduct resilience planning for price volatility and climate change, and design synergistic solutions that utilize systems thinking can be better prepared to meet nexus challenges. But how do they get there?

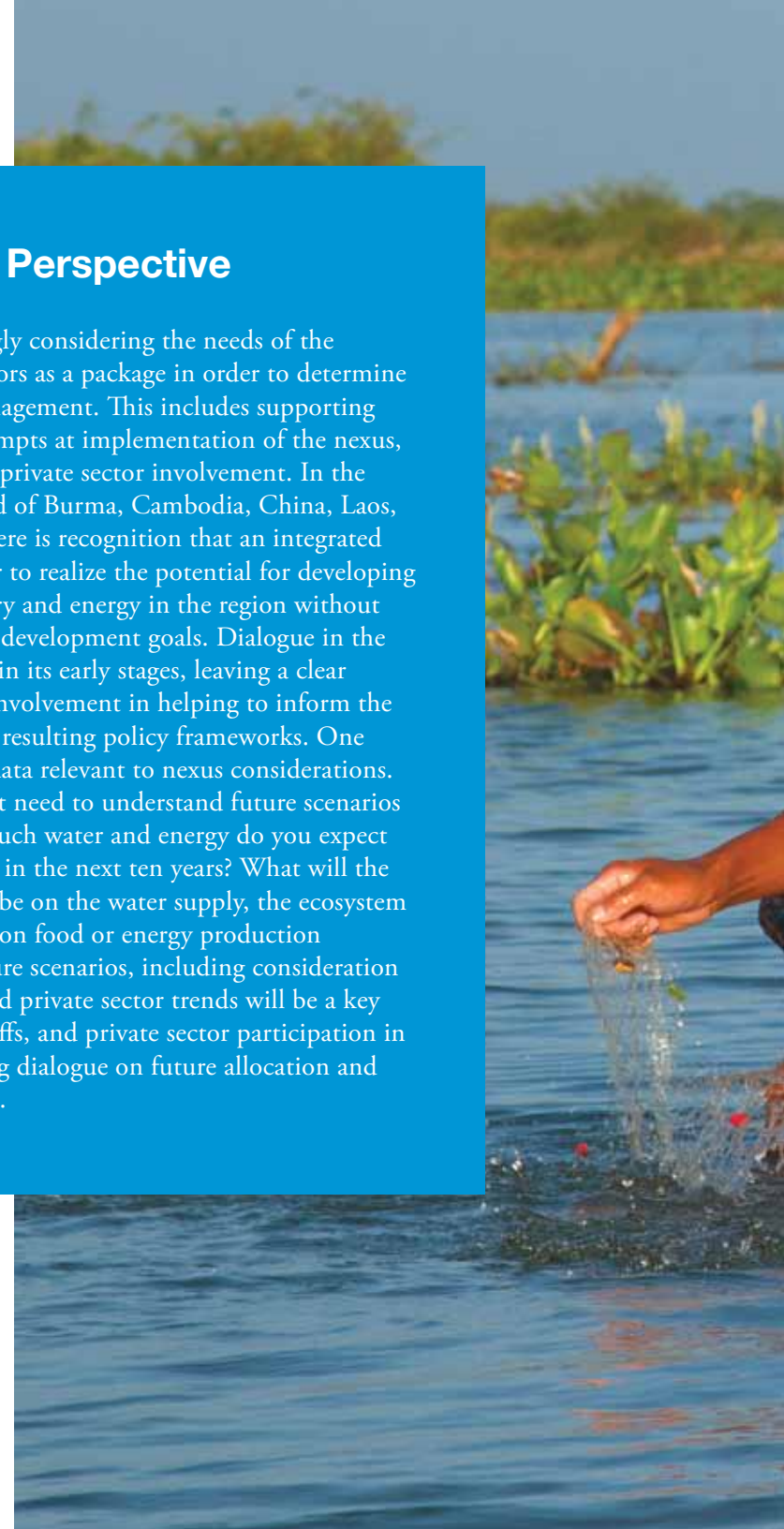
More complete and scientifically sound data will be key. An analysis by IBM's Smarter Planet found that compared to data on energy markets, energy-water data is highly limited. Models of how climate change may affect energy and water in the future are currently few to virtually non-existent. The available estimates of water demand and their deltas are much too large to be of use to policymakers or investors, and the time vector is missing altogether. Ecosystem valuation data may also play an important role in data for decision-making and trade off analysis. It will be important for stakeholders to foster data collection, assessment and research as well as more and better integrated modeling to fully understand where the critical nexus interactions lie, and how they are most susceptible in order to meaningfully inform decision-making.

Ground-truthing and sharing success stories will be an important step in the process. For example, pilots that model resilient landscapes and develop synergies for energy, water and food security are needed. While there are a handful of countries that have looked to develop these pilots, it will be important to find ways to share data, report on the results and create adaptive management and incentive mechanisms through an open source platform for further testing and replication.

Finally, to scale the results and planning frameworks, it will be important to pursue investment opportunities with companies and countries that support environmental and economic policies that address nexus challenges. There are also viable opportunities to develop a best practices investment framework with business that includes nature-based solutions that integrate natural capital valuation, Payment for Ecosystem Service (PES) mechanisms and trading schemes with public-private investments such as in green infrastructure—an approach that utilizes the natural environment in land use decision making that delivers multiple environmental and social benefits, such as open spaces for recreation and storm water management—as well as climate adaptation and sustainable consumption.

## A Public Sector Perspective

Governments are increasingly considering the needs of the energy, water and food sectors as a package in order to determine optimal allocation and management. This includes supporting new conversations and attempts at implementation of the nexus, along with a strong call for private sector involvement. In the Mekong region—comprised of Burma, Cambodia, China, Laos, Thailand and Vietnam—there is recognition that an integrated approach is needed in order to realize the potential for developing fisheries, agriculture, forestry and energy in the region without inadvertently undermining development goals. Dialogue in the Mekong, and in general, is in its early stages, leaving a clear opening for private sector involvement in helping to inform the conversation and shape the resulting policy frameworks. One important contribution is data relevant to nexus considerations. In particular, there is a great need to understand future scenarios of use and impact—how much water and energy do you expect to need in any given region in the next ten years? What will the impacts of your operations be on the water supply, the ecosystem that maintains that supply, on food or energy production processes? Modeling of future scenarios, including consideration of climate, demographic and private sector trends will be a key tool in determining trade-offs, and private sector participation in that process and the ensuing dialogue on future allocation and management will be crucial.





## Think Forward

In order to address the triple challenge of energy supplies, water stress and food security, we must recognize that any one issue cannot be solved in isolation. This systems or nexus approach requires both a clear understanding of the complex relationships among these tightly linked and interdependent resources, and solutions that equally consider all three. Collaboration among government, business and civil society is critical to securing sustainable supplies of energy, water and food. Through the Business & Sustainability Council, CI is engaging many of our corporate partners to better understand the connections between these resources and identify practical, scalable actions supporting healthy, sustainable societies, economies and ecosystems.

A landscape approach takes a geographical and socio-economic approach to managing natural capital and ecosystem services to achieve our goals around energy, water and food security while improving livelihoods and reducing negative environmental impacts. Since 1998, CI and Starbucks have been working together to promote best practices for coffee production that improve farmer livelihoods and help farming communities become more resilient to climate change, protect biodiversity and maintain ecosystem services, while ensuring a profitable crop. The resulting effort, Starbucks Coffee and Farmer Equity (C.A.F.E.) Practices, is a set of environmental, social and economically responsible coffee buying guidelines that help farmers grow coffee in a way that is better for both people and the planet. Since 2008, CI and Starbucks have been engaging local communities in coffee producing landscapes in Mexico, Brazil and Indonesia to support social and economic development and ensure future sustainable coffee production in the face of climate change. The results of this work include the training of more than 1,000 farmers on shade growing coffee practices and planting of more than 700,000 trees avoiding more than 50,000 tons of carbon emissions.

CI is working with other partners in Madagascar and across the tropics to assess nexus vulnerabilities at the landscape level. In these regions, small farmers

are extremely vulnerable to agricultural risks such as pest and disease outbreaks, climate variability and extreme weather events. With support from the Gates Foundation, CI is engaging with hundreds of farmers in three regions in Madagascar to better understand smallholder vulnerability to agriculture risks and climate change, identify coping strategies farmers have developed, and gain insights into their adaptation needs. This information, along with technical, financial and institutional support, is critical to improve agricultural production and food security of smallholder farmers, and help make their livelihoods more resilient to climate change.

Another solution is developing strong public-private sector partnerships. The Sustainable Landscapes Partnership (SLP)—whose founding members include CI, the United States Agency for International Development (USAID) and the Walton Family Foundation—is an innovative public-private partnership that brings together governments, businesses and NGOs to identify, develop and test solutions to avoid deforestation and associated greenhouse gas emissions through the development of low emission business models. The SLP serves as an innovative platform to address global climate change, create viable and sustainable economic opportunities for local communities and conserve biodiversity.

CI is further exploring these and other solutions with our corporate partners. Case studies and white papers will be important, as will sharing of successes and best practices in forums such as the BSC annual meeting. Synergies and solutions will best be found through the creation of on the ground demonstration projects and piloting tools in priority geographies.

While the energy-water-food nexus presents a daunting challenge, it is one that CI believes can and must be addressed through broad, large scale collaboration. We look forward to working in partnership on the forefront of innovative thinking and action to secure a sustainable supply of these precious limited resources we all depend on.

## About Conservation International

### OUR MISSION

Building upon a strong foundation of science, partnership and field demonstration, CI empowers societies to responsibly and sustainably care for nature, our global biodiversity, for the well-being of humanity.

### OUR VISION

We imagine a healthy, prosperous world in which societies are forever committed to caring for and valuing nature, our global biodiversity, for the long-term benefit of people and all life on Earth.

## About The Center for Environmental Leadership in Business

Since CI was established in 1987, we have worked collaboratively with business—from small-scale farmer co-ops to the world's largest corporations. CELB focuses its efforts on industries with the greatest impact on ecosystems: food & agriculture, oil & gas, mining, retail & consumer products and the financial services sector. CELB offers a wide range of products and services to our corporate partners to improve their business practices, creating and implementing strategies that combine bold commitments to sustainability with practical solutions that deliver benefits to the bottom line and the environment. CELB also cultivates investment in conservation initiatives, supporting field level conservation and ensuring economic benefits to local communities. CI's scientists and policy experts—in climate, agriculture, fresh water, ecosystem finance and marine conservation—create our core competency in environmental conservation with a strategic focus on contributing to the maintenance of the healthy ecosystems that support us all.

## About The Business & Sustainability Council

CI established the Business & Sustainability Council (BSC) in 2003 for companies committed to environmental and business leadership. Currently comprised of global leaders including Bunge, Chevron, The Coca-Cola Company, Disney, ExxonMobil, McDonald's, Monsanto, Rabobank International, Shell, Starbucks and Walmart, BSC member companies represent total combined revenues of more than \$2.2 trillion and 3.8 million employees. The BSC focuses on convening CI's network of scientists and other issue experts with corporate partners for interactive dialogue on key sustainability issues and further advancement of business and environmental goals.

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