wbcsd

Co-optimizing solutions in water and agriculture

Lessons from India for water security

Photo Credits: UPL Limited - Trials with "Zeba"

Knowledge contributions received from WBCSD member companies

contents

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

Every business needs water-smart agriculture

Around the world, water deficiency is a critical factor that limits growth and development. India ranks high on water stress. Over 330 million Indians were affected by drought conditions in April-May 2016.

For businesses, managing water has become a priority to ensure resilience, operational continuity and growth. Strategizing to counter water stress, especially for those engaged in agricultural production, manufacturing, mining or energy production, has become an imperative. This also holds true for companies where their workforce, supply chain or markets will be affected by disruption of water supply. It also includes those companies whose social license to operate depends on protecting and enhancing the welfare of vulnerable communities.

Strengthening water efficiency in agriculture, a lesson learned from India, is key for improving the availability and quality of all users, including industry. If agricultural water efficiency is not addressed smartly, other water management practices will not suffice.

As businesses, we recognize that water is the key common denominator underlying the challenges faced by India's food system. We also recognize that we have a significant role to play in developing solutions to mitigate these challenges.

This study outlines interventions on water efficiency and their impacts on productivity and other co-benefits. The study contends that implementation of "smart" solutions is a need as well as an opportunity. Finally, it outlines different avenues for the application of these solutions, and suggests means of collaboration for businesses, policy-makers and other stakeholders.

Jai Shroff
CEO, UPL Limited

Shilpa Divekar Nirula
CEO - Monsanto India Region

foreword

foreword

Water-smart agriculture brings solutions to the water-energy-food nexus

Estimates are that in the next three decades, the global food system will need 40-50% more water than today. Municipal and industrial demand for water will increase by 50-70% during this period, while demand for water in the energy sector will increase by 85%[1]. In India, the stresses to the ecosystem caused by this demand are already acutely felt.

In 2014 WBCSD produced a report on "Co-optimizing solutions: Water and energy for food, feed and fiber." The objective of this report was to identify a broad spectrum of business solutions to the inter-connected challenges and solutions involving climate and energy, water, food and land-use systems.

The 2014 report identifies how the most appropriate and scalable solutions can be implemented, with multiple benefits on yields, energy, water, climate change, resource use and other factors. Many of these benefits translate into direct financial opportunities and present a sound case for business action. In fact, there are a lot of advantages in co-optimization. If water is used more efficiently to grow crops, then less energy is needed to pump water for irrigation.

This paper builds on the findings of the 2014 report by placing a key emphasis on water and agriculture. It aims to learn from the experience of WBCSD members operating in India, and provides a narrative on a range of solutions across multiple parameters.

Water scarcity is a challenge in many geographies including South East Asia, Sub-Saharan Africa, Latin America and the United States of America (USA). In these regions, water efficient measures used in agriculture play a significant role in conserving and enhancing water availability and quality, increasing productivity and reducing emissions.

We hope the findings of this India-based study will support business to business collaboration in India, and are relevant for learning and implementing these practices in other geographies too.

Maria Mendiluce
Managing Director
Natural Capital, WBCSD

Joe Phelan
Director-India,
WBCSD

Introduction

India faces high water stress. The country is amongst those with the most fragile water resources across the world[2]. The serious impact of this stress was evident in early 2016, when 300 million Indians faced severe water shortages following two consecutive seasons of weak monsoons. Farm production fell and industrial production was significantly hit[3].

Estimates suggest that nearly 90% of available water in India is consumed by the agricultural sector. Agriculture holds the key for unlocking sound water management in the country if inefficiencies in water usage are identified and adequately addressed.

Water scarcity has a direct impact on all businesses operating in the agricultural value chain. Further, inefficiencies in agricultural water use impose significant operational risks on any business that relies on shared water resources for operations.

Businesses also have the opportunity to offer services, products and innovation that address the water challenge and create sustainable livelihoods for farmers.

Farming as a share of India's GDP has fallen dramatically, while remaining the largest employer by far. The increasing demand for food represents a sizeable market waiting to be served. The annual demand for food-grains in India will rise to 333 million tons by 2050, up from 250 million tons today. Further, commercially dominant segments such as dairy, horticulture and inland fisheries, which drive India's growth in international markets, can be significant in improving agriculture' share in India's economy.

However, agriculture in India operates on over-stretched resources of land and water. The judicious use of resources is required to improve agricultural production and trade practices.

Figure 1: Share of agriculture and allied sector in employment and GDP of India[4]

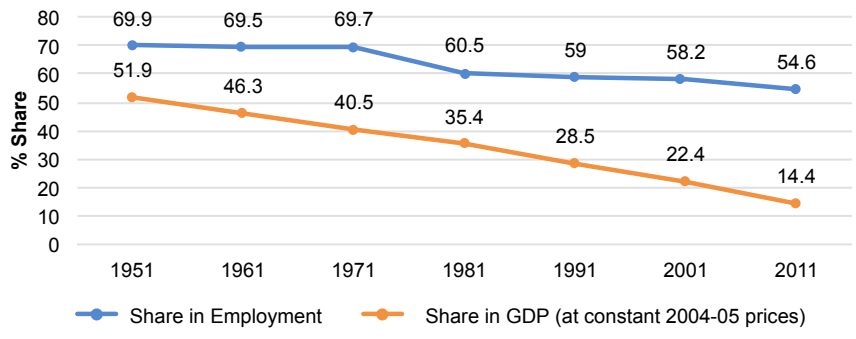

Table 1 Issues associated with the agricultural sector in India

Production

Issue	K	I	D	P
Technology development and application	✓	✓		
Low productivity (yield)	✓	✓		
Inappropriate use of inputs (water, fertilizers, energy)	✓	✓		
Depleting input/resource quality	✓			✓
Smallholder land sizes				✓
Agriculture-related GHG emissions	✓	✓		✓
Skewed production (towards cereals – rice and wheat)	✓			✓
Lack of productive non-agricultural activities like livestock-rearing and off-farm allied activities		✓	✓	
Lack of efficient storage and agro-processing facilities		✓	✓	
Lack of extension services, market-reach				
Climate-change adaptation and resilience	✓			✓
Food safety and health				✓
Price volatility				✓
Middlemen in agricultural supply chains	✓	✓	✓	
Low farmer incomes and poverty				✓
Inefficient credit and lending systems				✓
Ineffective reach and delivery of Insurance				✓
Gender inequalities in agriculture	✓			✓
Food loss and waste in production and processing	✓	✓		

Table 1 Provides a list of issues associated with the agricultural sector in India. It organizes these issues into four broad categories

- **K** Knowledge
- **I** Infrastructure
- **D** Delivery and support services
- **P** Policies

These categories are based on an understanding of the key controls for addressing these issues.

Consumption

Issue	K	I	D	P
Food loss and waste in retail and consumption	✓			✓
Consumer preferences and demands	✓			
Under-nutrition and obesity	✓		✓	✓

Against this background, the study describes "smart" agricultural solutions being implemented by businesses in India in order to address some of the issues mentioned above.

The study is an attempt to customize WBCSD's global work on "*Co-optimizing solutions: Water and energy for food, feed and fiber*" [5] in the Indian context. Its principle aim is to highlight solutions being deployed by Indian businesses, and set out their relevance and impact.

The study organizes the examples from India into 10 comprehensive solution areas, capturing ways to address the challenges faced by the agriculture sector. It highlights their applicability in the Indian context, while presenting the opportunities for business under each solution.

This study recognizes the nexus approach[6] i.e., the concept that there is an inter-connection between water, energy, food and climate change. A proper understanding of this is essential to develop solutions and address the identified challenges in a mutually beneficial manner.

Co-optimizing solutions

Table 2 provides an overview of the segments into which the solutions have been organized[7]

Table 2 provides an overview of the segments into which the solutions have been organized (continued)

Table 3 (next page) Overview of solutions, geographical spread and impacts

This paper attempts to identify opportunities to scale up and collaboratively implement some of these solutions. The solutions are in the form of technologies, practices or approaches. Often, these are implemented in combination with other technologies/practices. However, their success largely depends on local conditions.

Solution	Case examples from businesses in India; Data recorded from interventions by these companies	Effects on			Other Benefits
		Yield	Farmer Incomes	Water-use efficiency	
Smart varieties – high yielding	**Monsanto India's Dekalb** • Available in 16 high-yielding varieties • Introduced in 18 Indian maize-growing states	**32% higher**	**Limited data**	**Limited data**	Hardiness in case of rainfall fluctuations recorded for particular varieties
Smart varieties – insect resistant	**Monsanto India's Bt Cotton** • Available in 2 generations with trade name Bollgard I and Bollgard II • Introduced in 9 Indian cotton-growing states	**50% higher**	**375% higher**	**Limited data**	• Yield improvements recorded from reducing losses due to insect Bollworm • significant returns noted on the quality of life of farmers
Tissue culture and grafting	**Jain Irrigation** • JV-12 variety for white onions; grown by over 5,000 farmers in Maharashtra and Madhya, Pradesh • High-yielding varieties for banana, pomegranate and strawberry; grown by over 20,000 farmers • Grafted plants- high-yielding varieties developed for mango (Ultra HighDensity Plantation), citrus, guava, sapota and gooseberry	**50-200% higher**	**150-300% higher**	**90% higher**	• Superior product quality • Early fruiting allows for early harvesting, thus achieving multiple cropping cycles over the same period as compared to conventional practice

Solution	Case examples from businesses in India; Data recorded from interventions by these companies	Effects on			Other Benefits
		Yield	Farmer Incomes	Water-use efficiency	
Sustainable cotton cultivation – a cotton value chain initiative	**Ambuja Cements** • Set of practices that include integrated pest management, conservation and minimum tillage, and water management- good management of storage and delivery systems • Implemented in partnership with Better Cotton Initiative in five Indian states	**50% higher**	**14% higher**	**10-22% higher**	Significant reduction in the use of fertilizers **(33%) and chemical pesticides (60%) -** significant improvement in soil health
Fertigation products	**Yara India** • Traded as Yara Mila Complex and Yara Liva Nitrabor • Mainly on fruits and vegetable crops **Jain Irrigation** • Automated fertigation – traded as Nutricare • Manual Fertigation – Fertigation Tank, Venturi and Injector pumps	**Limited data** **50-200% higher** (when used with micro-irrigation systems)	**Limited data** **150-300% higher** (when used with micro-irrigation systems)	**Limited data** **Up to 90% higher** (when used with micro-irrigation systems)	• Targeted improvements on yields and farmer incomes, reduction in use of chemical fertilizers • Demonstrated on large farm-sizes **Saving in fertilizer use by 30-40%**

Solution	Case examples from businesses in India; Data recorded from interventions by these companies	Effects on			Other Benefits
		Yield	Farmer Incomes	Water-use efficiency	
Integrated watershed manage-ment	**ITC Limited** • Is an approach for water stewardship to achieve water security for all stakeholders • Implemented in 12 Indian states, covering 7.85 lakh acres of land **SABMiller India** • Implemented as an approach in all manufacturing locations of the company • Specific noted example of Neemrana, Rajasthan; implemented on crops- pearl millet, cotton, wheat etc. **Jain Irrigation** • Implemented on Girna river and its microwatershed in Maharashtra • Soil conservation and drainage and construction of rainwater harvesting structures	**Yield improved by 16%, 10% and 11% higher** than baselines in wheat, paddy (rice) and maize respec-tively	**Farm incomes improved in a range of 18 to 46%** against baselines across crops and geogra-phies	**46% higher area brought under irrigation; 18% to 73% improvement in groundwater levels** Total conservation capacity of 1,800 million L per annum; and total rainwater harvesting capacity of 1,500 million L per annum	Significant improvements in soil health and reduction of fertilizer use Significant run-off generated within the watershed; moderate to good possibility of groundwater recharge
Agroforestry	**ITC Limited** • A program involving cultivation of trees and field crops together to support small and marginal farmers • Implemented in Andhra Pradesh, Telangana and Karnataka covering over 83,000 acres of land	**44% higher**	**71% higher**	**Limited data**	Food, fuel, fodder and wood security for all stakeholders

Solution	Case examples from businesses in India; Data recorded from interventions by these companies	Effects on			Other Benefits
		Yield	Farmer Incomes	Water-use efficiency	
Drip Irrigation – a micro-irrigation solution	**Jain Irrigation** • Implemented as manufacturers and service providers of drip and other micro-irrigation solutions. Coverage: Four million smallholder families adopted drip to date	**50 - 360% higher**	**20-30% higher**	**60-70% higher**	50% reduction in energy use 50% reduction in fertilizer use High savings in labor cost
	Ambuja Cements • Implemented as facilitators for drip uptake as part of their CSR commitments on Water and Agriculture. Focus on provision of finance and training for drip uptake. Presence in nine Indian states with very good coverage in Gujarat				
	Monsanto India • Monsanto as facilitators for drip uptake among their contracted farmer community. Ensure finance and training. Coverage: 2300 acres in four Indian states				
Direct seeding, and drip fertigation – in rice	**PepsiCo** • Implemented direct seeding in four Indian states - Punjab, Rajasthan, Karnataka, Tamil Nadu	**Limited data**	**Higher by INR 1500 per acre**	**30% higher**	Significant (75%) reduction in greenhouse gas emissions
	Jain Irrigation • Implemented drip fertigation in rice	**22.5% higher**	**20% higher**	**60% higher**	100% reduction in greenhouse gas emissions due to maintenance of aerobic conditions in soil

Solution	Case examples from businesses in India; Data recorded from interventions by these companies	Effects on			Other Benefits
		Yield	Farmer Incomes	Water-use efficiency	
Bio-degradable super absorbent	**UPL Limited** • Starch-based super absorbent to improve field capacity; improve uptake of moisture and nutrients • Field trials in four priority markets in India • Crops: onions, potatoes, pomegranate, mustard, groundnut, cotton	**10 - 12% higher**	**10-12% higher** additional income from improved size and grade of commodity	**75%** reduction (in controlled trials)	Significant soil health improvement- improves soil porosity, prevents soil erosion, improves soil organic content Significant reduction in fertilizer application

Photo credits: Monsanto, promotion of Drip Irrigation in contracted farms

Solution	Case examples from businesses in India; Data recorded from interventions by these companies	Effects on			Other Benefits
		Yield	Farmer Incomes	Water-use efficiency	
Efficient water manage-ment practices implemented as a set - drip irrigation, furrow irrigation, gated pipes, land levelling, trash mulching	**Olam India** • Project Madhushree in Madhya Pradesh (Case 1) and Maharashtra (Case 2) • Implemented on sugarcane **ITC Limited** • Implemented in eight states covering 1.3 lakh acres • Zero tillage on wheat, broad-bed furrow in soya and direct seeding and mechanized transplant in paddy	**Case 1: 23% higher** **Case 2: 44% higher** **21% higher in soya; 13% higher in paddy**	**Case 1: 23%** **Case 2: 48%** **1.3 times higher in wheat; 39% higher in paddy**	**25- 35 % higher (Case 1 and 2)** **Number of irrigtions reduced from 9 to 7**	Significant supplement to small-holder income Significant improvement in soil moisture retention and resistance to climate variability
Conserva-tion tillage	**Monsanto India** • Implemented as a practice allowing crop residue on field before planting next crop • Project Nalanda from Bihar- covered 9 districts in South Bihar	**5.2% higher**	**45%**	**35%**	Significant saving in labor cost Often implemented in conjunction with other good practices
Greenhouse technology	**Jain Irrigation** • Cultivation of vegetables and flowers under protected conditions – controlled temperature, humidity, light intensity; use of special soil media, irrigation, fertigation and other agronomic practices	**Up to 1,000% higher**	**Significantly higher**	**50% higher**	• Significant (30%) higher fertilizer use efficiency • Constant supply of high quality produce

The irrigation method used conventionally in India, called the "furrow," or "flood irrigation" system, uses terrain for supplying water. The sand bunds or weirs regulate the amount of water that reaches individual rows of crops. A modern, more efficient technology of drip irrigation allows water to drip directly to the root-zone of crops, using a well-engineered system of pipes and valves. Drip has proved phenomenal, leading to a 60-70% improvement in water use efficiency and a 50-360% improvement in yield and farm productivity depending on the crop. It also leads to a significant improvement in farmer incomes due to reduced input and labor cost.

Jain Irrigation System Limited, the manufacturer and complete solution provider for drip and micro irrigation systems in India, impacted the lives of more than 4 million smallholder farmers in different parts of the country. Currently in partnership with the government of Karnataka for a large irrigation project, Jain Irrigation is working as a provider for Integrated Irrigation Solutions (IIS) for improving the efficiency of water pumping, purification and conveyance of water, involving the use of solar technology for pumping, and the use of modern piping systems for conveyance.

Ambuja Cements Foundation has made drip irrigation a part of its social commitments in the agriculture and livelihoods space. Its efforts include facilitating access to finance for smallholder farmers, as well as training them to improve the uptake of drip. Currently present in nine states of India, Ambuja Cements Foundation has created significant impact through the uptake of drip irrigation in Gujarat, in partnership with the Gujarat Green Revolution Company.

Monsanto India, the seed company, contracts up to 30,000 seed-growing farmers annually to produce high quality corn, cotton and vegetable seeds. The company is convinced that drip has the potential to improve the sustainability of Indian farming. And hence, it invests in improving the uptake of drip irrigation among its contracted farmers. By improving farmer access to funds, training them and connecting them to reliable drip vendors, the Monsanto supply chain production and research teams have remarkably converted 2,300 acres of agricultural land to drip in the 4 states of Andhra Pradesh, Telangana, Maharashtra and Karnataka.

India, with 44 million hectares of land under rice cultivation, is one of the world's largest rice producers. Around 21% of the global rice production in 2013-14 was contributed by India. Of the total area sown under rice, about 50% is irrigated, drawing water from India's precious reserves. Traditional growing involves seeding rice in nurseries, and then transplanting the seedlings into 10 centimeters of standing water. This system is labor and water intensive. In addition, the presence of biomass immersed in water over a longer period leads to 4.5 million tons of methane emitted yearly from India's paddies. In direct seeding, dry seeds of rice are sown onto the dry or wetted soil, avoiding puddling, transplanting and standing water.

Since 2004, **PepsiCo** has successfully supported direct-seeded rice in a number of initiatives with farmers in India, covering 4,000 hectares. PepsiCo also introduced a special tractor, coupled with a direct seeding machine, that can be adjusted according to seed variety, planting depth and plant-to-plant spacing. Its key benefits are in the form of 30% saving of water use, up to 75% reduction in methane emissions and significantly reduced labor costs. Several research institutes, including the Indian Agriculture Research Institute (IARI) and the International Rice Research Institute (IRRI), have vetted the results. Punjab Agriculture University included direct seeding in their package of practices and recommendations based on their own findings, as well as PepsiCo's results[15].

Photo credits: istock photo

Solution area 7

Bridging yield gaps

This solution area involves implementing management practices and inputs in accord with best practice, thereby improving yields. The yield gap in this case refers to the difference between actual yields realized in farmer fields and the yields attained in-farm under optimum conditions.

Yield gaps are often higher in rain-fed systems relative to irrigated systems, and can be addressed by enabling an access of farmers to better inputs and knowledge improving their awareness for effective use.

Table 7: The average yield gaps observed in research on major crops in India[16]

Crop	Yield Gap (kg/ha)	Condition for gap recording	Geographical variations
Rice	Higher than 1670	Rain-fed conditions; all-India average	Smaller in West Bengal; highest in Uttar Pradesh
Cotton	1120	Rain-fed conditions; state-average yield considered	High in Gujarat, Maharashtra; Modest in Andhra Pradesh; relatively low in Karnataka and Madhya Pradesh
Mustard	860	Rain-fed conditions; state-average yield considered	High in Uttar Pradesh and West Bengal
Wheat	Nil or small (80-800)	Irrigated conditions	Karnataka, West Bengal and Madhya Pradesh record gaps

Every crop grown in a certain agro-climatic condition and on a certain soil type has a set of recommended practices to achieve its optimum growth and best yield. Furthermore, for processed and packaged food items, an additional set of recommendations ensures that the product meets food safety and quality standards. Jain Irrigation has developed a set of standards called the Jain G.A.P. (Jain Good Agricultural Practice) that provide a recommended set of practices for sustainable farming and food safety. A customization of the Global G.A.P, Jain G.A.P, has been developed as an entry-level standard and certification process for small and marginal farmers. The Jain G.A.P standard helps farmers achieve the best attainable yields for specific crops. It also helps the company meet the buyer's concerns for food safety, farm-level practices and traceability. Jain Irrigation has implemented Jain G.A.P. among their contracted farmer base in India, especially for onions, mangos and bananas. Standards on pomegranate are under development. As of March 2017, almost 6,000 farmer suppliers of onions, mangos and bananas were certified on Jain G.A.P.

Crop-specific ecologically sustainable cropping systems, such as System of Rice Intensification (SRI) and Sustainable Sugarcane Initiative (SSI), are focused on the improvement of yields of specific crops by soil, water and nutrient management. The SRI and SSI approaches involve a set of recommended cultural practices involving controlled planting, irrigation and manuring. These approaches have demonstrated substantial improvements in crop productivity, while reducing the overall water use for these otherwise water-intensive crops. Nestlé India, as part of its water stewardship efforts, is currently implementing pilot projects for SRI and SRI in the catchment area of Kabini River basin in Karnataka. It has so far recorded encouraging results on key parameters such as crop yields, farmer incomes and water use efficiency. An increase of up to 57% in rice yields per acre, and up to 50% improvement in water use efficiency, has been recorded. Due to a reduction in the input cost of farmers, and good returns realized from improved yields, the net income of farmers increased by 62% relative to the conventional practice of rice cultivation. Soil health was enriched due to improved microbial activity, which holds the promise of benefiting farmers year-on-year. For sugarcane, the yield improvements stood at 28%, the water-use efficiency improved considerably, and farmer incomes improved by 45% due to the recommended practice of providing irrigation ay set intervals. Further, as SSI supports inter-cropping with crops like wheat, potato and cow pea, it ensures additional income for farmers while reducing weed growth.

Photo credits: Nestle, interventions with System of Rice Intensification

Photo credits: Jain Irrigation, implementation of vertical farming

Conclusions and recommendations

In India, water scarcity is a national issue, that affects both rural and urban populations, while impinging on agriculture, industry and the ecosystems that support life and biodiversity. Agriculture consumes most of the available water in India, and is often given the highest priority for water allocation. If water-use efficiencies are improved, agriculture can be more profitable and more water will be available to other users – domestic, municipal and industrial.

The solutions described in this report have the potential to help farming:

- Become more precise, less wasteful and lower emitting, with less impact on the food and land system through efficient irrigation, mixed farming and a reduction in food loss and waste.
- Become more stress and climate-resilient while maintaining productivity through smart-crop varieties, maintenance of soil moisture, mixed farming systems and smart crop management.
- Become more effective in the use of input resources to get the best value by bridging the yield gaps, smart-crop management and crop-specific sustainable cropping systems.
- Protect and restore ecological and societal capital, for example, by recharging water through integrated watershed management, and generating higher farmer incomes through agroforestry.

Each solution described in this report delivers value to business and to the farming community, paving the way for a more resilient future. In some cases, these solutions are implemented as a result of a strong collaboration between businesses and farming communities. There is an understanding that "de-risking agriculture" brings returns to businesses in the agriculture value chain. This includes businesses that share water resources with agriculture, or those seeking to improve the well-being and resilience of communities depending on agriculture for their livelihoods.

The solutions indicate that, when applied in the appropriate context and with robust management, investments in water

efficiency lead to significant co-benefits. These benefits are for farmers, for productivity, for communities and for the companies involved. There was a consensus among companies who took part in this study that **if farmers do well, businesses do well.** All recommendations for improving water-use efficiency that emerge from this work should be viewed in light of improvement in farmer livelihoods.

The study aims to highlight the potential for water-efficient technologies, practices and solutions to be scaled-up and co-implemented. Businesses have a large role to play in realizing this potential by:

- Using their organizational skills and community networks to strengthen supply systems, and deliver value to communities by deploying the identified solutions.
- Tracking performance, measuring impact and communicating the benefits of interventions.
- Applying their capacity to innovate towards higher water and energy productivity and ensuring sustainable harvests.
- Strategically anticipating future challenges and opportunities, by developing and investing in long-term agro-solutions.

As businesses implement these solutions, they advance the Indian Government's agenda of "water-to-every-farm" and "per-drop-more-crop." The identified solutions are a step forward in achieving the Sustainable Development Goals, directly contributing to SDG1 (No Poverty), SDG 2 (Zero Hunger), SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 15 (Life On Land). They support the Government in achieving India's Nationally Determined Contribution (NDC): enhancing water-use efficiency by 20%, provision of 100,000 solar pumps for farmers, and creating carbon sinks equivalent to 2.5-3 billion tons of carbon-di-oxide, through additional forest and tree cover by 2030.

This report demonstrates the relevance and potential of the smart business solutions in India. It should be used as:

1. A reference for the potential that business solutions hold and their scope to creating impact in the water and agriculture space in India. Several solutions have received endorsement from national and local research institutes. The approaches to implementing these have been standardized in a few cases.
2. An important first step to catalyzing partnerships and promoting collaborations to scale up the identified solutions.
3. An input into the co-development of guidance by businesses and authorities for technical and regulatory information, related to implementation and permitting of smart solutions.

The following enablers have been identified for these solutions:

1. Availability of funds

Several of these solutions are cost-intensive and their scale-up largely depends on the availability of funds. In the Indian context, Corporate Social Responsibility funds can be strategically invested and appropriately channeled, with the aim of delivering maximum value to the communities, while advancing business goals.

2. Government

Sound and supportive government policies can ensure that:

a. Proper and fair pricing of food drives investment in sustainable agriculture;

b. Clear and fair land ownership rights are defined and smallholder rights are protected;

c. Financial incentives support wider adoption of these solutions;

d. Innovation is encouraged and more relevance is given to science and technology in informing and guiding regulations and actions;

e. Business contributions in the space are recognized and supported;

f. Businesses are encouraged to improve data quality and availability of hydrology and agricultural productivity.

3. Training and on-site support

Providing farmers with training and support is critical to ensure successful implementation. Its role in scale-up as has been demonstrated in most of the case studies provided in this report.

4. Partnerships

Partnerships can support knowledge transfer, access to funds and bring in complementarity of solutions. The examples in this study involve partnerships that are business-to-community, business-to-NGO and business-to-government. In the process of producing this study, additional business-to-business partnerships have been created.

This set of enablers complement the scale-up of solutions which deliver the co-benefits to farmers and businesses. The solutions not only reduce the stress on water resources, they also assist in increasing yields and creating better quality products for India's growing population.

Photo credits: Jain Irrigation, Implementation of Aeroponics

Endnotes

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Resources

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WBCSD Water-smart Agriculture

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Acknowledgements

Written by Pradeep Mehta, SM Sehgal Foundation and Deepa Maggo, WBCSD

SM Sehgal Foundation designs and promotes rural development interventions that create opportunities, build resilience, and provide solutions to some of the most pressing challenges in India's poorest communities. The foundation team works together with rural communities to create sustainable programs for managing water resources, increasing agricultural productivity, and strengthening rural governance.

Sincere gratitude and thanks to the WBCSD member companies who provided case studies for this work, and their inputs and guidance throughout the process, and to Earth Genome and Arizona State University, who helped shape our early thinking on this project.

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WBCSD members have formed a leadership group to advance collective business action on water.

This report has been developed as part of one of the solutions under this group: the WBCSD Water-smart Agriculture business solution, part of the global WBCSD Climate-smart Agriculture solution. The other active business solutions of the Water program in India are:

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World Business Council
for Sustainable Development

WBCSD India office,
4th floor, Worldmark 2,
Aerocity, New Delhi 110 037
India

WBCSD Secretariat
Maison de la Paix
Chemin Eugène-Rigot 2B
CP 2075 1211 Geneva 1
Switzerland

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