2030 Water Resources Group

Hindustan Unilever Limited
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Agri-Water Sustainability in India:

Setting the Agenda for the Alliance for Thought Leadership and Action

Synopsis of the HUF - 2030 WRG Workshop in India

Knowledge Partner

CEEW Council on Energy, Environment & Water

A workshop report on 'Agri-Water Sustainability in India: Setting the Agenda for the Alliance for Thought Leadership and Action'.

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The report is a synopsis of the HUF-2030 WRG Workshop held on May 5, 2015 in New Delhi, India. We wish to acknowledge the support of Global Water Partnership (GWP-India) and International Water Management Institute (IWMI) as Associate Partners, and The Energy and Resources Institute (TERI) as Knowledge Partner for this workshop.

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Foreword

Water continues to remain an issue of critical importance for economic, environmental and social development, with inextricable linkages to food security, urbanization, sustainable rural development, industrial growth, and ecosystem services, among others.

Since initiating their respective operations in India in 2010, Hindustan Unilever Foundation (HUF) and 2030 Water Resources Group (2030 WRG) have demonstrated their commitment towards promoting better management of India's water resources.

With the aim of accelerating innovative and inclusive solutions, HUF and 2030 WRG convened a workshop aimed at catalyzing an alliance of progressive partners to address India's growing agri-water challenges. Although awareness levels about the agri-water sector consuming over eighty percent of the country's water resources remain high, current practices and policies target solutions directed at either water resources management or agricultural productivity solutions, without effectively bridging the gap between the two.

Applying a concerted approach towards reinforcing the knowledge, policy, and collective action interface of the agriculture and water sectors, the workshop aimed to accelerate agri-water efficiency at scale. Spanning a spectrum of solution areas, the workshop discussed technology and finance facilitation, knowledge development, and results-based implementation, driven by a bottom-up approach towards policy transformation.

Through this workshop and the broader alliance, HUF and 2030 WRG deepened their commitment to the agri-water sector. With millions of livelihoods linked to the sector, the cumulative impact of this unique alignment will contribute substantially towards improved water, food, and livelihood security.

We believe that transformational impact is only possible by leveraging the power of the collective. It is our sincere hope that you join us in this ambitious endeavor.

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Executive Summary

The United Nations defines India as a water-stressed region with a per capita availability of water of 1,545 cubic metres. The level of pollution is increasing in water bodies due to flow of untreated sewage and effluents. The agriculture sector, which consumes 80 percent of India's water resources and accounts for 90 percent of the groundwater withdrawals, uses water inefficiently. All these challenges have wide-scale implications for the nation's water security, further aggravated by climate change vagaries, burgeoning population, and industrialization.

In order to address these issues, a workshop was held on May 5, 2015 by 2030 Water Resources Group (2030 WRG) in partnership with Hindustan Unilever Foundation (HUF), titled "Alliance for Thought Leadership and Action for Agri-Water". The workshop highlighted the importance of building an alliance aimed at leveraging the collective potential of diverse actors such as the private sector, multilateral and bilateral donors, government agencies, and civil society organisations to achieve sustainable water resources management in the country.

The workshop in collaboration with local partners envisaged to:

- **Develop knowledge and foster innovation** by aggregating evidence-based grassroots experience and incubating best practices;
- **Provide agri-water policy leadership** by linking the successes and failures of on-ground practices with the policy discourse;
- **Adopt area-based approaches,** such as Ganga Rejuvenation; and
- **Align stakeholder interests and build trust** by facilitating collaboration and encouraging participatory decision-making.

This report integrates the insights and feedback that panelists and participants expressed during the workshop, and provides an overview of key issues in agricultural water management for further inquiry and action. These are listed below.

I. **Policy:** An effective national agri-water policy framework necessitates a shift from supply-side to demand-side management at scale, including:

   a. **Clear goals and targets,** particularly **improving water productivity** (more crop per drop) and **the livelihood status of farmers** by ensuring adequate water supply.

   b. **Tools,** comprising models for both economic and resource optimization, to achieve targets though a multi-sectoral approach that includes irrigation, agriculture, energy, financing, policy, and sociology, among other areas.

c. **Resource mapping and availability** to understand conflicting demands of various stakeholders in the design of any water management plan.

d. **Relevant design and implementation arrangements,** covering (a) Bottom-up approaches to policy making, (b) design of scientifically robust water interventions, including the development of a monitoring and evaluation framework, and (c) capacity building of local institutions and primary stakeholders (farmers/users).

II. **Finance:** Access to finance remains a major challenge for small and marginal farmers in developing countries. India has not witnessed much contribution from private sector in the irrigation space so far. According to the International Finance Corporation, it is estimated that the Indian irrigation sector requires investments totalling $ 50-100 billion, translating into a minimum of $ 10 billion every year over more than five years. Blended finance, which involves combining grants with loans, equity or other risk-sharing mechanisms, could be one of the vehicles to mobilise greater private sector participation in the agri-water sector.

However, the lack of a proper pricing mechanism for water usage and the ineffective enforcement of groundwater regulation have limited the application of risk sharing blended finance. At times, availing financial support under various government schemes becomes difficult because there is little alignment between these programs and governing bodies.

Unlocking more private funding would require tapping into diverse sources of finance as outlined below:

- **Capital markets,** given the limited potential and reach of corporate social responsibility in bridging the enormous financing needs of the sector.
- **Non-Banking Financial Companies (NBFCs)** such as the Sustainable Agro-commercial Finance Ltd. (SAFL), the first private sector NBFC with a focus on retail agriculture.
- **Water Benefit Certificates,** an innovative tool similar to the carbon credit mechanism, with the potential to mitigate farmers' concerns related to upfront payment.
- Schemes such as the **Public-Private Partnership for Integrated Agriculture Development (PPP-IAD),** if replicated across states, as a potentially important vehicle to garner private sector financing for large-scale integrated projects in agriculture and allied sectors.

Corporates along with Development Finance Institutions (DFIs), bankers, government agencies, grassroots organisations and individuals, and micro irrigation agencies could be the key agents for promoting sustainable agri-water projects. Corporates, in particular, could play a vital role in promoting water-use efficiency measures such as micro irrigation among farmers in their supply chain.

The workshop participants highlighted additional approaches to attract private investment in the agri-water sector:

- **Policy impetus,** such as in the case of Gujarat where farmers responded to drip irrigation after the government made electricity available for 8 hours;
- **Recognition of corporate investments** by the policy and regulatory framework;
- **Reform of Public-Private Partnerships** (PPP) by setting measurable timeframes and increasing accountability; and
- **Provision of reliable data.**

III. **Sustainable Development Goals (SDGs):** One-third of the Sustainable Development Goals (SDG) are closely linked to water, with Goal 6 focusing specifically on water availability and sanitation, in view of cross-sector challenges. Several aspects could be integrated into SDGs to aid in more effective implementation, such as:

- Spelling out the linkages between water and livelihood;
- Defining sub indicators to measure progress in meeting targets;
- Factoring in water availability for livestock;
- Delineating roles of communities and practitioners in achieving targets;
- Designing targets that are easily understood and disseminated within the local community.

The **2030 WRG A-C-T approach** - Analyse, Convene and Transform - could be one of the ways to achieve this objective.

The following interventions were recognized as vital for the effective realization of SDGs:

(i) Developing implementation strategies around the **4Rs of reuse, recycle, recharge and reduce;**

(ii) **Adopting a participatory approach** for setting the roadmap for the implementation of SDGs, in addition to driving behaviour change by building awareness;

(iii) Conducting a **detailed risk assessment** prior to implementing targets;

(iv) Developing and piloting various **site-specific business models** giving due importance to decentralised implementation approaches;

(v) **Providing financial aid** to farmers for adopting various water-efficient technologies such as micro irrigation systems;

(vi) **Adopting circular economy pathways** in water and wastewater management based on global experiences of countries such as Australia, Spain, and South Africa;

(vii) **Supporting programs and initiatives** that are aligned with broader government programs such as Clean Ganga and Clean India.

The workshop also deliberated on the importance of creating vocabulary and terminologies easily understood by stakeholders at all levels. In particular, participants highlighted the need for developing a new set of parameters that local communities can relate to better over terms such as water footprint and virtual water.

IV. Ganga: River Ganga is home to over 450 million people, of which over 60 percent of the population is dependent on agriculture. Sustenance of Ganga is threatened by increasing levels of pollution that in turn adversely affect agricultural productivity and the livelihoods of farmers. The ruling government has allocated substantial resources (budgetary allocation of INR 20,000 crores or approximately $3.1 billion over five years) to achieve the objective of Ganga Rejuvenation. This would however likely depend on the support and alignment with other areas.

- **Coordinated Governance:** The management of the Ganga basin is spread across multiple bodies. For example, at the central level, the Ministry of Water Resources, River Development, and Ganga Rejuvenation has set up the National Ganga River Basin Authority (NGRBA) for driving the National Mission for Clean Ganga, whereas at the state level, management groups drive the mission in various riparian states. Therefore, alignment of interests and governance are critical because both informal organizations and large formal institutions are working on River Ganga.
- **Private Investments:** Dearth of private investment in the irrigation space poses another significant challenge as public finance alone would be inadequate to meet the investment needed for the basin.
- **Heterogeneity in Approach:** It is important to understand that a single project cannot cater to the entire Ganga basin due to its vast size and heterogeneity. It is important to pilot projects of varying sizes and scope, and replicate the successful ones in various parts of the basin.

Considering the importance of Ganga in sustaining livelihoods of millions of farmers across the country, the HUF-2030 WRG workshop highlighted the need to foster greater collaboration across the government, private sector, civil society, grassroots organisations, and academia to rejuvenate the Ganga Basin.

Contents

Introduction

India's agriculture sector accounts for 80 percent of the country's total water use. An estimate by 2030 Water Resources Group (2030 WRG) suggests that the gap between freshwater demand and supply could be 755 billion cubic meters by the year 2030 if business-as-usual water management practices were to continue[1] Given this situation, it is imperative to drive water use efficiency, especially for irrigation, if water scarcity is to be prevented in the future.

Both as a consumer and provider of water services, the private sector, in collaboration with the government, civil society organisations and the community, could be a major driver of innovation, best practices, and convening power to address the challenges in sustainable management of water. 2030 WRG was established as an innovative and neutral public-private-expert-civil society platform to leverage the power of collaboration and help governments and local stakeholders accelerate reforms to ensure sustainable water resources management.

In an effort to address the complex and fragmented nature of the water sector, 2030 WRG in partnership with Hindustan Unilever Foundation (HUF) convened a multi-stakeholder conference on May 5, 2015 titled 'Alliance for Thought Leadership and Action for Agri-water'. The objective was to harness the collective potential of diverse actors such as the private sector, multilateral and bilateral donor agencies, government ministries, and civil society to work towards sustainable water resources management in the country. The workshop aimed to:

- **Catalyse partnerships** amongst various stakeholders in the agri-water sector for implementation of projects;
- **Act as a platform** to aggregate lessons on successes and failures, and
- **Integrate learning through bottom-up approaches** into the **policy framework.**

In addition to providing an overview of the sector, this report captures the insights and feedback that the panellists and participants presented during the workshop. Among a range of topics discussed were Sustainable Development Goals (SDGs), nexus for water resource security; the role of different stakeholders in rejuvenating the river Ganga; importance of blended finance for implementing and scaling up agri-water projects; lessons learnt from grassroots collective action; practice-based vocabulary that resonates with the communities; and practice-based National Agri-Water Participatory Policy Leadership.

The expectation is that it will pave the way for various stakeholders to come together within the framework of the alliance and forge partnerships to operationalise and/or scale up agri-water projects.

1 2030 Water Resources Group, "Charting our water future - Economic frameworks to inform decision making", available at http://www.2030waterresourcesgroup.com/water_full/Charting_Our_Water_Future_Final.pdf, accessed on 20 May 2015

HUF deploys collaborative strategies for collective action with grassroots organisations through programs such as “Water for Public Good” to resolve communities’ water-related issues.

According to HUF, the alliance’s emphasis on agri-water sustainability is the need of the hour considering agriculture’s dominant water use patterns with implications on water quality caused by non-point agricultural inputs. The workshop served as a step towards assessing the micro realities of the agri-water sector and how it influenced macro priorities at the national and global level, including ensuring food security and freshwater availability for all.

The 2030 WRG believes that traditional technological and policy approaches may not be adequate to address the challenge at hand. Concrete steps are needed in establishing vertical alignment among all the stakeholders in order to leverage their experiences and collective knowledge for integration into policy-making at the state and central level.

Broadly, the HUF- 2030 WRG workshop laid the foundation for:

1. **Developing Knowledge and Fostering Innovation** by:
    - Aggregating evidence-based knowledge from on-ground experiences
    - Comprehensively analysing cost, benefits, and risks
    - Adopting best international practices in areas such as Hybrid Finance and Circular Economy Solutions
    - Developing information and a monitoring and evaluation framework

2. **Providing Agri-Water Policy Leadership** by:

    - Facilitating fact and experience-based policy making
    - Unlocking government support and funding for addressing key bottlenecks in agri-water in India

3. **Area-Based Approaches,** such as:

    - Developing an engagement plan for Ganga Rejuvenation
    - Catalysing the rejuvenation of Hindon river in Uttar Pradesh, as an initial phase of Ganga Rejuvenation

4. **Stakeholder Alignment, Leverage, and Trust Building** by:

    - Facilitating collaboration across government, private sector, civil society, development organizations, and academia
    - Encouraging participatory engagements in decision-making

Among those who participated in and supported the workshop were eminent scientists, practitioners, and government dignitaries such as Dr. Tushaar Shah, International Water Management Institute (IWMI); Dr. Amarjit Singh, Additional Secretary, Ministry of Water Resources, Government of India; Dr. Mihir Shah, Former Member, Planning Commission, Government of India (2009-2014); Dr. Vinod Tare, IIT Kanpur and Chairperson, IIT Consortium for Ganga; and Mr. Rajendra Singh, winner of Stockholm Water Prize 2015 and Magsaysay Award.

The workshop convened grassroots practitioners and organisations such as People's Action for National Integration (PANI), Development Support Centre (DSC), Development of Humane Action (DHAN) foundation, Samuha, Advanced Centre for Water Resources Development and Management ACWADAM, IIT Mumbai, Foundation for Ecological Security (FES), and Aga Khan Rural Support Program (AKRSP) to share their exemplary work and lessons from grassroots collective action.

In addition, corporates such as Olam Agro India, Coca Cola, Arvind Limited and DCM Shriram Limited, and various financing institutions such as Ratnakar Bank, YES Bank and SAFL (Non-Banking Financial Company also participated in the workshop and outlined their contributions towards adopting best practices in water conservation and management. The discussion also saw participation from not-for-profit policy research think tanks such as the Council on Energy, Environment and Water (CEEW) and The Energy and Resources Institute (TERI).

This report presents the outcomes of desk-based research and extensive deliberations of the sector experts at the workshop on the following themes: (i) Sustainable Development Goals (SDG) nexus for water resource security; (ii) The role of farmers and supply chains in rejuvenating river Ganga and the Ganga Multi-Stakeholder Action Forum; (iii) Blended public and private finance and other innovative financing mechanisms for agri-water; (iv) Practice-based vocabulary in agri-water for standardised results measurement; and (v) Practice-based National Agri-Water Participatory Policy Leadership.

Chapter I

I. Sustainable Development Goals (SDGs) Nexus for Water Source Security: Agri-Water and WASH

Sustainable Development Goals and water security in rural and peri-urban India

As the end-date for achievement of targets for the Millennium Development Goals approaches, latest global statistics show that around 750 million people lack access to drinking water, 2.5 billion are without an improved sanitation facility, and more than 800 million people[2] do not have enough food to eat. Understanding the reasons behind the failures and the challenges faced in achieving MDGs is crucial to ensure that the emerging Sustainable Development Goals are attained successfully within the prescribed timeframe.

The Sustainable Development Goals that will substitute the Millennium Development Goals will come into effect from 2016. SDGs are a new universal set of goals, targets, and indicators that UN member states will be expected to use for framing agendas and political policies over the next 15 years.[3] These were first discussed at the United Nations Conference on Sustainable Development held Rio de Janeiro in June 2012. The UN conducted the largest consultation program to gauge opinion on what the SDGs should comprise and finally listed 17 goals to be achieved. The SDGs are inclusive and holistic in nature as they are not limited to water access but also focus on achieving water use efficiency, integrated watershed management, and water quality among others.

The SDGs require nations to provide access to safe and affordable drinking water, ensure access to improved sanitation facilities for all, including an end to open defecation, and substantially increase water use efficiency across all sectors.[4] Particularly relevant in this respect are **Goal 6 - Ensure availability and sustainable management of water and sanitation for all**, and **Goal 2 - End hunger, achieve food security and improved nutrition, and promote sustainable agriculture**.

India is not performing well on these goals, especially in rural and peri-urban regions. Only 35 percent of the rural population and 71 percent of the urban population have access to drinking water within the premises. The sanitation scenario is not too encouraging with almost 70 percent of the rural population devoid of latrines and 18.6 percent of the urban population without toilets.

Similarly, the agriculture sector, which dominates rural land use, utilises water inefficiently. In India, agriculture accounted for 91 percent of total water use in 2013[5]. Both due to over-

2 UNICEF (2014), Progress on drinking water and sanitation, Available on http://apps.who.int/iris/bitstream/10665/112727/1/9789241507240_eng.pdf, accessed on 17Jun15

3 Liz Ford (2015), "Sustainable development goals: all you need to know", Put on Guardian.com on 19 January 2015, Available at http://www.theguardian.com/global-development/2015/jan/19/sustainable-development-goals-united-nations, accessed on 17Jun15

4 UN (2014), "Open Working Group proposal for Sustainable Development Goals" United Nations", Available at https://sustainabledevelopment.un.org/content/documents/1579SDGs%20Proposal.pdf ; Accessed 7 April 2015.

5 WB (2014), "Annual freshwater withdrawals, agriculture (% of total freshwater withdrawal)" World Bank, available at: http://data.worldbank.org/indicator/ER.H2O.FWAG.ZS/countries; accessed 8 April 2015

withdrawal of surface and ground water, and excessive pollution in water bodies, these have become unfit for most uses[6]. In addition, there are water demands of the livestock and the environment that are essential to be considered. In order to progress towards achieving SDGs, an integrated water management approach must be developed to benchmark sustainable rural water management[7].

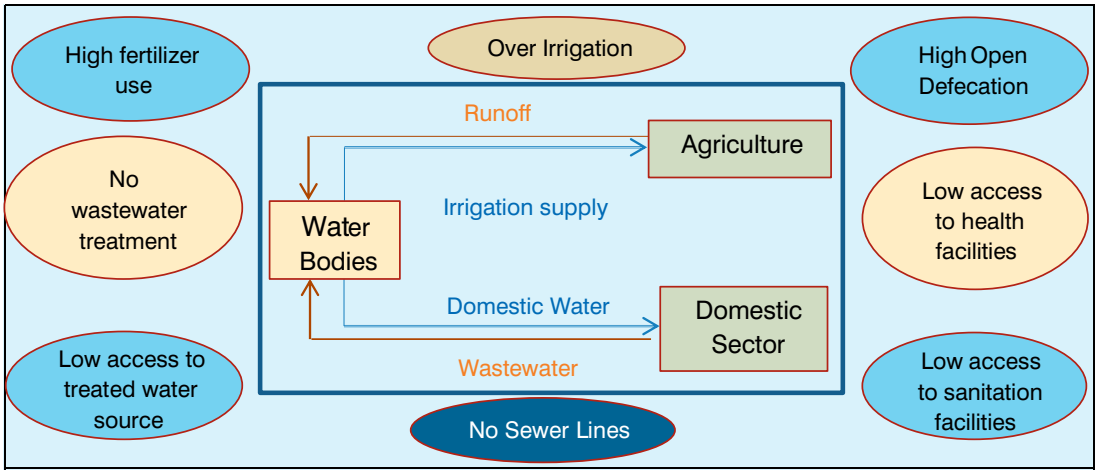
Linking agri-water sector and WASH (Water, Sanitation and Hygiene)

Rural and peri-urban regions in India, which primarily have agricultural and domestic water requirements, suffer from many challenges such as the lack of water supply infrastructure and inadequate sanitation facilities, among others. Both agricultural and domestic water users tap into the same finite water resource to secure their needs. The WASH term (Water, Sanitation and Hygiene) has been introduced globally to promote and support access to safe (drinking) water and basic sanitation services to promote improved hygiene[8].

There is a growing awareness of **'water source security'** under the traditional WASH approach- both at the rural community level as well as in larger towns and cities. On one hand, this concerns the direct quantitative correlation between water use for agriculture and for drinking water and sanitation and, on the other hand, the qualitative impact of urban pollution on water resources as a result of sub-standard treatment of sewage water, including faecal waste.

Linking agri-water and WASH sectors can facilitate an integrated and inter-sectorial approach. Figure 1 below highlights the nexus between water for use in agriculture and water for domestic use in an Indian rural and peri-urban set-up.

Figure 1: Agri-water and WASH nexus in a typical Indian rural / peri-urban set-up



Source: CEEW (circles represent challenges, box describes Agri - water and WASH nexus)

Challenges to the agri-water and WASH nexus

There are several challenges to the agri-water and WASH nexus. While open defecation emerges as one of the most important causes of pollution from domestic use, overly irrigated and fertilized

6 CPCB (2010), "Ground Water Quality Monitoring at major cities in Chhattisgarh state", Central Pollution Control Board, Bhopal; available at http://cpcb.nic.in/GWQltyChattisgar%202010-11.pdf, accessed on 8 April 2015
7 IGES (2015), "Interview on SDGs Water brief",Institute for Global Environmental Strategies, Kanagawa, Japan
8 UNICEF (2008), UNICEF WASH Strategies, available at http://www.unicef.org/wash/index_43084.html, accessed on 9 April 2015

farm lands leading to high runoff rates also contribute significantly to the pollution of water bodies. Agricultural runoff, the result of excessively subsidized water and electricity supply, is a major problem in the agrarian states of Punjab, Haryana, and western Uttar Pradesh[9], among others.

The use of wastewater for agriculture from the domestic sector, for one, has been found to have immense scope. At the same time, efforts must also be invested towards channelling water from overly irrigated farm lands to houses and settlements nearby, or for other purposes downstream, to improve water-use efficiency.

For this reason, it is important to adopt a circular economy pathway in which wastewater is treated as a valuable resource instead of being considered a waste. Such a paradigm shift would relieve escalating pressure on all resources - water, energy, materials and food - and lead to a virtuous cycle with financial, environmental, health, and community-related benefits. This also means new economic opportunities for different users, fertilizer for farmers, biogas for energy demand of sewage treatment plants, water for other purposes and so on.

At the same time, good agricultural practices have a positive impact on water use efficiency, often to the extent of 10 to 20 percent. Further efficiencies can be derived from investments in technology targeted towards water use efficiency. With improved water use efficiency in farming, not only can agricultural pollution from the use of pesticides and fertilizers come down, but it can also free up water for other purposes, including drinking water.

Therefore, good agricultural practices, including water saving technologies, lead to higher yields and farmer incomes. In addition, farmers can reduce their labour cost, an added benefit as seasonal labour is becoming scarcer in several parts of the country. In summary, improved agri-water efficiency spells a win-win situation for all water users, including the ecosystem.

Potential risks from/to water reuse and recycling and global best practices

While the benefits of using wastewater for agriculture have been globally acknowledged by experts, the most prevalent risks/challenges include:

- **Health and sanitation risks:** Wastewater used directly for irrigation without processing can cause outbreak of food, water or vector-borne diseases[10].
- **Environmental risks:** Use of wastewater containing toxic elements for irrigation causes harm to human beings and the biotic community.
- **Socio economic challenges:** A series of community-level surveys conducted in different parts of the world revealed that communities tend to be less welcoming of reusing water across sectors. However, there are a few overseas examples of water recycling and reuse. For example, Israel treats 86 percent of its domestic wastewater and recycles it for agricultural use. Spain comes next, recycling 17 percent of its effluent[11].
- **Economic challenges:** To encourage water use across sectors, the economic value of

9 PC (2013), "Report of the high level expert group on water logging in Punjab", Planning Commission, Government of India.
10 Jens Liebe, Reza Ardakanian (2013), "Proceedings of the UN-Water project on the Safe Use of Wastewater in Agriculture", UN-Water Decade Programme on Capacity Development (UNW-DPC), United Nations University, Germany; available at http://www.ais.unwater.org/ais/pluginfile.php/62/course/section/29/proceedings-no-11_WEB.pdf ; accessed May 11, 2015
11 Kershner, Isabelle (2015), Aided by the Sea, Israel Overcomes an Old Foe: Drought, New York Times, May 29. Available at http://www.nytimes.com/2015/05/30/world/middleeast/water-revolution-in-israel-overcomes-any-threat-of-drought.html?_r=0, accessed June 15, 2015

water should be assessed regularly. However, since that market is yet to develop in India, economic valuation often poses a major impediment, which undermines the promotion of wastewater reuse.

There is a lot to learn from existing best practices across the globe. Singapore is known for its holistic water management system, integrating the management of both water and wastewater. One of the districts of California boasts of a wastewater treatment facility that recycles sewage water and reuses it for drinking water supply[12]. A retrospective analysis of the nitrification process in the River Seine downstream from Paris over a period of 20 years suggests that with improved treatment of wastewater and reduction of the untreated wastewater discharge, the overall ammonium oxidation rate has been continuously reduced[13].

Opportunities to improve water use efficiency at the farm level

There is a need for **low-cost water use efficiency measures,** such as mulching, trench farming and intercropping, in addition to technology use such as drip irrigation, laser land levelling, and solar pumps. However, unless there is a clear business case for farmers and supply chain partners ("more output with less inputs"), better agri-water practices and water saving technologies will not be adopted.

In this context more **innovative policy instruments and financial arrangements**, such as "smart subsidies" or market-friendly subsidies[14] and cash incentives to farmers for measurable water footprint reduction, could be considered to catalyse large-scale adoption of water-saving practices and technologies. In order to measure the water footprint at the farm level, scientific and technology-based impact assessments are a necessary component of the overall design of any initiative at scale.

Collaboration among stakeholders from the government, private sector, and civil society (farmers) is required to achieve large-scale adoption of cost-effective water-saving technologies. Public-Private-Community Partnerships, or PPCPs could be an effective mechanism to structure the implementation of such programs. This will also help to share costs across the public sector, private sector and farming communities, the last being the core beneficiaries of the engagement.

Farmers could also be aggregated through **supply chain actors** along with extension services --"train the trainer model"- to achieve a multiplier effect. State governments could leverage the Public Private Partnership for Integrated Agricultural Development (PPP-IAD) scheme to implement PPP projects in the agri-water sector. Coupled with demonstration pilots developed by the government along with the private sector, these approaches could serve as useful tools to facilitate behaviour change at the farm level.

Experts across the globe have clearly recommended that water resources should be managed through **integrated and participatory approaches**. The Dublin principles, which are globally accepted and followed, also suggest considering water as a finite resource and an economic good. Evidently, it will be difficult to attain SDGs targets with regard to water security and access unless the agri-water, domestic and WASH sector are looked at in an integrated way. Even at the national level where the Indian government is struggling to achieve food & water security and total sanitation, especially in the rural and peri-urban regions, integrated management and a circular economy pathway could be the way forward.

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12 Kieron Monks (May 1, 2014), "From toilet to tap: Getting a taste for drinking recycled waste water"; available at http://edition.cnn.com/2014/05/01/world/from-toilet-to-tap-water/ ; accessed 11 May 2015.

13 Brion, N., & Billen, G. (2000, August 15). Wastewater as a source of nitrifying bacteria in river systems: the case of the River Seine downstream from Paris. 34(12), 3213-3221.

14 Smart subsidies can be defined as carefully designed interventions that minimize distortions, mistargeting, and inefficiencies while maximizing social benefits

Change agenda for agri-water in India: Encouraging case studies

Case Study 1:

OLAM - Business case for Water Use Efficiency Practices in Sugarcane Cultivation

Partners - OLAM, IFC, Solidaridad, HUF

Olam International is a leading seed-to-shelf agri-business company operating in 65 countries, supplying food and industrial raw materials to over 13,800 customers worldwide. In India along with IFC, Solidaridad and HUF, Olam International started a program "Madhu Shree" in 2013 for sustainable sugarcane cultivation in Madhya Pradesh. The project covers around 20,000 farmers. The main objectives of this program are to boost agriculture productivity, conserve water, improve soil health, support economic empowerment, and increase general participation.

Interventions carried out so far are:

- **Training and capacity building:** Farmers, project staff, lead farmers and extension workers were trained on improved agricultural practices and improved water efficiency in sugarcane cultivation.
- **Implementation of good water management practices:** In the project areas of Barwani and Hemarus, water availability and access respectively are major concerns. Considering the agro climatic and soil conditions, four appropriate low-cost water-saving techniques were promoted, which include Trash Mulching, Application of Organic Manure, Furrow Irrigation and Drip Irrigation
- **Community water governance:** In cooperation with local NGOs, a roadmap was prepared to enhance community engagement in the ongoing programs. In order to intensify community engagement and to sensitize women on good agronomical practices, one-to-one interactions between farmers and extension workers were carried out in addition to classroom sessions.

The program also aims to explore knowledge partnerships with water institutions such as CII-Triveni Water Institute, Jaipur, Rajasthan, to document best practices for promoting water sustainability in sugarcane cultivation for industry-wide dissemination and experience-sharing.

The overall adoption of good agronomical practices and water-efficient practices under this program has been reported to be very encouraging. For example, practices such as trash mulching and use of compost in fields have shown a positive behavioural change among small and marginal farmers, leading to successful implementation on the ground.

Case Study 2:

Foundation for Ecological Security (FES) - Water Commons - Influencing Practice and Policy

Partners - FES, HUF, Government of India

The project aims to improve the status of land and water resources by considering them a common pool resource and work towards managing them as common property regimes. It was initiated in eight districts spread across five states - Anantapur & Chittoor in Andhra Pradesh, Chickballapur in Karnataka, Mandla in Madhya Pradesh, Bhilwara, Pratapgarh & Udaipur in Rajasthan, and Yavatmal in Maharashtra.

The project districts were selected based on parameters that included a high degree of degradation, preponderance of common lands, criticality of surface- and groundwater regimes, level of poverty as well as the government support available for leveraging NREGA for facilitating the implementation of the projects.

The major objectives of the project are:

- Improving the democratic functioning of village institutions for good governance of land and water resources
- Supporting and promoting institutions at the higher level for managing resources at a landscape level
- Integrating water conservation and promoting water-frugal agriculture interventions, with an emphasis on access to water for the poor and marginalized
- Influencing policies and programmatic action so that conservation of water is the fundamental objective

FES, together with its partners, strives to build strong evidence on effective management of water resources by local communities and community institutions, and to establish the legitimacy of community tenure as a viable option. The project helps in building a critical linkage between FES work on restoration of forest and common lands with the farming systems by integrating the agenda of water commons. Major components of the project include participatory planning, conservation of natural resources through watershed approach, livelihood enhancement, crop-water budgeting, promoting community cooperation to protect and improve common lands and shared water resources, and establishing wider networking and policy dialogue.

Case Study 3:

People's Action For National Integration (PANI) - Improving Water Use Efficiency In Agriculture In Eastern Uttar Pradesh

Partners - PANI, HUF, CSOs

PANI is an NGO working in Uttar Pradesh to address both, social and economic poverty, and striving to change the socio-political scenario in the eastern region of Uttar Pradesh since 1989. PANI is currently working in 19 districts of eastern UP.

PANI, along with HUF, is working on implementing an agro-based project named FASAL-2 to support livelihood and economic growth of marginalized farming community in seven districts. One of the major components of this project is to incorporate water conservation in agriculture through water-efficient technologies and practices amongst farmers. The project, with the help of eight CSOs partners, is reaching out 26,577 marginal farmers from the 103 Gram Panchayats of seven districts in eastern Uttar Pradesh.

The focused activities of this livelihood project are:

- **Social development:** Formation and strengthening of farmers collectives and their federations at the gram panchayat level and Farmers' Resource Centres; capacity building of Community Resource Persons in management and leadership; formation of Water Users Groups
- **Crop improvement:** Training and demonstration lessons for the cultivation of cereals, pulses, sugarcane, mentha, and vegetables.
- **Soil health improvement:** Composting and water friendly POPs of sugarcane, mentha & vegetables.
- **Demonstration:** Promotion of pusa hydrogel, drip irrigation, and water efficient agriculture practices like mulching etc.
- **Convergence:** Facilitate convergence of MNREGA specifically for supportive activities.

Targeted outcomes of the project are:

i. **73.51 MCM** water saved, leading in turn to diesel savings worth **Rs. 85 million** in lifting water from the ground.

ii. **26577 families influenced,** contributing indirectly towards sustained use of water.

iii. **15000 acre** area brought under water-efficient techniques.

iv. **28500 tons** of additional production supported

v. Soil and water resources conserved by promoting resource-efficient technologies.

vi. Marginal farmers benefitted from access to various government schemes.

vii. Increased farm incomes of **26577 marginal farmers by 25 to 30 percent** by 2019.

Case Study 4:

Aga Khan Rural Support Program (AKRTP): Water for Public Good - Influencing Practice and Policy

Partners - AKRSP, HUF

This is a joint project undertaken by AKRSP and HUF in 2013 in the Dangs district, which is the southernmost district of Gujarat. Approximately, 60 percent of the district is forest area and 36 percent cultivated land. Most of the villages are situated in forest areas with virtually no urbanization to speak of. The farmers are mostly small and marginal, and the average landholding per household is 1.58 hectares. The average land holding per cultivator is even smaller at 1.07 hectares. Three-fourths of the population lives below the poverty line and 98 percent of the community belong to scheduled tribes.

Dangs experiences high rainfall, receiving 3000mm per year over 100 days. Because of steep incline, soil erosion is a huge challenge, which is gradually degrading the soil fertility. Therefore, the use of these lands for agriculture without sufficient soil protection and management can be really difficult, especially given the continuing deforestation. Also, the district falls under high category of climate vulnerability index.

To target these challenges, this project works towards improving the quality of life of rural and tribal families and conserve the environment through holistic approach. The major interventions are to:

i. Improve the water availability through runoff water harvesting measures

ii. Conserve fertile soil through soil and moisture conservation

iii. Improve production

iv. Mobilise the community and generate awareness on soil and moisture conservation

v. Influence policy

As reported, *Gram Vikas Mandals* were formed and regular meetings were conducted under the project in 20 villages. During the reporting period, close to 400 people received training and learned from exposure visits. Several capacity-building programs like watershed development training and hamlet training were organised. On-ground activities such as farm bunding and nala plugging were taken up in 12 villages. As a result of these and other water resources development activities like '*Boribandhs*', check dam repairing, farm ponds among others, water harvesting potential of 0.44 billion litres has been built.

The program aims to harvest 15.6 billion litres of water in the course of five years. Social return on investment and other reporting systems are implemented to reinforce the results claimed by the agency through various interventions.

Case Study 5:

Watershed Organisation Trust (WOTR)[15] - Securing Water and Livelihoods Through Community - Led Watershed Development in Drought- Prone Region of India

Partners - Government of Maharashtra, HUF, WOTR, local administration and local communities

This project is being implemented in three blocks of Jalna, a district situated in central Maharashtra, and in the northern part of Marathwada region. During 2012-13, the Maharashtra government declared Jalna as a severely drought-affected district with more than 970 villages impacted.

This project seeks to operationalise a Public-Private-Civil Society Partnership (PPCP) to leverage complementary strengths of these key sectors: investment funds from the government; operational funds and technical support from the private sector; mobilisation, technological and networking skills of NGOs; and ownership, implementation, and governance resources of the local communities.

With the recently announced government policies underlying the need for such partnerships to drive India's growth, this multi-cornered collaboration of the Maharashtra government, HUF, WOTR, the local administration and local communities is timely. It will help develop and validate a model and pedagogy that can facilitate the widening and deepening of such synergistic developmental alliances across the country.

The project aims to increase water and biomass availability to primarily alleviate poverty and empower village communities in 75 villages of Jalna district. The project targets to:

i. **Harvest a cumulative volume of 178 billion litres** of runoff water over the project period (2013-18), and control soil erosion over 25,000 hectares of agriculture land through soil and water conservation measures.

ii. **Stabilize and enhance the productive capacity of the local ecosystem,** the agricultural and livelihood base of the project villages.

iii. **Mainstream women and marginal groups** in villages, improve the quality of their lives and strengthen the capacities of village institutions to effectively manage the project as well as access locally available resources.

iv. Improve the livelihood status of 5 percent of people from very poor categories by providing **improved land (treated land), livelihood opportunity, and access to water.**

v. **Promote Climate resilient agriculture** by providing weather-related information for the benefit of farmers who make decisions for 30 percent of the net cultivated area.

vi. **Enhanced social equity** as evidenced by the upward movement of the lowest income section of local communities.

15 http://www.wri.org/blog/2013/01/climate-change-adaptation-rural-india-green-infrastructure-approach

Way forward

Water is a neglected resource in India despite being the most important aspect of life. The widening gap between the demand and supply of water in India makes it imperative to study and develop solutions if current challenges related to agri-water and WASH are to be effectively tackled. Key recommendations to address these challenges and achieve the SDGs are:

i. **Enhance water use efficiency in all sectors:** The government of India has suggested achieving a 20 percent increase in water use efficiency. However, the target is ambiguous as the data for current water use across sectors is limited. Nonetheless, there exists a huge potential to enhance water use efficiency because of the low base in nearly all the sectors. Targeting improvements across the WASH and agri-water sector should be ideally addressed jointly. The 4Rs of reuse, recycle, recharge and reduce could form the base on which several implementation strategies could be developed. Micro irrigation is one such solution, but the associated costs may pose a challenge. Unlocking channels of financing and necessary tools such as subsidies and incentives can help tackle this problem. Therefore, any solution would need to be comprehensive, targeting both the technical and financial challenges.

ii. **Adopt multi-stakeholder and participatory approaches:** Fundamentally different stakeholders with common interests - public, private, community leaders, CSOs - must be brought together to develop a roadmap to achieve the SDGs. This should also include plans to assess risks for appropriate target setting. Knowledge partners should be added to the network of Public-Private-Community Partnerships (PPP) for developing customised and operative solutions.

iii. **Conduct water balance estimations:** Water balances may be defined as the net change in water, taking into consideration all the inflows to, and outflows from, a hydrological system. Spatial variations due to distributed land-use, soil texture, topography, groundwater levels, and hydro-meteorological conditions should be accounted for in the water balance estimation[16].

16 Latha et al. (2010), A Semi - Distributed Water Balance Model for Amaravathi River Basin using Remote Sensing and GIS, International Journal of Geomatics and Geosciences, Vol-1 (2),

In order to compute the natural run-off of a basin, the following must be considered: (1) surface flow measured at the terminal site; (2) net export of the surface water out of the basin; (3) net increase of the surface water storage; (4) additional evapotranspiration caused by the use or storage of surface water and groundwater; (5) direct groundwater flow from the river basin below or along the terminal site; (6) net export of groundwater out of the basin; and (7) net increase in groundwater storage and soil moisture storage[17].

iv. **Develop site-specific business models:** To make SDGs work in India it is crucial to have a working business model. Every model developed should be tested on a pilot scale and appraised according to a rating standard, so that the best among them could be identified. These models should be customized according to the area. The current centralized approach to implementation needs to make way for decentralised solutions.

v. **Encourage the concept of water footprint:** Water footprint serves as an indicator for the direct and indirect use of water by both consumers and producers. Water Footprint as defined by the Water Footprint Network comprises the following: (i) green water footprint, the consumption of rainwater stored in the soil as soil moisture; (ii) blue water footprint, the consumption of surface and groundwater; and (iii) grey water footprint, the volume of freshwater required to assimilate the load of pollutants based on existing ambient water quality standards[18]. This is a comprehensive indicator of freshwater consumption and any practice should be tested against this before application. Only those practices that lead to the reduction of the water footprint should be encouraged.

Accounting for water quality impacts in the total water footprint is often quite challenging. IFC completed a ground-breaking water footprint assessment of Jain Irrigation's dehydrated onion production, undertaking a comprehensive view to include all the three components of water footprint assessment outlined above. It showed that the grey water footprint for onions grown under drip irrigation reduced by 90 percent[14].

vi. **Extend financial help to farmers:** Access to finance remains a major challenge for small and marginal farmers in India even though the government provides several subsidy schemes. Different departments such as Agriculture, Energy, Irrigation, Rural Development will have to work together to find integrated solutions. The subsidy procedures and processes need to be streamlined to address financing constraints in agriculture. Learning should be derived from other sectors such as energy and transport to identify relevant models. Corporates should be tapped under their Corporate Social Responsibility spend to unlock market-based financing for agri-water projects.

vii. **Learn from experiences of other countries:** There is an immense scope to learn from many successful models implemented around the world. For example, Israel and Spain recycle 86 percent and 17 percent of the effluent for reuse, respectively. Several small

17 http://www.cwc.gov.in/main/downloads/WRA%20report_final_NRSC-CWC.pdf
18 IFC (2010), Water Footprint Assessments Jain Irrigation Systems Ltd. - Dehydrated Onion Products Micro-Irrigation Systems, available at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2010/09/07/000334955_20100907052558/Rendered/PDF/564590WP0Med1J10Box349496B01PUBLIC1.pdf, accessed on 15 June 2015

towns throughout Australia recycle 100 percent of their wastewater. Around 98 percent of Durban's wastewater is recycled, freeing up 40,000 cubic meters a day for consumption by citizens[19]. Netherlands has set good examples in agri-water management that Indian engineers can adapt for desired outcomes.

viii. **Adopt a circular economy pathway:** Globally, a paradigm shift is emerging from a linear to a more circular economy. The current "take-make/use-dispose" economic model is changing to more circular thinking to relieve escalating pressures on resources - water, energy, materials and food. An integrated "nexus" approach for supplying, conserving and saving water, energy and materials is necessary and possible across all sectors. Innovative technologies can in fact open new revenue streams e.g. waste to energy.

19 Veolia (2014), Water at the Heart of Circular Economy, available at http://www.veolia.com/gulfcountries/sites/g/files/dvc171/f/assets/documents/2014/10/Veolia_brochure_WWW_STOCKHOLM_2014.pdf, accessed on 15 June 2015

The rising costs and growing challenges of fresh water supply make it imperative to develop strategies and systems for recycling and reuse of water. Planners need to strategize the allocation and utilization of available water resources, including untreated, partially-treated and fully-treated wastewater, for different productive purposes. Wastewater management has to be regarded not only from an ecological viewpoint, but also from a socio-political, micro-biological and hydro-economic perspective.

ix. **Influence behavioural change:** While the benefits of using wastewater for agriculture have been globally acknowledged by experts, a series of community-level surveys conducted in different parts of the world have revealed hesitation in the use of treated wastewater in rural and urban settings. Awareness must be built to address this challenge and bring in a behaviour change.

x. **Support current initiatives:** The sustainable use of water has direct linkages to the SDGs and initiatives to make the SDGs more focused and concrete need to be promoted. HUF's initiative 'Lifebuoy hand washing program', which promotes behaviour change for hygiene, is a good example of this and must be promoted in rural areas. Likewise, support for UNDP's initiatives of Clean Ganga and Clean India Mission, aligned with several government programs, must be supported.

Chapter II

II. Rejuvenating the Ganga: The Role of Farmers and Supply Chains

Ganga Basin Ecosystem

River Ganga, the most important and sacred river basin in India, is home to over 450 million people, with more than 60 percent dependent on agriculture for their livelihoods[20],[21]. The river basin:

- Covers more than a quarter of India's geographical area[22];
- Supports agriculture, domestic, industry sectors[23],[24]; and
- Counts as one of the poorest regions in the world[25]. High levels of rural poverty are a particular concern in the middle Gangetic Plain[26].

Population growth and increased per capita water use in the basin over the years has contributed to water scarcity and water quality degradation[27]. As a result of ever-rising pollution in the river, the total disease burden in the state of Uttar Pradesh[28] has gone up by 9 to 12 percent. The irrigated plains of the Ganges are facing problems with sustaining productivity largely due to degradation of land and surface waters[23].

Collective Action: The Need of the hour

Preserving the quality of water and managing multiple demands on it require an integrated water management strategy[29]. All sectors and stakeholders will have to work collectively to alleviate these challenges. However, the agriculture sector, which consumes about 89 percent of the total water use in India[30], needs special attention. It is of utmost importance to focus on improving water use efficiency in agriculture in the interest of water security. Its proper management would require the involvement of a number of stakeholders, principal among them being the farmers[31].

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20 IWMI. (2014),"Ganges Focal Region Development Challenge", IWMI. Retreived March 26, 2015 from, http://wle.cgiar.org/wp-content/uploads/2014/04/Ganges_FRdraft.pdf
21 WWF. (n.d.). Managing Rivers Wisely.
22 Joshi, D. M., Kumar, A., & Agrawal, N. (2009), "Assessment of the irrigation water quality of river Ganga in Haridwar district",Rasayan J Chem,2 (2), 285-292.
23 Das, P., & Tamminga, K. R. (2012),"The Ganges and the GAP: An Assessment of Efforts to Clean a Sacred River", Sustainibility, 4, 1647-1668.
24 WWF. (2012), "Assessment of Environmental Flows for the Upper Ganga Basin",WWF, Retreived March 26, 2015 from, http://awsassets.wwfindia.org/downloads/wwf_e_flows_report.pdf
25 Rahaman, M. M. (2009), "Integrated Ganges basin management: conflict and hope for regional development",Water Policy, 11, 168-190.
26 TERI. (2011), "Environmental and Social Management Framework", MoEFCC.
27 Lacy, S. (2006),"Modeling the Efficacy of the Ganga Action Plan's Restoration of the Ganga River, India"
28 Rai, B. (2013),"Pollution and Conservation of Ganga River in Modern India", International Journal of Scientific and Research Publications, 3 (4).
29 Gaur, A., & Priyanie, A. (2011),"A River Basin Perspective of Water Resources and Challenges", In India Infrastructure Report,IDFC, Retreived March 28, 2015 from, http://www.idfc.com/pdf/report/2011/Chp-1-A-River-Basin-Perspective-of-Water-Resources-and-C.pdf
30 WWF, "Problems and Prospects of Saving Water and Energy in Agriculture in Upper Ganga River Basin", Retreived March 28, 2015 from, http://assets.wwfindia.org/downloads/water_and_energy_use_efficiency_study.pdf
31 Sonali Mittra, Rudresh Sugam, Arunabha Ghosh (2014), "Collective Action for Water Security and Sustainability: Preliminary

There is strong evidence to highlight the positive aspects of collective action in the management of water systems[32].However, given the size of the Ganga basin, it is impossible to undertake any initiative across the whole basin without conducting pilot work. Therefore, an initiative to work with a **million farmers** distributed across the basin is envisioned as the needed scale for a pilot engagement. This would be large enough to generate visible impacts through a true multi-stakeholder engagement involving government, farmers, industries, private sector, and NGOs, while at the same time, serving as a model for learning and replication across the Ganga and in other river basins. *Jal Jan Jodo Campaign* started by "Waterman of India" Rajendra Singh is working along with IFC, government organisations, NGOs and other stakeholders to develop an integrated watershed management plan in a participatory manner for cleaning the Hindon River, a major tributary of River Yamuna.

Major challenges facing rejuvenation of Ganga Basin

In India, water is a state subject. Hence, its management is spread across multiple organizations that have little coordination[33]. Even though the emphasis is primarily on state policies, adjustments made by local actors are often significant and need to be thoroughly understood[34]. With diverse informal institutional arrangements and large formal institutions working together for the Ganga river management, governance is critical. There could be challenges in the implementation of any basin-wide stakeholder group.[35] Lack of investment from the private sector in the irrigation sector is another significant challenge because public finance alone cannot support the basin-wide investment requirements[36].

Encouraging successful practices across India

The participation of rural community groups in different aspects of irrigation management and development of transparent and accountable policy processes may potentially increase the efficiency of water resources management initiatives[37]. This is evident from a number of successful projects undertaken in different geographical areas across India:

Investigations", CEEW-2030 WRG Report, August 2014

32 McCarthy, N., & Essam, T. (2009),"Impact of Water User Associations on Agricultural Productivity in Chile", IFPRI. Retreived April 13, 2015 from, http://www.ifpri.org/sites/default/files/publications/ifpridp00892.pdf

33 Gaur, A., & Priyanie, A. (2011),"A River Basin Perspective of Water Resources and Challenges", In India Infrastructure Report. IDFC. Retreived March 28, 2015 from, http://www.idfc.com/pdf/report/2011/Chp-1-A-River-Basin-Perspective-of-Water-Resources-and-C.pdf

34 Molle, F. (2003),"Development Trajectories of River Basins: A Conseptual Framework", IWMI. Retreived March 28, 2015 from, https://books.google.co.in/books?hl=en&lr=&id=5uHiBAAAQBAJ&oi=fnd&pg=PR5&dq=integrated+basin+development+ganga&ots=TLR_J_bmwx&sig=L7ZNrwKrQ9QSG7rhE7h5vQ5-Ghs#v=onepage&q=integrated%20basin%20development%20ganga&f=false

35 IWMI. (2014), "Ganges Focal Region Development Challenge", IWMI. Retreived March 26, 2015 from, http://wle.cgiar.org/wp-content/uploads/2014/04/Ganges_FRdraft.pdf

36 Martin A. Burton, Rahul Sen, Simon Gordon-Walker, and Arunabha Ghosh (2011), "National Water Resources Framework Study: Roadmaps for Reforms", October, New Delhi: Council on Energy, Environment and Water and 2030 Water Resources Group, pp. 49

37 Kurian, M., & Dietz, T. (2005), "How Pro-Poor are Participatory Watershed Management Projects? An Indian Case Study", IWMI. Retreived March 26, 2015 from, https://openaccess.leidenuniv.nl/bitstream/handle/1887/15365/ASC-075287668-2363-01.pdf?sequence=2

Community-led initiatives

- In Rajasthan, **community mobilization** led to the revitalization of six rivers[38].
- Increase in groundwater storage, reduction in soil loss and increase in farmer incomes was achieved by adopting **farmer co-operation model** in Kothapally, Telangana[39].

Government-led initiatives

- In all, 620 **Water User Associations** (WUAs) for the operation and management of surface irrigation systems are being formed by the irrigation department in Rajasthan[40]. Maharashtra, with a long tradition of participatory irrigation management, has seen an appreciable growth in these associations over the last 10-15 years. The state has around 8,500 WUAs, including registered, unregistered and proposed associations[41].
- An **integrated management approach** in Andhra Pradesh, Gujarat, and Maharashtra resulted in an increase in cropped area, irrigated area and average crop yield[42].

Private Sector initiatives

- As part of its **Corporate Social Responsibilit**y initiatives, ITC has undertaken a number of integrated watershed management programs all over the country[43].
- An integrated approach led to an increase in **agricultural productivity** and improvement in **drinking water quality** in the coastal region of Junagadh in Gujarat[44].

There can be no doubt that diverse stakeholders from different backgrounds must be tapped for collective action on the improvement of agri-water use efficiency within the existing policy framework and political landscape.

With its capital and technical expertise, the private sector can play an important role in designing solutions[45] for water security. Private participation can also be leveraged for the delivery of services and to strengthen linkages in agricultural production for better livelihood opportunities for farmers[46].

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38 Pant, R. (2003), “From Communities’ Hands to MNCs’ BOOTs: A Case Study from India on Right to Water”, Rights and Humanity, Retreived March 26, 2015 from, http://www.righttowater.info/wp-content/uploads/india_cs.pdf

39 WRM. (2013),“Managing Water Use Managing Water Use: A Catalogue of Case Studies”, 2030 Water Resources Group. Retreived March 28, 2015 from, http://www.waterscarcitysolutions.org/assets/WRG-Managing-Water-Scarcity-Catalogue.pdf

40 WRM. (2009),“Vulnerability and Adaptation Experiences from Rajasthan and Andhra Pradesh”, WRM. Retreived March 28, 2015 from, http://www.saiplatform.org/uploads/Library/Climate%20Change%20-%20Case%20study%20on%20Water%20Resource%20Management.pdf

41 Belsare, Sanjay (2014), “Participatory Irrigation Management in Maharashtra - A Case Study”, Presented at National Convention of Presidents of Water User Associations organized by MoWR RD & GR. - IndiaNPIM at Delhi (7-8 Nov. 2014); available at http://wrmin.nic.in/writereaddata/PIM06.pdf, accessed on 16Jun15

42 Gandhi, V. P., & Namboodiri, N. V., “Participatory Irrigation Management in India: An Evaluation of the Performance in Andhra Pradesh, Gujarat and Maharashtra”, Ahmedabad: Indian Institute of Management.

43 ITC, “Integrated Watershed Development”, wbcsdwater.

44 CII. (2009),“Breaking the Boundaries in Water Management” - A Case Study Booklet, CII, Retreived March 28, 2015 from, http://www.cii.in/uploads/Breaking%20the%20boundaries%20in%20Water%20management-%20A%20Case%20study%20booklet.pdf

45 WRG. (2009),“Charting Our Water Future: Economic frameworks to inform decision-making”

46 Sinha, P. (2014), “ Status of Participatory Irrigation Management (PIM) In India”, National Convention of Presidents of Water User Associations organized by MoWR RD & GR. - IndiaNPIM, (pp. 6-22). Delhi.

Few Encouraging Practices in Detail

Case Study 6:

Ambuja Cement - Increase in Agricultural Productivity and Improvement in Drinking Water Quality in a Coastal Region

Partners - Ambuja Cement, Government of Gujarat, Sir Ratan Tata Trust, AKRSP, local population

Junagadh located in the coastal region of Gujarat[47] faces massive salinity due to sea-water intrusion. This had adversely affected all aspects of rural sustenance. Therefore, Ambuja Cement, in collaboration with the Gujarat government, Sir Ratan Tata Trust and AKRSP, mobilized the local population to tackle salinity ingress.

The overall project plan and its actual implementation was developed with the participation of the villagers. The traditional knowledge of local water resources, monsoon patterns, and soil quality, among other areas, was developed from local villagers and combined with the latest scientific know-how and technical inputs from trained professional personnel.

Check dams were built to tap water from seasonal rivers of the region, allowing percolation for recharge of groundwater. Existing ponds in the region were de-silted, deepened and inter-linked. Also, old mines of the company were used as reservoirs of water. These were inter-linked to maximize storage.

Outcome: The project has delivered positive results for the social, environmental and economic life of the local community. Few of the results achieved are listed below:

- Introduction of low water intensity crops has led to an overall increase in agricultural productivity ranging from one-and-a-half to three times.
- The intervention benefitted 15,500 farmers covering 23,000 hectares.
- Improvement in the quality of drinking water has led to a decline of health disorders such as kidney stones and bone-related problems.
- The project has harvested 1,067 MCFT of water.
- With improvement in water quality, the salt layer that had formed on the soil dissolved. This improved soil quality, which in turn led to better crop yields.

47 CII. (2009). "Breaking the Boundaries in Water Management" - A Case Study Booklet. CII. Retreived March 28, 2015 from, http://www.cii.in/uploads/Breaking%20the%20boundaries%20in%20Water%20management-%20A%20Case%20study%20booklet.pdf

Case Study 7:

Development support center (DSC) - from participatory irrigation management to participatory water (surface and ground), land and agriculture development

Partners - DSC, HUF

Mehsana and **Sabarkantha** districts of **Gujarat** have high fluoride and nitrate contamination in groundwater. Agriculture, which is the main occupation in this region, requires ample water as farmers cultivate cotton, wheat, and other cash crops. As the surface irrigation schemes do not provide adequate water, groundwater is a major source of irrigation for about 60 - 70 percent of the farmers. The result is water scarcity and several health-related issues.

To address this problem, the Development Support Centre undertook a project in association with HUF in 12 villages located in four blocks of Mehsana district, and another 12 villages in three blocks of Sabarkantha.

The objectives of the project are to:

- Develop a participatory plan at the village-level for sustainable management of soil moisture and water.
- Build capacity of small and marginal farmers to plan, implement, and manage the assets
- Promote sustainable agriculture through practices, technologies, and varieties that optimizes the use of water.
- Develop a model for Integrated Water Resources Management in the water-scarce region.

The program has resulted in some quantifiable benefits: land levelling of 54 ha, farm bunding and grass seeding over 172 ha, and two well recharges. The program has also led to the construction of two small and seven medium check dams, 14 check walls, two stone and three masonry outlets, and four farm ponds. Additionally, as a result of the collaboration with the Gram Panchayat and the Water Resources Department, five medium check dams and de-silting of two village ponds was completed during 2013-14.

In all, 377 farmers have benefited from implementing these activities. Eleven user groups have been formed especially for the check dam and check wall structures. With the financial support of the Royal Bank of Scotland Foundation, DSC has organized farmers and women into 32 Farmers Clubs and 11 Women Self Help Groups respectively.

As a part of the capacity building undertaken by the program, roughly 500 people benefited from training and exposure visits. These were conducted to increase awareness about how to keep administrative and financial records, and to maintain quality control during the execution of work.

Case Study 8:

Community - Led Interventions For Improvement In Groundwater Storage

Partners - Asian Development Bank, private organizations, NGOs and government organizations, local community and farmers

Kothapally in Andhra Pradesh[48] is a village spread over 465 hectares of undulating farmland. The local population depends on subsistence agriculture. The region is characterized by low rainwater use efficiency and high soil erosion, with no measures taken to check soil run-off.

The project has placed an emphasis on community-based integrated watershed management, engaging all tiers of the community. A consortium of private organizations came together for the project, including NGOs and national and state government organizations, working alongside the local community and farmers. The Asian Development Bank provided financing for the project. The use of traditional knowledge was emphasized, with a focus on conservation measures at the level of individual farmers to increase productivity.

Community-scale infrastructure was built as a part of the project. This included the execution of 11 check dams, 95 gully control structures and five sunken pits to support groundwater recharge. Wasteland that accounted for 10 percent of the total area was partially reclaimed through the planting of custard apple and other trees on field bunds to promote soil stabilization.

Key Outcomes

- The groundwater table has risen by over four metres, equivalent to nearly 1 million m^3 of water.
- A reduction in soil erosion was noted. The reduced sediment load in surface runoff positively impacted downstream water quality.
- About 100 hectares of area under cultivation was diverted from cotton to more lucrative maize and pigeon pea. This was possible because of the improved soil moisture and the availability of water for supplementary irrigation.
- Changes in the cropping pattern led to increased yields.
- The average net incomes in the project area were recorded as 21 percent higher than those in the adjacent area.
- The vegetation cover increased from 129 hectares to 200 hectares.

48 WRM. (2013). Managing Water Use Managing Water Use: A Catalogue of Case Studies. 2030 Water Resources Group. Retreived March 28, 2015 from, http://www.waterscarcitysolutions.org/assets/WRG-Managing-Water-Scarcity-Catalogue.pdf

Case Study 9:

Dhan Foundation[49] - Tank Cascade Development For Livelihood Security In Gundar Basin

Partners - DHAN Foundation, HUF, National Bank for Agriculture and Rural development

The HUF-DHAN partnership project envisaged the holistic development of 250 minor irrigation tanks in the Gundar basin of south Tamil Nadu. For this, an integrated approach was followed taking into account water availability and the storage requirement for multiple water demands.

This project was designed as a **"Public Private Partnership Project"** in collaboration with the National Bank for Agriculture and Rural Development. The project objectives included building social capital, developing leadership, and working with the government and other associated agencies to compliment the efforts of HUF by aligning various schemes and projects.

The project adopted a comprehensive approach of participatory planning, strengthened the hydrological boundary, empowered farmers and women through exposure visits and training, and facilitated implementation through qualified professional team members.

The integrated tank works helped to create potential water availability for 21.3 Million Cumecs, sufficient to support 3,805 ha of cultivation in the command area. In all, 7041 man days of the employment were generated due to tank works during the year.

Since the initiation of the project, 6,793 ha of tank command area have been created from the completed 225 tanks. The cumulative number of groups in the project area is 133, with a total membership of 2,115 members.

49 https://www.huf.co.in/DHAN.aspx

Case Study 10:

ITC - Integrated Watershed Management Programme[50]

Partners - ITC, NGOs, farmers

Farmers constitute the largest proportion of ITC's agri-supply chains and are therefore one of the key stakeholder groups for the company. ITC's Integrated Watershed Development Programme aims to achieve three critical objectives:

- Water conservation and soil enrichment
- Community-based management of water and other natural resources
- Optimization of benefits of water resources created by the watershed development projects

Employing a bottom-up participatory approach, ITC works in partnership with NGOs to mobilize target communities to form Water User Groups. These groups form the key decision-makers at every stage of the project. Knowledge and technology transfer is also a critical component in the entire process. Traditional methods in conjunction with modern techniques are adapted to local needs and resources so that they can be replicated and scaled up easily.

Outcomes:

- The program covers 126,208 hectares over seven states benefitting over 117,188 households.
- In all, 4,385 water-harvesting structures have been built, creating a potential of 20.8 million kilo liters.
- Due to the increase in agricultural activity and construction work on water-harvesting structures, more than 3.7 million person-days of employment have been generated.
- Increased availability of water for longer periods have enabled crop diversification towards more commercial varieties, and expansion of area under double/multiple-cropping regimes, which was not possible earlier.
- A 10 to 20 percent rise in productivity was noted across all ITC projects.
- Regeneration of water resources as a result of watershed activities has greatly improved the availability of drinking water by improving groundwater recharge and raising the water table.

50 ITC Limited: Integrated Watershed Development Programme-transforming lives and landscapes. Retreived March 28, 2015 from,http://www.wbcsd.org/Pages/Adm/Download.aspx?ID=8757&ObjectTypeId=7

Way Forward

River Ganga forms a lifeline for almost 450 million people. Over the years, population growth and increased per capita water use in the Ganga basin have led to water scarcity and degradation in water quality. Critical steps for rejuvenating the river basin include:

- **Understanding the administrative set-up:** The management of water in India is spread across multiple organizations, requiring varying degrees of coordination. For example, at the central level, the Ministry of Water Resources, River Development and Ganga Rejuvenation has set up the National Ganga River Basin Authority for driving the National Mission for Clean Ganga. At the state level, state management agencies drive the mission in various riparian states. Additionally, there are ministries and institutions at the state level such as the Ministries of Water Resources, Irrigation, Urban Development, Health, and Environment, among others, under which different departments function. For the successful implementation of any intervention, it is critical to understand this institutional structure. In a scenario with multiple institutional arrangements for the management of the Ganga river basin, ensuring streamlined governance and alignment of interests is critical.

- **Learning from existing experiences:** Successful projects implemented across the world provide valuable learning in water use efficiency. Singapore is known for its holistic water management system - integrating the management of both water and wastewater. The country's water supply comprises of local catchment water, imported water, and highly-purified reclaimed water known as NEWater. NEWater meets 30 percent of the nation's water demand. In Australia, a study was undertaken by Commonwealth Scientific and Industrial Research Organization (CSIRO) and several other institutes to analyse the long-term ecological sustainability of the Murray-Darling river basin.

- **Understanding water use efficiency at the basin level:** The overall efficiency of irrigation systems in the Ganges basin is about 80 percent as compared to almost 100 percent in the Murray-Darling Basin. It is therefore important to understand the differences in water flow between the monsoon period of the year and the dry season. This will help to formulate strategies when environmentally it is possible to have more water back into the system and to use it productively. Additionally, it is important to assess the impact on the quality of the extracted water which may not be useful if polluted.

- **Establishing a common platform for stakeholders:** The Ganga basin has numerous stakeholders with different perceptions and interests. As a result, many interventions have a narrow focus on a particular group of stakeholders, making it difficult to bring about significant changes at the basin level. There is a need to bring all stakeholders on a common platform so that issues are addressed with a long-term vision.

- **Implementing PPP models:** The funding required to transform the entire Ganga basin is sizeable and beyond the capacity of government agencies alone. PPPs are required to address issues that constrain areas such as water supply, irrigation, water use efficiency, and integrated water management, among others. It is also important to understand the reasons for the success of collaborative projects like the Nagpur Water Supply PPP. Not only must an integrated approach be followed in such PPPs, it is also essential to focus on the public contribution and interest.

- **Involving the Community:** It is critical to undertake capacity building activities for the communities located in the basin. These activities should focus on instilling a sense of responsibility among the communities. There should also be a focus on linking local stakeholders with relevant government officials.

- **Understanding groundwater:** It has to be recognized that the water basin consists of both surface and groundwater. Thus, the use of both surface and groundwater to meet increasing demands should be prioritized.

- **Deploying water-efficient technologies:** The water holding capacity of soil can be enhanced by implementing a number of cost-effective practices and technologies. Furrow irrigation, land-levelling practices and trash mulching are some of the suggested interventions.

Chapter III

III. Blended Public and Private Finance for Agri-Water

Introduction

Globally, a large volume of private sector investment has flowed to infrastructure sectors like roads, telecommunication, power and others, but we have yet to see the same level of private financing in the agri-water or irrigation sector. Public funding is essential to boost irrigation as it has a direct bearing on food security and water security, crucial for the country's socio-economic growth.

The World Panel on Financing Water Infrastructure - also called the Camdessus Panel that was active from year 2001-2003 recognised that public funding in the water sector needed to be augmented by private capital. This could take the form of public-private partnerships, making water a more attractive investment opportunity. PPPs require good regulation and legal systems, transparent contracting procedures, reliable cost recovery, and public acceptance[51].

Blended finance, which involves combining grants with loans, equity or other risk-sharing mechanisms from public and private financiers, could be one of the vehicles to mobilize greater private participation in the agri-water sector. Public sector contributions to blended finance could be structured as debt and other risk-free instruments to mobilize private funding in the sector. These could also be packaged as incentives, smart subsidies for example, to unlock market-based mechanisms.

Financing in irrigation projects is required for procuring on-farm technologies and funding infrastructure such as water tanks, laser levelling, micro irrigation systems, and decentralised solutions like solar pumps and farm tanks. The Indian irrigation sector requires an estimated $ 50-100 billion of investment, which would translate into a minimum of $10 billion a year over more than five years.

Learning from the energy sector - examples of successful blended financing

There is a lot to learn from the way the energy sector has transformed through the use of blended finance. Following are a few examples wherein blended financing has aided the implementation of energy projects:

- **Partial Risk Sharing Facility for energy efficiency projects in India:** The World Bank and the Government of India signed a $43 million grant and guarantee agreement on March 31, 2015 towards a partial risk-sharing facility for energy efficiency projects. This will help enterprises and Energy Service Companies, or ESCOs, mobilize commercial finance for investments in EE initiatives[52]. The $43-million project consists of a partial

51 Winpenny, James (2003), "Report of the World Panel on Financing Water Infrastructure: Financing Water For All"
52 World Bank (2015), available at: http://www.worldbank.org/en/news/press-release/2015/03/31/partial-risk-sharing-facility-energy-efficiency-singing, accessed on 8 April 2015

risk-sharing facility of $37 million managed by the Small Industries Development Bank of India, and an advisory support and capacity building component of $6 million. This Facility would provide partial credit guarantee for default risk that commercial financial institutions face in extending loans to eligible energy efficiency projects.

- **Viability Gap Funding (VGF)**: VGF is a form of front-loaded subsidy provided by the central government to support solar power projects through PPPs under the National Solar Mission. VGF bids are limited to 30 percent of the total project costs or a maximum of INR 2.5 crores, and are distributed in the following manner: 50 percent upon successful commissioning of the project, and then 10 percent a year for five years following the date of commissioning[53].

- **Feed-in Tariffs (FiTs)/ preferential tariffs for renewable energy projects**: FiTs[54] awarded by federal or state governments under long-term power purchase agreements have aided widespread uptake of grid-connected solar and wind power projects in countries like Germany, China, and India. FiTs ensure a steady revenue stream for power projects and increase their bankability. Approximately 67 percent of the levelized cost of energy for solar power in India is supported by FiTs[55].

- **Clean energy financing in Thailand:** Thailand's Energy Efficiency Revolving Fund exemplifies how governments can leverage additional financing by channelling funds through local financing institutions. The government provides funds to collaborating local financial institutions at an interest rate of 0.5 percent, which then "on-lends" these funds for sustainable energy projects at an interest rate not exceeding 4 percent. Technical support from the Department of Alternative Energy Development and Efficiency provides banks the confidence needed to evaluate sustainable energy projects, even without technical or engineering staff of their own. The effort has led to loans worth $ 286 million. Almost half of this came from financial institutions by blending government funds with their own funding sources[56].

Innovative approaches

The Gold Standard's Water Benefit Standard is based on results-based financing mechanisms that claims to be the first global standard to define and certify best practices for positive impacts of investment in water projects. It aims to incentivize long-term

53 CEEW-NRDC (2014) *Reenergising India's Solar Market through Financing*, available at http://ceew.in/pdf/ceew-nrdc-india-solar-finance-report-25aug14.pdf, accessed on 20 April 2015

54 Feed-in tariff represent unit cost of electricity fed to the grid

55 CEEW-NRDC (2014), "*Reenergising India's Solar Market through Financing"*, available at http://ceew.in/pdf/ceew-nrdc-india-solar-finance-report-25aug14.pdf, accessed on 20 April 2015

56 IRENA (2012), "*Financial Mechanisms and Investment Frameworks for Renewables in Developing Countries", available at:* http://irena.org/Finance_RE_Developing_Countries.pdf, accessed on 8 April 2015

financing of water projects by quantifying the project's water benefits and their sale in the form of Water Benefit Certificates (WBCs)[57]. These certificates represent the volume of clean freshwater that has been supplied, purified or saved by the project activity during a specific period of time, meeting the sustainability criteria required by the WBC Standard. WBCs guarantee a rigorous initial certification and annual independent verification of projects. The idea is to enable stakeholders such as corporates, NGOs and government players to finance projects of their choice by buying WBCs. The benefits are outlined in Table 1.

The four basic project types under the Water Benefit Certificate mechanism include (i) water efficiency; (ii) water supply; (iii) water treatment; and (iv) water productivity. Few pilot projects implemented under the WBC mechanism include: (i) the Sustainable Sugarcane Initiative in India, which educates farmers about water-efficient, high-yielding sugarcane planting techniques; (ii) a safe drinking water initiative by WaterHealth India, which builds "WaterHealth Centres" to treat poor quality water; and (iii) Water access, sanitation and hygiene project in Uganda[58].

Although there are already some established water initiatives, such as the CEO Water Mandate and the Alliance for Water Stewardship, the **uniqueness of WBCs** lies in its endeavour to trigger financing for new projects, rather than certify and verify the impacts of existing water management projects of corporates.

Table 1: Benefits of WBCs for buyers and project developers

Advantages for WBC buyers	Advantages for WBC project developers
• **Credibility:** Annual third-party verification according to the Water Benefit Standard • **Transparency:** Project information available publicly • **Tangibility:** Tangible returns in the form of WBCs • **Accessibility:** Even small buyers get to participate in water projects • **Certainty:** A result-based program increases certainty among investors that funding achieves results.	• **Long-term financing:** Projects receive recurring payments over a long period of time as opposed to one-off donations • **Local ownership and capacity building** • **Operational incentives:** Annual ex-post verification and issuance of WBCs incentivises sustainable project operations • **Risk reduction:** Multiple WBC buyers per project reduce risks • **Regular revenue stream:** WBCs are issued and sold on a yearly basis providing a regular revenue stream
Source: CEEW compilation[59]	

57 Gold Standard, "*Water Benefit Certificates", available at:*http://www.goldstandard.org/water-benefit-certificates-%E2%80%93-a-new-approach-to-tackle-global-water-problems, accessed on 7 April 2015
58 http://www.carbonneutral.com/our-services/water-benefit-certificates
59 Water Benefit Partners, available at: http://www.waterbenefitpartners.org/wp-content/uploads/2014/05/WBCs_intro.pdf, accessed on 8 April 2015

The Water Benefit Certificate mechanism draws several lessons from the carbon markets (see Table 2).

Table 2: Learning from carbon markets

Points of convergence:

- **Monitoring:** Regular monitoring and reporting of project outcomes, in line with voluntary carbon markets.
- **Third-party verification:** Verification by an independent third-party auditor creates a marketplace for companies and individuals. This also makes for credible and transparent water stewardship engagements beyond public regulation, similar to the voluntary carbon market. WBCs ensure the long-term sustainability of projects through additional cash flows based upon annually verified results.
- **Project "additionality":** Similar to the Clean Development Mechanism, each water project must demonstrate a need for additional finance to be eligible under the WBCs.

Points of divergence

- One key point of distinction from the carbon market is that the pricing of WBCs is decided on a project-by-project basis, based on the amount of finance needed to stimulate investment in similar projects in the country.

Source: CEEW compilation

Challenges and risks associated with attracting finance for agri-water projects

The constraints faced for attracting finance for irrigation projects, and micro irrigation, in particular, in the country include:

- **Inadequacies in the existing system of distribution of micro irrigation systems:** Lack of speedy and transparent mechanisms of distributing micro irrigation systems was cited as an impediment to scale.
- **Absence of a proper pricing mechanism diminishes project viability:** When comparing blended financing instruments available to the energy sector, the value proposition of risk-sharing financing instruments is not as strong in case of water due to the lack of a proper pricing mechanism. One of the key drawbacks of the lack of proper pricing is that water is treated as a free resource, and thus misused.
- **Lack of ability to pay upfront:** Even with 20 to 30 percent of back-ended government subsidy and a viable business case, the upfront cost of buying micro irrigation systems is formidable for farmers.
- **Limited alignment between various schemes:** With the current agriculture credit target of INR 820,000 crore or roughly $136 billion, there is ample money in the system but the challenge lies in multiplicity of frameworks. Therefore, there is a need to dovetail various schemes and mechanisms.
- **Challenges in implementing the WBC mechanism:** As in the case of the Renewable Energy Certificate mechanism in India, creating demand and ensuring commensurate supply of Water Benefit Certificates could be one of the biggest challenges.

Learning from successful practices implemented in India

Case Study 11:

Public-Private Partnership For Integrated Agriculture Development (PPP-IAD) In Maharashtra

Partners - Government of Maharashtra, IFC and others

The state of Maharashtra has undertaken pioneering work in implementing projects under the scheme of **Public-Private Partnership for Integrated Agriculture Development** (PPP-IAD). The PPP-IAD leverages a national government scheme called **Rashtriya Krishi Vikas Yojana,** aimed at using the technical and managerial capabilities of the private sector. In combination with public funding, the scheme aims to achieve value chain integration and unlock additional private investment in agriculture[60].

The Maharashtra government was the first Indian state in 2012 to initiate the roll-out of projects under PPP-IAD with a focus on developing **integrated value chains** for crops through public-private collaboration and co-investment.

The PPP-IAD mechanism has been a success in Maharashtra thus far. By the close of 2014-15, around 60 corporates had benefitted 488,285 farmers, working on almost 350,000 hectares. The program is on target to meet its goal of reaching one million farmers[61]. In addition to the positive impact achieved in agricultural value chain activities, increased yields and farmer incomes, the Maharashtra PPP-IAD program has also been appreciated as a best practice model of public-private collaboration for other Indian states to replicate.

60 Government of India, Ministry of Agriculture, " Framework for supporting public private partnership for integrated agricultural development (PPPIAD) under Rashtriya Krishi Vikas Yojana (RKVY), available at http://sfacindia.com/PDFs/PPPIAD_Guidelines.pdf, accessed on 21 May 2015

61 FICCI, "Evaluation of the PPPIAD Project on Cotton", available at http://www.ficci.com/spdocument/20502/Evaluation-of-the-PPPIAD-Project-on-Cotton.pdf, accessed on 21 May 2015

Case Study 12:

Sustainable Sugarcane Initiative - Leveraging WBCs

Partners - Agricultural Services Private Limited (AgSri), smallholder farmers

Agricultural Services Private Limited (AgSri) was one of the first project developers to issue WBCs under the Water Benefit Standard for their innovative **Sustainable Sugarcane Initiative** techniques. Under SSI, AgSri is working with smallholder farmers across the sugarcane-growing regions of India to improve sugarcane planting techniques to enhance crop yields and minimise water requirement.

SSI encourages farmers to shift from planting a significant portion of seed cane taken from their previous harvest to planting one-month old seedlings directly into the field. The germination stage usually consumes a large amount of water, but raising seedlings in nurseries and transplanting after one month can lead to water saving of close to 90 percent.

In addition, planting seedlings in a regular, widely spaced pattern could increase the yield per hectare while allowing farmers to use drip irrigation technology, which was difficult in the past. Through revenue from selling WBCs, AgSri expects to widen its reach from 1,500 farmers (as of 2014) to 20,000 in five years[62].

62 First Climate, the Gold Standard, Water Benefit Partners, "Water benefit certificate project: Implementation of sustainable sugarcane initiative (SSI) practices among smallholders in rural India", available at http://www.agsri.com/images/WBP_FS_AgSri_06_2014.pdf, accessed on 18 May 2015

Case Study 13:

Sustainable Agro-Commercial Finance Ltd. (SAFL) - First Private NBFC to Foray Into Agri-Loans

Partners - Jain Irrigation, IFC, Mandala Capital

SAFL is the first NBFC with a focus on retail agriculture. Promoted by Jain Irrigation, it has International Finance Corporation and private equity Mandala Capital as its key shareholders. It completed two years of operation on March 31, 2015.

Recognising that more than 50 percent of farmers in India are small and marginal, SAFL is focussed on providing term loans to these farmers. It has disbursed $30 million for **financing small and marginal farmers** in the last two years. Mr. Arvind Sonmale, Managing Director and CEO, SAFL, pointed out that only 2 percent of India's agricultural land is presently under drip irrigation, which shows the immense untapped potential of the technology.

He also highlighted that banks find it difficult to identify creditworthy farmers to whom loans can be provided for buying drip irrigation equipment. SAFL's own record of financing confirms the huge unmet demand. About 70 percent of the company's loans have been directed towards drip irrigation while the balance 30 percent has been allocated to polyhouses, dairies and other activities that increase farm productivity.

Way Forward

- **How can we unlock more private funding sources?**

i. **Tapping into capital markets:** For unlocking private financing, tapping into capital markets might be one of the most feasible recourses, given the limited potential and reach of CSR in bridging the enormous financing need. The challenge, however, is to create a blended structure such that capital markets and financial institutions can be effectively leveraged.

ii. **Tapping into Non-Banking Financial Companies (NBFCs):** NBFCs, such as the Sustainable Agro-commercial Finance Ltd, which is the first private sector NBFC focused on retail agriculture, should be leveraged to the extent possible.

iii. **Leveraging Water Benefit Certificates (WBCs):** Revenue generated from the sale of WBCs can play an important role in helping small and marginal farmers meet the upfront and recurring cost associated with irrigation equipment. However, WBCs are more focused on projects related to water treatment and supply, and therefore other options should be explored as well.

iv. **Raising financing though national or state schemes such as the PPP-IAD:** There is a need to replicate the Maharashtra government's successful implementation of the PPP-IAD scheme through co-investment with private sector players.

v. **Using the National Adaptation Fund being implemented by the National Bank for Agriculture and Rural Development (NABARD) worth Rs 150 crore:** The Adaptation Fund was established to finance concrete climate change adaptation projects and programs categorized as agriculture, horticulture, allied sectors, and rural livelihood, and could be tapped into for the growth of the agri-water sector in India.

- **Which entities are the key drivers for promoting water-efficient practices?**

i. **Corporates**: Corporates could lead the agenda for promoting water-efficient practices as they are well-positioned to influence the supply chain. By endorsing micro irrigation practices, corporates which are also buyers of the produce, could facilitate greater buy-in from farmers.

ii. **Development Finance Institutions (DFIs):** Technical as well as financial assistance from institutions such as World Bank and GIZ is required.

iii. **Others:** In addition to corporates and DFIs, bankers, government agencies, grassroots organisations or individuals, and micro irrigation agencies operating within a government framework have also been identified as important agents for driving water efficiency.

- **What are the best approaches to attract private investment?**

i. **Participatory approaches for multi-stakeholder decision-making:** The importance of developing a framework in collaboration with various key entities through a participatory process is essential.

ii. **Policy impetus:** The broader policy framework under which farmers operate could be crucial to drive uptake. This was illustrated with the case of Gujarat where farmers responded to drip irrigation when government made electricity available for eight hours.

iii. **Public recognition of investment:** Recognition of corporate investment into the sector by the policy and regulatory framework would boost private sector participation.

iv. **Introduce reforms in the PPP design:** PPPs should be regarded as strategic partnerships for long-term planning instead of quick-fixes to get financial contributions from the private sector. Equally, the private sector cannot view PPPs as a short cut at the expense of long-term investment planning and implementation for water supply as well as sanitation. Implementation of PPPs often suffers from inordinate delays with no incentives for proper and timely implementation of projects. Thus, a PPP should fix measurable timeframes and include contracting on the basis of performance in order to increase accountability.

v. **Availability of reliable data:** The current practice of forming PPPs is not likely to be successful, unless there is a robust database of the quality and quantity of water resources available, status of assets, metering coverage, and cost recovery records against investment incurred, and unless various risk assessments and feasibility studies have been carried out. PPPs should proceed with systematic data-building and sector studies, and the local community and stakeholders should play a crucial role in designing the PPP contract.

Chapter IV

IV. Practice-based Vocabulary in Agri-Water: Standardized Results Measurement

Introduction

Data plays an important role in the management of resources. Data can be interpreted into matrices, tools, and indices with distinct applications. Conspicuously, the measurement and collection of reliable data, and its evaluation in the agricultural sector allows for improvement in water use efficiency, appropriate investments, fair pricing, risk management, equitable access, advance warning of variability, and a prudent approach to environmental flows**.**

The Sustainable Development Goals promise to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" in Goal 2, and to "Ensure availability and sustainable management of water and sanitation for all" in Goal 6[63]. These SDGs, while highlighting the issue of water sustainability in agriculture, recommend that nations take initiatives to adopt and potentially increase the measurement of agri-water efficiency to enhance agriculture outcomes[64]. In 2013, agriculture accounted for 90 percent of the total water consumed[65].

However, the data on water resources withdrawal and its consumption by the agriculture sector in India is inadequate. Data on groundwater withdrawal, 60 percent of which gets used in irrigation, is even worse. Therefore, for proper planning and equitable water resources allocation, it is essential to develop a robust database for water withdrawal and its use in agriculture.

Agri-water data interpretation at different scales

At different scales, data interpretation would serve different purposes.

At the **national scale**, it would help in identifying the areas of potential concern, for example, agricultural lands at the risk of desertification. It can also delineate changing global trends, which may have policy implications, such as increasing water scarcity. Data analysis at the **landscape scale** would help in determining the impact of farming activities on the environment and economy, thus helping in designing local resource-based interventions for sustainable outcomes.

At the **field level**, data interpretation could be used for validation[66]. Thus, it is necessary that an information system is developed around agri-water, starting from the farmers. It is also important to develop a common vocabulary and standardized terminologies, easily understood by stakeholders at various levels.

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63 UN (2014), Open Working Group proposal for Sustainable Development Goals. United Nations; available at https://sustainabledevelopment.un.org/content/documents/1579SDGs%20Proposal.pdf; accessed 7 April 2015.

64 Scarlett, S. B. (2013), "Agricultural Conservation & Environmental Programs: The Challenge of Measuring Performance" The University of Montana, available at http://www.foodandagpolicy.org/sites/default/files/AGree%20Ag%20Conserv%20and%20Environ-Apr%202013.pdf; accessed 27 March 2015.

65 WB (2014), "Annual freshwater withdrawals, agriculture (% of total freshwater withdrawal)", available at: http://data.worldbank.org/indicator/ER.H2O.FWAG.ZS/countries; accessed 8 April 2015.

66 Jonathan R. B. Fisher, T. M. (2013), "How Do We Know an Agricultural System is Sustainable?" The Nature Conservancy (Central Science department) & The Nature Conservancy (External Affairs department); available at http://www.nature.org/science-in-action/science-features/ag-sustainability-metrics.pdf; accessed 30 March 2015

In essence, commonality in water indices and their understanding can support the aggregation/ disaggregation of data and information for different scales. It will also simplify the assessment of challenges and impacts according to common, accepted, tested and scientific methodologies, particularly when linked directly to on-going practices on the ground.

Principles and tools for achieving agri-water sustainability

Five broad principles which govern the sustainable management of agri-water are: (1) Sustainable Farming, (2) Economic Sustainability, (3) Social Sustainability, (4) Environmental Sustainability, and (5) Focus on specific crops[67].

Some common techniques for agri-water sustainability include (1) the adoption of drip irrigation, (2) replacing earthen irrigation channels with concrete linings, (3) upgrading flood irrigation systems through measures such as the levelling of fields or scheduling of irrigation according to plant needs, and (4) using rainwater for irrigation[68]. The use of new crop varieties that are stress-tolerant is also becoming popular[69]. Measures like choosing less-polluting chemicals, checking erosion, and protecting vulnerable areas such as springs and riverbanks from agricultural runoff can help mitigate the potential externalities of agricultural cultivation considerably. Integrated Pest Management is another method to prevent the impacts of pesticides on water quality and biodiversity[70].

Measurement of the outcomes of agriculture practices

In order to assess the outcomes of these practices, there is a need for **structured paradigms and matrices**[71]. Sustainability metrics for agriculture rely on data at multiple scales, which can be gauged through remote sensing to a large extent. This could be complemented with GIS modelling. Any set of measures needs to be scientifically robust, reasonably low-cost to implement, and reproducible over time and space[72].

Encouraging practices in India

It is not enough to merely provide technology to the farmers to tackle issues related to agri-water. It is also important to increase awareness and build capacity of farming communities for data collection. The private sector can contribute substantially by way of financial support for acquiring instruments, developing a robust monitoring network, providing expertise for

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67 SAI Platform Water Working Group (2010), "Principles & Practices for Sustainable Water Management in Agriculture"; available at: http://www.saiplatform.org/uploads/Library/Principles%20and%20Practices%20for%20%20Sustainable%20Water%20Management%20_At%20a%20farm%20level-final-2.pdf; accessed 8 April 2015.

68 OECD (2010), "Sustainable Management of water resources in agriculture" Organisation for Economic Co-operation and Development, London; available at http://www.oecd.org/tad/sustainable-agriculture/49040929.pdf, accessed 27 March 2015.

69 CropLife International (2004), "Water Matters for Sustainable Agriculture: A Collection of Case Studies" CropLife International, Monhein am Rhein, Germany; available athttps://croplife.org/wp-content/uploads/2014/05/Water-Matters-for-Sustainable-Agriculture.pdf, accessed 8 April 2015.

70 Unilever (2009), "Unilever & Sustainable Agriculture, Water"; available at http://www.unilever.com/images/sd_Unilever_and_Sustainable_Agriculture%20-%20Water_tcm13-179363.pdf; accessed 5 April 2015.

71 CLM & SAI Platform (2014)," Sustainability Performance Assessment Version 2.0 - Towards Consistent Measurement of Sustainability at Farm Level" Centre for Agriculture and Environment, Netherlands and Sustainable Agriculture Initiative, Belgium; available at, accessed 27 March 2015.

72 Scarlett, S. B. (2013), "Agricultural Conservation & Environmental Programs: The Challenge of Measuring Performance", The University of Montana; Available athttp://www.foodandagpolicy.org/sites/default/files/AGree%20Ag%20Conserv%20and%20Environ-Apr%202013.pdf; Accessed 5 April 2015.

collecting and analysing datasets, and, most importantly, training farmers to use the devices on the field. Few such good practices have been highlighted below.

The Columbia Water Center is collaborating with the Punjab Agricultural University to promote the application of the tensiometer, an instrument used for measuring soil moisture, as a cheap alternative to address the challenge of water crisis in Punjab. At the farm level, the device allows farmers to irrigate fields only when needed, thus saving water and promoting better crop health[73].

The Hindustan Unilever Foundation's 'Water for Public Good' program is being implemented in more than 90 districts across 13 states. While 'collective action' forms the fulcrum of its approach, the interventions are based on the principles of (i) water governance; (ii) quantity of water; and (iii) benefits to communities (direct and indirect; tangible and intangible).

In addition to HUF, these projects are supported by state governments (through the Integrated Watershed Management Program (IWMP)), financial institutions (such as NABARD), companies (such as DCM Shriram, Olam), investing organisations (International Finance Corporation) and corporate entities (such as SDTT, Axis Bank Foundation), among others.

These interventions focus on both (a) augmenting the **supply** of water through watershed management, rejuvenating water-harvesting structures such as tanks, and (b) supporting interventions that help in **demand-side** management of water thereby increasing water use efficiency. Equally, these approaches focus on **qualitative** aspects, such as developing and strengthening community institutions, and **quantitative** aspects, such as the measurement of agri yields, and the establishment of agro met stations.

The Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) program is an intervention focused around collectively-managed water resources. It works on: Farmer Field Schools (FFS), Habitation Resource Information System (HRIS) and Crop-Water Information Kiosks (CWIK). They have delineated 63 Hydrologic Units (HUs) in the project area at which water data is regularly monitored and compiled with the help of 190 rain gauges, 2,109 monitoring wells, and 63 surface flow gauging stations. Artificial recharge under the program is supported by 969 recharge wells.[74] APFAMGS has established 658 Groundwater Management Committees (GMCs) at the habitation level and 63 Hydrological Unit Networks (HUNs) at the HU level, which are well-connected to government departments. This initiative has been unique in many respects, such as adopting the scientific approach of delineating HUs, facilitating the formation of associations at different levels, increasing the capability of farmers to monitor and, most importantly, understand water data, linking water availability with crop planning at the farm level, bringing all related departments on board, and strengthening the water-crop-climate nexus.[75]

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73 CWC (2012), "Water agriculture livelihood security in Punjab, India", Columbia Water Center, Punjab; available at http://water.columbia.edu/research-themes/water-food-energy-nexus/water-agriculture-livelihood-security-in-india/punjab-india/; accessed 5 April 2015.

74 Sonali Mittra, Rudresh Sugam, Arunabha Ghosh (2014) Collective Action for Water Security and Sustainability: Preliminary Investigations, CEEW-2030 WRG Report, August 2014

75 Samala Venkata Govardhan Das and Jacob Burke (2013), "Smallholders and sustainable wells - A Retrospect: Participatory Groundwater Management in Andhra Pradesh (India)", Food and Agriculture Organization, The United Nations, Rome, 2013

Initiatives to support knowledge-building in the water sector and a new vocabulary

ACWADAM - Defining a New Vocabulary for Groundwater Science

Partners - ACWADAM, HUF

Water that is available - stored and transmitted - within the 'saturated' portion of the sub-surface of the earth is called groundwater. Groundwater is the world's largest freshwater reserve and available in abundance. Though annually replenished, its occurrence is quite variable in space and time. In India, groundwater signifies the water that is obtained through wells - open (dug) wells, bore wells (drilled in rock) and tube wells (drilled in soft material such as sand, silt, clay and gravel). More and more people are also realising that springs - mainly in the mountain regions - are natural discharges of groundwater.

Aquifers

Aquifers are rocks, or material derived from rocks, that possess openings capable of storing and transmitting water. When such openings are interconnected, the 'aquifer material' allows the movement of water from one point to another. Rock material constituting aquifers is 'porous' because of the openings in the rock, or rock material. Because the openings or pores are interconnected, such rock material is also 'permeable', permitting the groundwater to move freely enough so that it flows naturally to springs or to constructed wells. Hence, aquifers can provide water to meet the various needs of people - drinking water, agriculture, industrial development - while also meeting the ecosystem needs through base flows to streams and rivers, seeping into wetlands, and supporting natural vegetation.

Aquifer Properties

An aquifer serves two functions. Firstly, it is capable of 'storing' groundwater, the amount of water it stores depending upon the 'aquifer storage capacity' or 'aquifer specific yield'. The amount of openings and their geometry (shape and size) determine the storage capacity, and consequently the quantity of groundwater stored in an aquifer. It also depends upon the depth at which an aquifer occurs, the pressure conditions in the aquifer, and other such factors that depend largely on the geological conditions in the region.

Secondly, an aquifer is capable of 'transmitting' groundwater from one point to another. This capacity will depend on the amount of water the aquifer can transmit in unit time through a unit volume of aquifer material.

Groundwater Quality

Groundwater is water that occurs in rocks and rock material. Hence, groundwater quality is represented by many factors, the first and foremost being the degree and nature of interaction between water and the rock material. Groundwater moves *through* rocks and not *on* rocks. Hence, it moves relatively slower than 'runoff' water in streams and rivers. Consequently, the time it 'stays' in contact with the rock and rock material is also longer determining the physical, chemical, and biological characteristics of groundwater. Moreover, aquifers often receive 'recharge' water that has come in contact with human activity like agriculture, human, and other biological substances present on the surface of the earth. Hence, groundwater in such aquifers may come to possess chemical constituents like ions and compounds, in addition to containing a variety of biological elements, including different pathogens.

Base Flow

The common belief is that streams and rivers recharge groundwater. However, in a country with a monsoon that brings largely unimodal rainfall, one must acknowledge the fact that many streams and rivers run perennial. This is primarily because aquifers in such regions contribute through groundwater discharge to streams and rivers, mainly through springs and seeps. Such contribution of aquifers to streams, rivers, and other surface-water ecosystems, wetlands and natural lakes, for example, is called base flow. The base flow from aquifers has great relevance to ecosystems and ecosystem services, work on which is also progressively emerging from many regions of the world.

Case Study 14:

Samuha - Water Pressure, A Centre For Water Enquiries

Partners - Samuha, HUF

The HUF-SAMUHA Partnership was initiated in June 2014 to optimize agricultural returns and enhance water conservation. The objective was to develop canal-irrigated paddy cultivation in the command areas of the Upper Krishna Project and the Tungabhadra Left Bank Canal as a national model. The project targets to save 179 billion liters of canal water in five years through an integrated package of crop management practices that includes non-pesticide management of paddy cultivation.

In the kharif season of 2014, the project achieved a water savings of 2.7 billion litres in flood-irrigated NPM paddy by introducing water conservation practices over 1,298 acres. This experience has helped to formulate a sustainable model for conservation of canal water by incentivising farmers to accelerate the adoption of NPM paddy cultivation. The incentive is provided by way of **water credits** as a hybrid financial instrument

This hypothesis is based on the following:

- Water footprint of paddy can be reduced using non-flooding irrigation
- Monetising of water savings is possible
- Savings due to cut-down of water bills will allow farmers to earn more from the same yield

The question that Water Pressure, the Centre for Water Enquiries being established under the HUF-SAMUHA Partnership, will try to answer in the coming four years is whether the additional earning can accelerate acceptance and change to a rational use of water.

Similarly, and as a reflection of the different facets of water conservation that HUF's partners represent, Water Pressure will set up an open framework of enquiry that will allow practitioners, policy makers and users to examine water in a holistic manner. For this, the Centre will:

- Identify and address research questions in the field;
- Promote media interest and attention in areas that require awareness and policy interventions;
- Support, incubate, and promote technology that converts the emotion in water into objective data;
- Promote best practices in water conservation and management in agriculture across the country;
- Link water savings to supply chains by creating a premium for agricultural produce grown with low water footprint;
- Create and foster a Community-Civil Society-Corporate-Consumer Connect through social media, encouraging volunteerism and water stewardship and partnerships.

Way forward

The suite of indicators currently being debated at the inter-governmental forum are put forth by water practitioners and do not necessary make sense to local communities.

None of the targets talk about the role of communities and water for livelihood. There is a need to differentiate between what practitioners and the indicators they use aim to do, and what the community understands. Currently, there is a bifurcation between the two set of audiences. The nomenclature needs to be developed such that the community can relate to it.

Chapter V

V. Practice-based National Agri-Water Policy Leadership

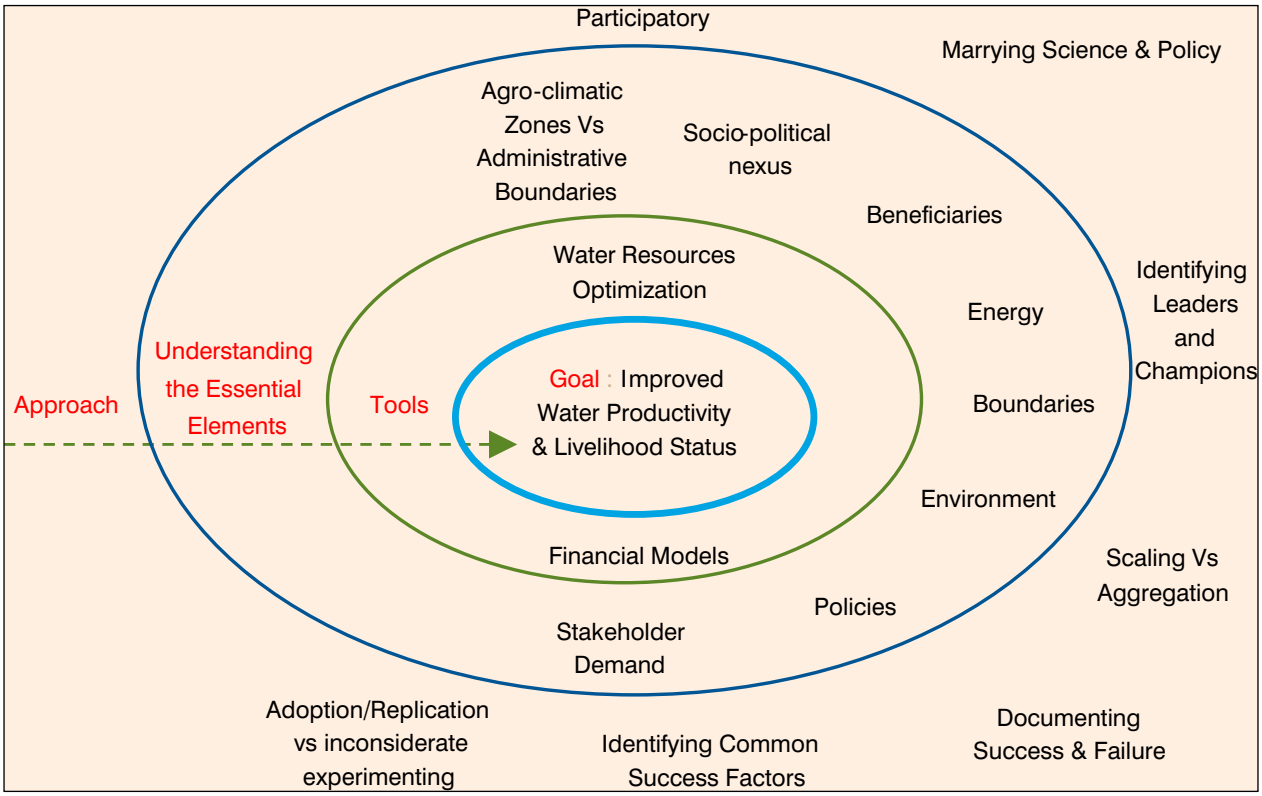
Introduction

A focus on National Agri-water Policy requires an overarching strategy to convert policies into action through bottom-up inputs.

A draft framework (Figure 2) for the National Agri-Water Policy is included below, the proposed components of which include:

- **Goals**- Targets to be achieved on priority
- **Tools**- Models, both economic and those pertaining to resource optimisation, to achieve the goals set
- **Understanding resources** - Socio-economic situation, policies, stakeholders' demands and other contextual background to customise tools better
- **Approach** - Pathway for action, both at the national and local level, to achieve targets

Figure 2: National Agri-Water Policy Framework



Source: Prepared by CEEW (based on experts' discussion)

Goals

India is an agrarian economy with 60 percent rural population. Agriculture is the mainstay in the villages, with more than 85 percent of the country's rural population depending on the sector for livelihood sustenance. In India, the productivity as well as the profitability in agriculture have been significantly low. This has led many of the marginal farmers and smallholders into a vicious cycle of debt and unemployment. Moreover, too much dependence on rainfall because of unassured irrigation is one of the major reasons of crop failure.

India is currently in the midst of moving from a rural to urban growth trajectory. This has increased the competition between different sectors for limited water resources. Currently, agriculture consumes more than 80 percent of the water resources in the country. Several studies suggest that the pace of industrial and urban growth in the coming decades would put additional pressure on the already-stressed water resources.

In this context, the following two goals may be targeted on priority in the agri-water policy framework:

1. **Improving water productivity (more crop per drop)**
2. **Improving the livelihood status of farmers (by ensuring sufficient water supply)**

Tools

To accomplish the above mentioned goals, the following suggested tools can be used effectively:

1. **Optimization of water resources**
2. **Identifying feasible financial models for the agri-water sector**

For water resources optimization, certain processes and methods must be followed to find the best match between the available water resources and the needs of the various sectors. The optimization will have to consider water availability, its storage, cost, priority, and demand. The need to optimize resources is particularly evident when the demand tends to saturate or exceed the resources currently available. This tool can be utilised in improving water productivity.

Access to finance remains a major challenge for small and marginal farmers in developing countries. Therefore, financial constraints in the rural market and in agriculture in particular, must be addressed and models identified to improve access to financial services. This could be done by promoting public-private partnerships, and by making water a more attractive investment opportunity. PPPs require good regulatory and legal systems, transparent contracting procedures, reliable cost recovery, and public acceptance[76]. Blended finance, which involves combining grants with loans, equity or other risk-sharing mechanisms from public and private financiers, could be one of the vehicles to mobilise greater private sector participation in the agri-water sector.

76 Winpenny, James (2003), "Report of the World Panel on Financing Water Infrastructure: Financing Water For All"

Understanding the Essential Elements

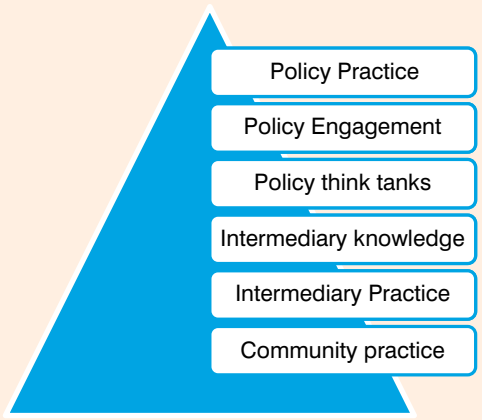
For adequate utilisation of tools, a thorough understanding is required on many fronts, including the following essential elements:

- **Agro-climatic zones vs administrative boundaries:** As there are numerous agro-climatic zones in India that rarely align with administrative boundaries, it is absolutely critical to comprehend the agri-water institutions and the suitability of a particular type of agricultural intervention. The classification of administrative divisions into various agro-climatic zones should be a prerequisite for developing any agriculture development plan.
- **Socio-political nexus:** India is a diverse country where numerous region-specific socio-political issues dominate the discourse. Water, society, and politics form a strong nexus in India, and for any plan to work, it is important to understand this nexus.
- **Beneficiaries:** As in other sectors, it is advisable not to segregate the agri-water sector into service providers, regulators, and beneficiaries. This is because water is considered a social good in India and treating it only as an economic good would not be appropriate.
- **Energy:** Modern agriculture requires the direct use of energy as an input at all stages of agricultural production, including farm machinery, groundwater extraction, irrigation, cultivation, harvesting, and storage. The energy requirement, its availability and the corresponding capital needed to increase access must be fully analysed for agri-water planning.
- **Boundaries:** The spatial scaling requirements of tools and practices must be understood for best results. A certain plan might work well for a village or a small catchment area but it might fail if applied at a sub-basin level.
- **Environment:** The unsustainable use of water and chemicals in agriculture can lead to harmful effects on the local environment. While optimising water use in agriculture, activities with high negative impacts on the environment should be kept low on the priority list.
- **Policies:** Agri-water policies in India should focus on connecting stronger application on the ground. Most of the farmers working are unaware of the existing policies and therefore unable to get the desired benefits.
- **Stakeholder demand:** Key stakeholders in the agri-water domain may have conflicting requirements or priorities. This needs to be understood so that no one is left out. Also, for improved water productivity, planning must follow a bottom-up approach.

Overall Approach

According to the experts, we need to develop the policy based on the following lines (Figure 3):

Figure 3: Bottom-up approach to policy making



Source: 2030 WRG-HUF Workshop on Alliance for Thought Leadership and Action for Agri-Water, 5 May 2015

- **Participatory approach:** At present most of the initiatives do not involve all the stakeholders. Hence the underlying institutional frameworks are fragmented and unsynchronised, leading to ineffective governance, mismanagement, and eventually wastage of water resources. In order to build a structure for agri-water management that can adhere to socio-economic realities, collective action is imperative. There should be strong communication and coordination between major actors in the country's water sector - the government, water users, civil society, industry, and bilateral and multilateral donors. Those designing programs and interventions should build technical, organisational, and management capacities of local representatives to create village-level leaders through training workshops and modules for continuous skill improvement. Such a participatory approach could ensure that projects are properly executed at the community level instead of depending on external support. Currently there is greater focus on supply-side water management. There is a need to now focus on demand side management by building the capacity of institutions and primary stakeholders.

- **Marrying Science and Policy:** Water sector policies have to be based on scientific rigour. To ensure this, scientists should be involved right at the start of the policy-making process. A populist policy that has not been thought through will have long-term adverse implications even if it works in the short run.

- **Scaling vs aggregation:** Pilot testing implemented on a small level, and thereafter scaled up is the current model being followed. However, the ideal approach would be to aggregate different practices, and then test and implement these on a larger scale. By simply scaling up without aggregation, implementation overlooks the data on climate, topography, soils, land-use, farm-level management, socio-economic conditions, and so on.

- **Identifying leaders and champions:** The identification of individuals and institutions that have worked on agri-water issues with some success in the past would provide insight into how sound some of these proposed interventions are. Also, it would help build a database of individuals and institutions that could be approached for support when planning a project in their area of interest.
- **Documentation of success and failure:** Documentation of the successes and failures of different practices across the country is required. In the course of project implementation, coordination processes must be established at multiple levels for monitoring and evaluation of the project so that cases are well-documented. This reduces operational ambiguity and makes information readily available for analysis as and when required.
- **Identification of common success factors for adoption/replication:** When documentation is done over a number of projects, it would highlight some common success factors. These can be studied thoroughly to check their applicability in other regions when designing interventions. This will also help to predict potential risks in the implementation process. By documenting and identifying success parameters, it is possible to replicate or adapt solutions for regions with similar problems.

To drive the overall initiative, expertise in various sectors is essential. A group of experts drawn from different associated sectors such as irrigation, agriculture, energy, financing, and the social sector, among others, could lead and guide the action on the ground.

Case Study 15:

Hydrological Modelling-based decision making may be the right approach

Partners - IFC, IIT and HUF

IIT Mumbai, in collaboration with HUF and IFC, is working on a project on sugarcane water demand management in Barwani district, located in the south-western part of Madhya Pradesh. The project is implemented as a part of IFC's India Sugar Program. The climate of the district on the whole is tropical and dry, except during the south-west monsoon season. The mean annual rainfall is 738.64 mm. Sugarcane is a water-intensive crop and is cultivated in the region even though rainfall is meagre.

There are two components of this project. The first is to develop a generic water balance model for the entire watershed to understand the water availability situation.

The second part is to get a socio-economic understanding of different agronomic activities and inputs where water is one of the inputs. The project will appraise what is the optimal water use in each of the activities like drip irrigation or organic farming, taking into account the cost.

The learning will help to develop a cost curve that will ultimately be used to support decisions for optimal water use in sugarcane cultivation. Water will be the key variable.

The final objective of the project is to develop a tool to support decisions for Demand-Side Management in sugarcane irrigation from the perspective of: a) The farming community b) Sugar Mills, and c) Policy makers.

The hydrological model and decision-making would follow the following steps:

- Develop a Generic/Conceptual **"Water Balance"** model at the **meso level**, or at the Sub-River Basin Level (including surface and groundwater).
- Develop a **"Water Balance"** Model for the **micro level**, or the watershed level/ sugarcane catchment area (including surface and groundwater)
- Quantify the existing and projected **"water gap"** of the defined geography (as per the above outcomes) for the sugarcane catchment area
- Make a **socio-economic assessment** of different agricultural practices, including inputs and specific techniques in sugarcane cultivation, to arrive at the optimum use of inputs, including water.
- Define specifically the dynamics between "water gap" and the **"cost of input water"** arising from different agricultural practices in sugarcane cultivation now, and in 10 years' time.

Conclusion

The HUF-2030 WRG workshop highlights the importance of sustainable water resources management in the agriculture sector in India. The key themes of **strengthening policy**, facilitating **finance**, and developing **knowledge for integrated & area-based approaches** that emerged from the workshop represent both the key bottlenecks as well as opportunities for drastic improvements in the country's agri-water sector.

Setting the agenda for such an engagement, the focus of this report, is the first step of the process. To move ahead on this trajectory to transformation requires an alliance of committed stakeholders to pool their knowledge, resources, and experience.

In establishing some of the core elements of the transformational agri-water agenda, the HUF-2030 WRG workshop placed a strong emphasis on building a **partnership-driven model**.

The workshop initiated a collaboration between interested stakeholders across public sector, private sector, civil society, research and academia and the development sector. This alliance of progressive stakeholders is expected to collectively redefine India's agri-water trajectory for scalable impact.

For further details,
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HUF - 2030 WRG Agri-Water Sustainability Workshop in India
May 5, 2015, New Delhi, India

List of workshop participants

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Council on Energy, Environment and Water

The Council on Energy, Environment and Water (http://ceew.in/) is an independent, not-for-profit policy research institution. CEEW addresses pressing global challenges through an integrated and internationally focused approach. It does so through high quality research, partnerships with public and private institutions, and engagement with and outreach to the wider public.

The Global Go To Think Tank Index has ranked CEEW as

- 1st in India among 'Top Think Tanks with Annual Operating Budgets of Less Than $ 5 Million USD' (2013, 2014 also first in South Asia; 14th globally)
- 1st in India for 'Best Institutional Collaboration' involving two or more think tanks (2013, 2014 also first in South Asia)
- 1st in India for 'Best Policy Study/Report' for its study on India's National Water Resources Framework (2013)

CEEW has also been rated as India's top climate change think-tank in 2012 and 2013 as per the ICCG Climate Think Tank's standardised rankings.

In five years of operations, CEEW has engaged in more than 100 research projects, published 50 peer-reviewed policy reports and papers, advised governments around the world over 120 times, engaged with industry to encourage investments in clean technologies and improve efficiency in resource use, promoted bilateral and multilateral initiatives between governments on more than 40 occasions, helped state governments with water and irrigation reforms, and organised more than 100 seminars and conferences.

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About 2030 WRG

The 2030 Water Resources Group (2030 WRG) is an innovative public-private platform for collaboration at global as well as national/local levels. It mobilizes stakeholders from public and private sector, civil society, centers of academic expertise and financing institutions to engage in fact-based, analytical water security approaches and coalition building.

Our aim is to support governments in their long-term development and economic growth plans by catalyzing sustainable water sector transformations and accelerating reforms. The 2030 WRG acts as an independent entity and offers no political, partisan or national nuance to its advice.

After an incubation phase within the World Economic Forum, it has become part of the International Finance Corporation, a member of the World Bank Group, since March 2012.

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About Hindustan Unilever Foundation

Future demand for water resources will increase significantly as populations, rate of economic development and consumption rates grow. Estimates tell us that by 2030, the supply of water in India could be significantly lesser than demand. The adverse impact of climate change on agriculture will further compound problems arising due to linkages between food, energy and livelihoods in the country. To understand and partake in meeting this challenge, Hindustan Unilever Foundation (HUF) was formed in 2010.

HUF is a not-for-profit company that anchors various community development initiatives of Hindustan Unilever Limited. HUF supports national priorities for socio-economic development through its 'Water For Public Good' programme. Its projects also complies with the requirements of The Companies Act 2013.

By 2020, the cumulative impacts of our collective actions are expected to generate:

- Water potential of 500 billion liters.
- Employment of more than one million person-days.
- Annual Additional agricultural production of 0.1 million tonnes on a cumulative basis

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2030 Water Resources Group

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Knowledge Partner

CEEW Council on Energy, Environment & Water