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Community Water Management

A STRATEGY FOR ADAPTATION TO CLIMATE CHANGE

Jal Bhagirathi Foundation (JBF)

Jal Bhagirathi Foundation (JBF) was established as a Trust on January 15, 2002. The Organization serves to provide an enabling environment to foster community leadership, facilitate village institutions and create a social capital that can access adequate drinking water for humans and animals by leveraging traditional knowledge and appropriate technology. JBF works with a vision of creating water security, sustained by responsive governance and inclusive growth leading to sustainable development.

The organizational structure is a unique integration of a village-level volunteer pool of 18000 and a professional resource base, both complementing each other's effort in providing safe and sustainable water supply to 300,000 people living in 200 villages covering 10,000 sq. kms of the most water distressed region of the world - in the Thar Desert of Western India.

JBF has adopted international management standards of operations and has been awarded an ISO 9001: 2008 certification for its management systems and procedures. It has a Board of Trustees comprising of five members: HH Maharaja Gaj Singh is the Chairman, Shri Rajendra Singh is the Vice Chairman, Shri Prithvi Raj Singh is the Managing Trustee, HH Maharani Hemlata Rajye and Smt. Kanupriya Harish are Trustees.

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As one of the world's biggest banks, HSBC recognizes that it has an important role to play in addressing global challenges and ensuring that progress is pursued today without putting future generations at risk. In keeping pace with these changes, HSBC's work in India in this space has also evolved, leading to a paradigm shift in approach from a philanthropy-led to a sustainability-led one.

HSBC is committed to achieving sustained profits for its shareholders, developing long-lasting customer relationships, valuing highly committed employees and managing the social and environmental impact of business. Corporate Sustainability is accepted unanimously across the Bank, not only as responsibility or as 'the right thing to do' but also as an opportunity to strengthen and grow business. It is indispensable for long term success.

This document summarizes the key learning's and results of a community based project titled "Adaptive Strategies through Community Management of Natural Resources to address Climate Change in the Marwar Region" implemented by Jal Bhagirathi Foundation(2009-2010) with the support of Hong Kong and Shanghai Banking Corporation Limited.

Community Water Management

A strategy for adaptation to climate change

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1 Water and Climate: Deepening Crisis

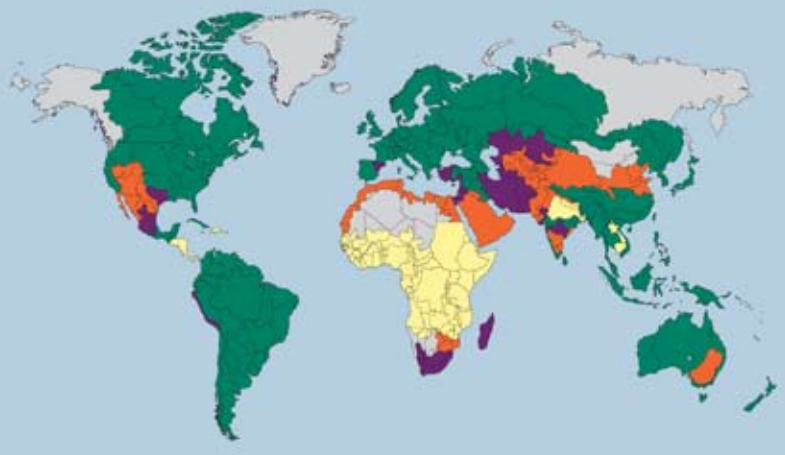
In recent years humanity has seen increased progress and growth in technology and economy, however with the looming water crisis and climate change, the economic progress could be overshadowed. There is need to address these challenges with fierce urgency; else development targets could turn into a mirage, the closer we reach the farther we will be.

Water scarcity has already plagued the globe, mostly affecting the disadvantaged communities in the 'developing' or 'underdeveloped' nations. According to the Comprehensive Assessment of Water Management in Agriculture (2007)[1], one out of three people are already facing water shortages. Almost one-fifth of the world's population live in areas of physical scarcity, while another 1.6 billion people live in countries that lack necessary water infrastructure. It is a much cited fact that 1.2 billion people lack access to safe drinking water while 2.4 billion live without secure sanitation. The seriousness of the issue is evident from the fact that at least five million people die yearly from water related diseases, including 2.2 million children under the age of five[2].

According to the IPCC (Intergovernmental Panel on Climate Change), there are at least four main factors that aggravate water crisis. First, the rapidly increasing population has catapulted the demand for water. While the population has tripled in the last century, it is expected to rise from the present 6.5 billion to 8.9 billion by 2050. Water demand has been increasing more than twice the rate of population growth resulting in more regions with chronic water scarcity. Second, increasing urbanisation leads to concentrated demand of water in vulnerable geographical locations. In the next 20 years, another one billion people are expected to be added in the Asian cities, most of them are already water stressed. Third, with the changing lifestyle, the amount of water used for domestic purposes is increasing. And finally, water availability is severely impacted by climate change.

It is predicted that climate change will shrink the resources of freshwater, which are already scarce[3]. Depending on water regime, the impacts of climate change will vary from location to location. In places where hydrology is snow driven, climate

Areas of Physical and Economic Water Scarcity



- **Little or no water scarcity**. Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.
- **Physical water scarcity** (water resources development is approaching or has exceeded sustainable limits). More than 75% of the river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition—relating water availability to water demand—implies that dry areas are not necessarily water scarce.
- **Approaching physical water scarcity**. More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.
- **Economic water scarcity** (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands). Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.

Physical water scarcity | Approaching physical water scarcity | Economic water scarcity | Little or no water scarcity | Not estimated

Source: Comprehensive Assessment of Water Management in Agriculture, 2007

Accessed from http://www.unwater.org/wwd07/downloads/documents/wwd07brochure.pdf

[1] *Comprehensive Assessment of Water Management in Agriculture, 2007, Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture. London: Earthscan, and Colombo: International Water Management Institute.*
[2] *Information available on http://www.h2oequalslife.org/issues.htm*
[3] *IPCC 4th Assessment Report, 2007 and can be accessed from http://www.ipcc.ch/ipccreports/ar4-wg1.htm*

change will bring temporal changes. With melting glaciers flooding can be expected in the initial years while water availability would be reduced in the future. Annual precipitation is predicted to increase in the tropics and high lands while decrease is likely to happen in the subtropics, where the population is high. With the increase in population and decrease in rainfall in the subtropical region, water resources are predicted to become more stressed. The impacts on coastal region would be much severe as it would be affected with both sea level rise and flooding due to increased rainfall. However, water shortages are going to be most acute in the driest areas of the world, where two billion people are living and most of them are poor[4].

The developing countries and its population will suffer the most with this crisis. First of all, developing countries have not yet achieved water security due to their low institutional capacities and financial resources; climate change will make it even more difficult. Second, the livelihood of the poor is dependent on climate sensitive sectors like agriculture and livestock rearing. Reduction in water availability therefore increases their vulnerability. Third, the absence of appropriate policies and laws result in pollution of available water resources. Most of the industrial effluents and sewage in developing countries is disposed untreated into fresh water sources. Moreover the effects of extreme events such as droughts and flood have long lasting effects on the economy of poor countries. The effects of climate change will be first felt by the poor.

Facts

- 1.2 billion people lack access to safe drinking water while 2.4 billion live without secure sanitation
- Almost 90% of the population growth in the next 40 years (which is another 3 million) is predicted to happen in developing countries where the current population is already lacking sustainable water supply and access to sanitation. [a]
- Water withdrawals are predicted to increase by 50 percent by 2025 in developing countries, and 18 per cent in developed countries. [b]
- By 2030, 47% of world population will be living in areas of high water stress. [c]
- Every $1 invested in improving water supply and sanitation will yield an economic return of $4-$12. [a]
- Poor people/slum dwellers in a city often pay 5 to10 times more for water than rich people living in the same city. [d]
- Almost two billion people were affected by floods and droughts in the last decade of the 20th century [e]
- With changing climate and increased intensity of droughts and storms, substantial population displacements will take place within the next 30-50 years [a]
- Feeding everyone in 2050 with an additional 3 billion people expected could require 50% more water [f]
- In poor countries, where a total population of some 3 billion live, climate change would result in a reduction of cereal production up to a fifth potential (g)
- 70 to 80% of industrial waste and sewage in developing countries are disposed into water contaminating the precious water resources. (a, h).
- Freshwater species populations were reduced by half between 1970 and 2005 (a)

a. UN Water: 3rd UN World Water Development Report, 2009
b. UNEP: Global Environment Outlook Report GEO-4, 2007
c. OECD: OECD environmental outlook to 2030, 2008
d. UNDP: Human Development Report, 2006
e. WHO: Water, sanitation and hygiene links to health, 2004
f. Falkenmark, M. and J. Rockström: Balancing Water for Humans and Nature. The New Approach in Ecohydrology, 2004
g. SIWI: Let it Reign: The New Water Paradigm for Global Food Security, 2005
h. UN-Water: Transboundary Waters: Shared Waters, Shared Opportunities, 2009

[4]Coping with Water Scarcity, 2007 and can be accessed from http://www.unwater.org/wwd07/downloads/documents/wwd07brochure.pdf

2 Adaptation: Name of the Struggle for Survival

Even with maximum possible mitigation measures the effects of climate change can only be reduced, but cannot be halted or reversed. It poses an urgent need for developing coping strategies to survive with the inevitable impacts of climate change. Given this, the term 'adaptation' has gained significant currency in the discourse of climate change. However, importance of adaptation with regard to water management requires more attention. The management of water resources impacts almost all aspects of society and economy, including food production and security, domestic water supply and sanitation, health, energy, tourism, industry and the functioning of ecosystems[5].

Though climate change has a major impact on water management, the water sector itself seldom identifies the importance of adaptation. As climate change has long term impacts on water and the environment, it requires long term solutions. The major impediments to develop such a long term strategy include lack of institutional capacity, absence of sufficient financial resources and ineffective policies. Above all, as IPCC highlights, the knowledge on water related impacts of climate change and their socio-economic dimensions is inadequate. The data and predictions of hydrological impacts at temporal and spatial scales are often uncertain.

The uncertainties of climate change make it difficult to plan and develop adaptation strategies based on a predicted scenario. Uncertainty, however, cannot be a reason for continuing with the status quo. There is a need to develop an adaptive water management framework that addresses the challenges of uncertainty by providing space for adjustments as and when additional and better information is available. Adaptive water management focuses on developing resilience of communities by identifying vulnerable areas for improvement. After all, vulnerability is not only a function of sensitivity or exposure, but also of adaptive capacity. The goal of adaptive water management is therefore to improve adaptive capacities to cope with climate uncertainties and the impacts of climate change[6].

An approach building on traditional coping mechanisms would be a realistic way forward. It helps people to adapt to present climate variability by building on past experiences and then develop strategies to initiate responses to changing climate. It also requires conscious attempts to involve the poor and disadvantaged, based on the human rights approach. This approach aims that every individual will have access to water that is: (i) sufficient in quantity to meet all their basic needs, (ii) safe, to prevent water borne diseases, (iii) physically accessible within a safe physical reach, and (iv) affordable and not affecting one's capacity to buy essential goods. This is important as it is the poor and disadvantaged who are most impacted with climate change even though they are not the ones responsible for global warming[7].

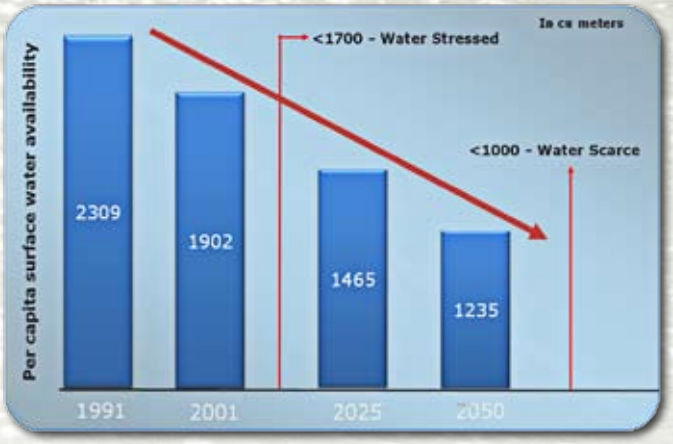
[5] *UNWATER, 2010, Climate Change Adaptation: The Pivotal Role of Water*
[6] *MJ Fluet, L Vescovi and AI Bokoye, 2009, Water and Climate Change: Citizen Mobilization, A Source of Solutions, UNESCO, Paris*
[7] *UN-HABITAT, 2008, "Review of Existing Concepts of Water Governance'*

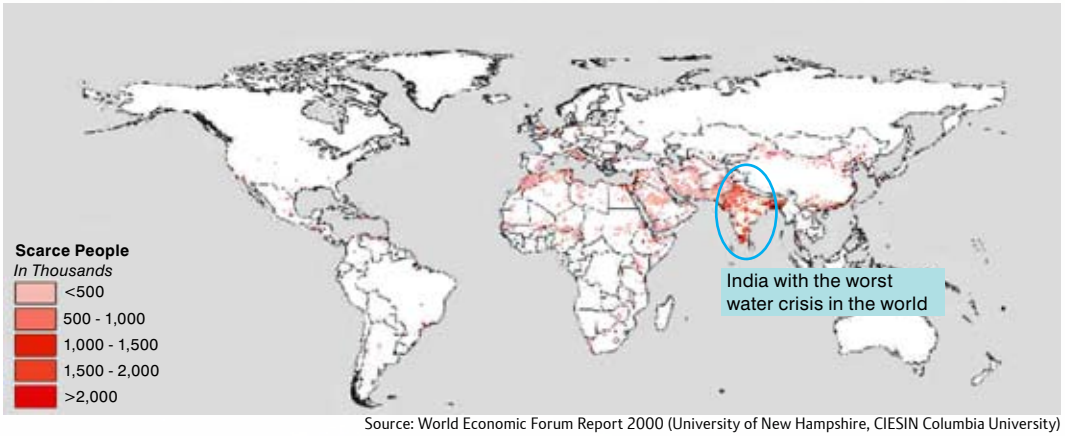
3 India: Biggest Challenge in the World

It is predicted that India, with its current rate of economic growth, will become the fastest growing economy in the world within a few years. However, the water scenario in India is grim. With increasing population and diminishing water sources, India's per-capita water availability has been declining sharply and has already reached below 1700 m^3 - the bench mark of water stress[8].

A recent international study projected that by 2030 India would face severe water crisis, the most severe in the world in terms of water scarcity, as shown with the more intensified red spots on the world map.

This increasing water scarcity can raise tensions across borders and within the country. There have been a number of conflicts in India around the issue of water, particularly between headwater and tributary states and between local communities and industries. To name a few, conflicts surrounding water bodies have caused major law and order issues at Lava Ka Baas[9], Indira Gandhi Canal[10], Sheonath River[11], Kaladera[12], The Palar Basin[13] and Bisalpur Dam[14]. In addition there have been at least seven major interstate water disputes in India on sharing water of rivers such as Cauveri (Tamil Nadu and Karnataka), Krishna(Maharashtra, Andhra Pradesh and Karnataka) , Godavari (Madhya Pradesh, Andhra Pradesh and Maharashtra) Narmada(Madhya Pradesh, Maharashtra and Gujarat) and Vansadhara (Orissa and Andhra Pradesh). It is predicted that these kinds of conflict are going to increase alarmingly with the impending water scarcity. The Asian sub-continent with three nuclear powers, could face severe turmoil as it has already witnessed a number of disagreements in sharing water across borders. It includes but is not limited to tension between India and China on sharing water of the Brahmaputra River, India and Pakistan on sharing the Indus water and between India and Bangladesh on sharing water of the Ganges. These challenges emphasize the need of addressing the deepening water crisis at local level rather than depending on cross boundary waters.





Source: World Economic Forum Report 2000 (University of New Hampshire, CIESIN Columbia University)

[8] *Water resources of India, Rakesh Kumar. R. D. Singh. K.D. Sharma, National Institute of Hydrology*
[9] *It is a struggle to access surface-water resources in Lava ka Baas, in Alwar district, Rajasthan, India. The conflict is between the Rajasthan state's irrigation department and the villagers where the state irrigation department declared the structure (Johad, an earthen embankment) technically unsafe and illegal, passing orders for its demolition.*
[10] *Ongoing struggle of a rural community demanding its share of water for irrigation according to an allocation arrangement worked out by the state government. Lack of adequate surface water flow due to intra-state water conflict and erratic rainfall have led the state government to shift its priority from irrigation to drinking water.*
[11] *India's first private project to supply water to industry from the Sheonath river.*
[12] *A profitable bottling water business has been a source of conflict between communities and bottling companies in the case of Kaladera, a drought-prone village in Govindgarh block, and located about 40 km from Jaipur, in Rajasthan.*
[13] *Palar in Tamil Nadu is one of the most heavily stressed river basins in India where leather tanneries have contributed to the environmental degradation, particularly water pollution. There has been a conflict between the tanners and the farmers due to acute water scarcity and pollution.*
[14] *It is a struggle of the local people against the state's prioritization in using water from a dam for urban consumption while bypassing the overwhelming rural demand.*

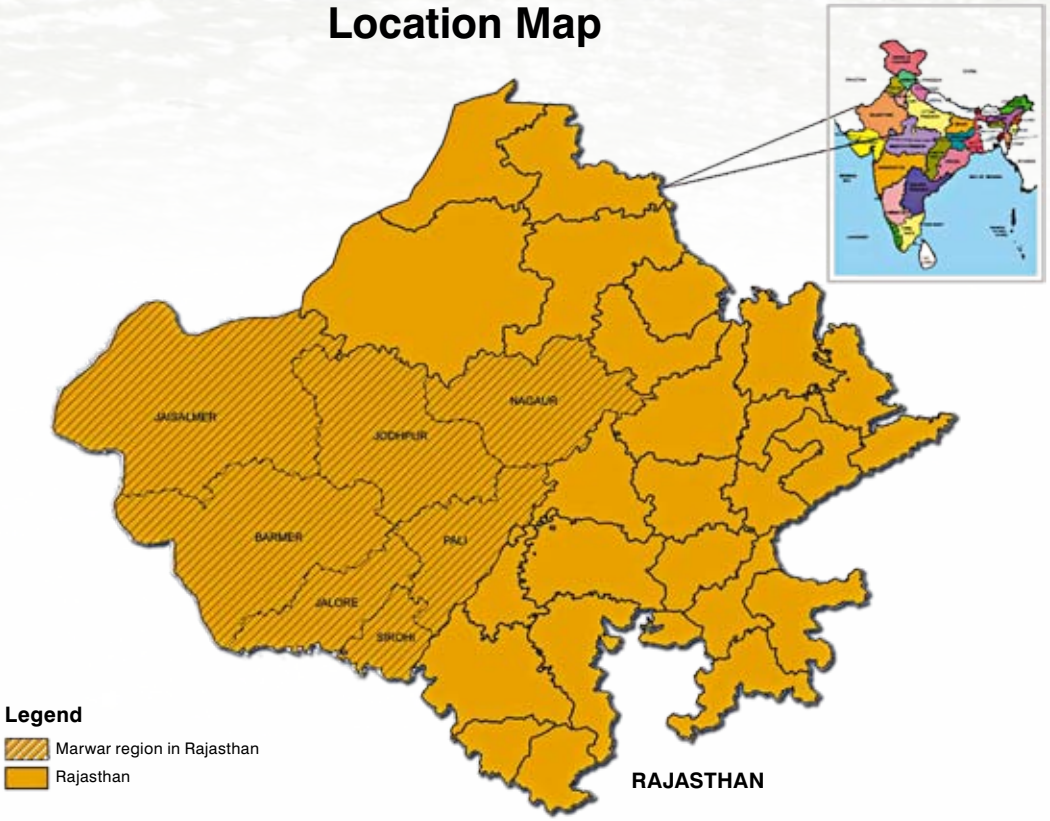
4 Marwar region: Water Crisis at its Worst

While in the global water crisis India stands at the dismal bottom, in the deepening Indian water crisis Marwar region in Rajasthan state is the worst hit with severe drinking water crisis. Situated in north-west of India in the arid zone of the Great Indian Thar Desert, the region experiences hostile climatic conditions with temperatures ranging from 50° Celsius in summers to 0° in winters. The average rainfall ranges from 150 to 300 millimeters. It is the most densely populated arid zone in the world with average density of 84-90 people per square km[15]. The economy of the Marwar region has traditionally revolved around animal husbandry and subsistence rainfed agriculture while its primary ecological resources have been water bodies, pastures, grazing lands and sacred groves.

As the region is characterized by low and erratic rainfall, less nutritious sandy soil, deep and saline ground water, sparse vegetation, and strong sun and winds, the people face extreme water scarcity. Climatic extremes such as droughts of varying intensity are a recurring phenomenon. These environmental conditions along with increasing population growth and consumption have resulted in severe ecological degradation and increasing desertification leading to scarcity in water for drinking, especially for the poor communities. Although people in this area have developed a variety of coping mechanisms for centuries, it is increasingly observed that the resilience of the community, particularly of the poor, to adverse climatic conditions has declined considerably due to various social and political reasons[16].

The already stressed water sector in this area is getting much worse with the impacts of climate change. Rain-fed agriculture, the major source of livelihood would be adversely affected by climate variability, impacting millions of poor lives. These challenges necessitate an adaptive governance to manage water resources in the region.

Location Map



[15]*Dhir, Ram Paul, 2003: "Ecological Fluxes in the Thar Desert", in: Narain, Pratap.; Kathju, Suresh.; Kar, Amal; Singh, Mahendra Pal; Kumar, Praveen (Eds.), 2003: Human Impact on Desert Environment (Jodhpur: Arid Zone Research Association of India).*

[16]*Lucy Scott, 'Climate Variability and Climate Change: Implications for Chronic Poverty', Chronic Poverty Research Centre Working Paper, February 2008, No.108, p.9*

Facts

- The estimated annual, per capita water availability in the state during 2001 was 840 m^3 and it is expected to be 439 m^3 by the year 2050, against the national average of 1,140 m^3 by 2050.(a)
- Rainfall in Marwar is associated with the short July-September southwest monsoon that brings a mere 100-500 mm of precipitation, while the average rainfall in the region is only 200mm (b).
- On an average the region witnesses six drought years in a decade (c). As per a study of Central Arid Zone Research Institute, there is only a 16% probability for a no drought scenario in any year, while 40% probably exists for a severe drought year.
- The first national communication of India to the United Nations Framework Convention on Climate Change (UNFCCC) reveals that Marwar comes under the most vulnerable regions in India.
- The evaporation rate in the region is as high as 1.8meter/ year, while the temperature in summer months goes above 50^0 Celsius.
- The agriculture in the region is mostly rainfed, and drought would seriously affect the livelihood of the population
- The National Habitation Survey 2003 found that about 50% of the total rural habitations of Rajasthan were not covered by the government's water supply system, while most of these habitations comes in the Marwar region.
- The women in the region walk up to 4 kilometers under the scorching sun to fetch an urn of water. Children, particularly girls, forsake education to help their mothers to fetch water.

a. Report of the Expert Committee on Integrated Development of Water Resources, Government of Rajasthan, June 2005
b. Khan, M.A., 1998: "Rainwater Management", in: Faroda, A.S.; Singh, Manjit. 1998: Fifty Years of Arid Zone Research in India (Jodhpur: CAZRI)
c. Mohnot, Surendar Mal, 2003: The Maru Gauchar Yojana (MGY) 2003- Government of India, (Jodhpur: The School of Desert Sciences)

5 The Project: A Strategy for Strengthening Adaptive Capacities

Given the above context, Jal Bhagirathi Foundation with the support of the Hong Kong and Shanghai Banking Corporation Limited (HSBC) initiated a project in five villages of the Marwar region namely Baniawas, Nedli, Paralia Sasan, Paralia Dhamat and Surani, to showcase local action that can bring a global change in addressing water crisis. The project aimed at developing replicable models and strategies for increased water security through sustainable natural resource management as part of integrated approach to address climate change and reduce vulnerability. It adopted a participatory bottom up approach that enables communities to enhance their coping capacities towards adaptive local governance of water and natural resources. Since it is rooted in the tradition and local knowledge, the approach is easily understandable and replicable.

The project activities can be broadly classified into four major strategic components as given below.

Community Mobilisation and Creating Social Capital

Creating community ownership and promoting rights based approach of water management is fundamental to adaptive water management. The project has, therefore, emphasized on creating and strengthening community institutions to effectively manage natural resources. A multi-tiered system of community institutions from the village level called the *Jal Sabha* (village water user association) to the regional level called the *Jal Sansad* (Stakeholders Forum), ensures active participation of the actual beneficiary community, including women and marginalized sections of the society.

Capacity Development for Adaptive Planning

Aiming to support village level institutions to adopt a pragmatic approach towards development of common property resources and adaptive management of ecological resources, the project has facilitated capacity development of village communities and community institutions. It has included structured as well as semi structured training programmes and exposure visits to successful community based projects. These programmes have helped to empower community institutions, particularly the *Jal Sabha* at the base level, to make informed decisions on development initiatives and develop adaptive strategies.

Supporting Community Driven Micro Projects

With the participation from the community, JBF act as a catalyst and facilitator for the construction and restoration of traditional water harvesting systems and other natural resources. The aim is to enable people to adapt to climate variability in a sustainable manner through location specific interventions. Emphasising on a 'bottom-up approach', the project has provided financial support to micro projects only after the *Jal Sabha* has raised at least 30% of the cost of the micro-project and formed a *Jal Kosh* (development fund) to ensure future sustainability of the water infrastructure.

Networking and Knowledge Sharing

The project has given importance on networking and knowledge sharing since adaptive management requires continuous updating of knowledge and sharing of best practices, especially as climatic knowledge is dynamic. While the best practices from the project villages are worth replicating in a wider context, the village *Jal Sabhas* will benefit with advanced knowledge through networking and knowledge sharing. To this end, the project feeds into policy advocacy to strengthen an enabling environment conducive for community planning and action.

Community institutions facilitated by Jal Bhagirathi Foundation

- The *Jal Sabha* or the Water Users' Association is a village level forum where people from all habitations in a village congregate, discuss problems, seek solutions and assert priorities. This institution at the base level develops and implements micro-projects of water and natural resource development in the village.
- The *Jal Samiti* or the Water Development Group is a block level forum and comprises of members of *Jal Sabha* and key community leaders from the area. They meet on a periodic basis to review the proposals received from *Jal Sabhas* and as water is a shared resource the *Jal Samiti* acts as a conflict resolution mechanism building a consensus in the region.
- The *Jal Parishad* or the Water Forum has been set up at division level with members consisting of people's representatives as well as experts from reputed resource institutions and members nominated by the JBF. The *Parishad* meets every month to review and sanction projects submitted by *Jal Sabhas*.
- The *Jal Sansad* or the Stakeholders Forum has been constituted for the entire Marwar region and it is represented by all stakeholders i.e. key community leaders, government representatives, staff of the JBF, renowned development practitioners from the NGO sector and volunteers.
- The *Jal Mandal* or women's self-help groups, are instituted for the empowerment of rural women, with savings and credit activities. JBF has encouraged such *Jal Mandals* to take up livelihood activities in the emerging service sector of distributing drinking water. Furthermore, *Jal Mandals* initiate variety of income generation activities like, animal husbandry, non-farm activities like trading, retail shop and tailoring.
- The *Jal Dal* or students forum in schools where water harvesting structures have been constructed. The students are oriented to the best practices of water and environment conservation. They also take part and contribute for the maintenance of water harvesting structures in the school.

6 Enabling Environment: Bringing Change from the Grassroots

The project followed a bottom up approach that recognizes the importance of community participation for bringing sustainable water security in the project villages. To initiate actions at the grassroots and to ensure that they are owned and sustained by communities a three pronged strategy has been adopted:

Formation of Community Based Institutions

With an emphasis on strengthening community institutions to create an active social capital, the project has facilitated the formation of community institutions in the project villages. These newly created institutions have also been integrated into the existing system of community institutions of the Foundation which consists of 300 *Jal Sabhas*, 80 *Jal Dals*, 55 *Jal Mandals*, 4 *Jal Samitis*, 1 *Jal Parishad* and the *Jal Sansad*.

Institutionalizing the CBOs i.e. *Jal Sabhas*, is the key input in creating an environment where people come together to manage water resources. Communities in each project village were mobilized and five *Jal Sabhas* were formed, with one in each village. Also, three women *Jal Mandals* or self help groups have been instituted for exploring possible linkages of SHGs with natural resource management. Furthermore, for sensitizing the next generation, three *Jal Dals* have been formed in the project villages: one in Government Secondary School at Surani, second in Government Girls Upper Primary School at Paralia Dhamat and the third in Government Upper Primary School at Baniawas.

Capacity Development and Empowering the Marginalised

Capacity development has been central to the project implementation aiming to empower village level institutions to develop common property resources, benefits of which accrue to the entire village community. The strategy focuses on capacity building of rural community for development and proper management of ecological resources. In addition to field level trainings, the project has facilitated structured training programs to equip community representatives, village volunteers and JBF field staff in micro-planning, community mobilisation, technical aspects of water harvesting structures, micro-project planning and management. Exposure visits to successful community based projects were organized. These initiatives were supported by faculty and resources of JBF's Water Resource Centre called the *Jal Sansthan* in Bijolai, Jodhpur which promotes an active and enlightened rural community by conducting capacity building programs for stakeholders on community based water management. The Centre has provided valuable exposure and orientation to community members and volunteers from the project villages.

Facilitating the formation and strengthening of community institutions ensures active participation of the beneficiary community, including women and marginalized sections of the society. Through its unique processes JBF has ensured Community Based Institutions render equal opportunities for all in the community, which enables inclusive governance at the village level. Representation of women and marginalized sections in *Jal Sabhas* ensures their voices are heard in village level water management

in addition to equitable access to natural resources. The practice of community contribution ensures that all the community members, irrespective of caste and class, contribute to a micro project to ensure equitable ownership of the project.

Jal Kosh - Community Contribution

In the process of developing community owned water projects the need for people's contribution has been well established as a norm and practice. Up to 30% contribution is raised in all projects by the *Jal Sabha* (water users association) themselves with contribution from beneficiaries. The people's contribution is deposited in a *Jal Kosh* (development fund) ensuring better transparency and accountability. *Jal Sabhas* are also responsible for the maintenance of water harvesting structure. In this regard efficient managements systems have been developed by *Jal Sabhas* such as collecting user charges to raise sufficient fund for annual maintenance of the structures. With these systems and norms in place, the project has supported *Jal Sabhas* in undertaking micro projects to bring water security.

Sensitizing Communities

- To bring water security, the project focused on creating awareness and mobilising communities around the issue of water. It employed a range of tools and programs such as *Jal Chetna Yatra* (awareness rallies), Participatory Rural Appraisal (PRA), slogan writing and film screenings. These programs were used as a platform to initiate discussions with community members and start planning for micro-project implementation.
- The *Jal Chetna Yatras* that passed through all the project villages received significant attention from all sections of the community, particularly women and children. These *yatras* also included corner meetings, in which community leaders and volunteers discussed the importance of conserving water and need of community management of natural resources.
- The PRA was facilitated by trained staff members using various tools such as resource mapping; transact walk and focus group discussions. The use of various tools not only ensured active participation of communities in identifying available resources and scope of improvement but also proper triangulation of the data.
- Another strategic activity adopted to sensitise people in the project villages was by mobilizing school children with slogan writing campaign. Water related slogans were written in various public areas by school children. It is noted that an awareness program facilitated through children is effective in influencing their parents.
- Film screenings were organised as they are a powerful communication tool. People were sensitized on water management systems through films made by the *Jal Chitran*, a Community Video Unit setup by JBF.

Gawai Talab and water channel at Nedli village

7 Micro Projects: Enhancing Adaptive Capacity

Water Harvesting

The project has primarily focused on bringing water security through traditional methods of rain water harvesting. It has been realized that bringing water security is the first step towards vulnerability reduction in the region. Being a predominantly pastoral community, the livelihood of the population is dependent on availability of water. Furthermore, education, one of the most important prerequisite and indicator of development is often impacted with water scarcity as it results in loss of school days. Lack of water availability also results in drudgery of women and girls and they pay a huge opportunity cost forsaking education and other productive work.

The Foundation has facilitated a Community Led Water Management System, which is built upon the traditional wisdom of rainwater harvesting that recognizes and addresses the issue of water scarcity as rainfall in the region is meagre, erratic and of varying intensity. The efficiency of water harvesting and conservation has been enhanced to tap the runoff from the *agor* (catchment) through water or feeder channels to a surface water harvesting structure or pond (*talab, nadi* or *nada)* located at the outskirts of the village. From these water harvesting structures, water is transported to community or school water harvesting *tankas* (underground rain water harvesting tanks) in the vicinity of the village/*dhani* (hamlet). This reduces the drudgery of women in fetching water from distant water harvesting structures and reduces the evaporation and seepage losses which are greater in surface water harvesting bodies.

Mr. Stuart Davis, CEO of HSBC planting a tree in village Baniawas

Village	Name of the structure	Type of the structure	Water storage Capacity (Litres)	Total cost (Rs.)
Nedli	*Gawai Talab*	Pond	31,933,000	196,980
	Gawai Talab-Feeder Channel	Water Channel	5,000,000	99,072
Baniawas	*Kesa Nada*	Pond	8,122,000	123,828
	Saraswati Jal Sangrahan Pariyojana	Roof Water Harvesting	80,000	29,655
Paralia Sasan	*Gawai Talab*	Pond	31,772,000	185,604
Surani	*Gawai Talab*	Pond	66,143,000	197,460
Paralia Dhamat	*Laun Talab*	Pond	14,517,000	190,908
	Shri Bajrang Tanka	School *Tanka*	24,000	52,505
	Piplai Talab	Pond	23,401,000	132,564
Total (Rs.)			**180,992,000**	**12,08,576**

It has been found that water security in schools has direct impact on number of students accessing education, particularly in the Marwar region. Therefore, the project has supported schools through village *Jal Sabhas* (water users association) for the construction of roof-top rainwater harvesting structures. These structures collect rainwater from the roof of a school building and direct it through a conveyance system comprising of series of pipes that leads to an underground storage facility (*tanka*). The water from these *tankas* is accessed through a hand pump providing children with clean drinking water while the *tanka* itself offers a sanitary space for water to be stored. Thus, with this initiative, schools become water-independent and are no longer forced to be closed for prolonged "water breaks", which is a practice in the Marwar region. Furthermore, school *tankas* are maintained by a voluntary group of students called the *Jal Dal*. These students are responsible for cleaning the roof-top and *tanka* before the onset of the monsoons, thereby ensuring that high quality rainwater is harvested and stored.

Land Management

Maintenance of the natural balance of vegetation in the desert region has become an increasingly challenging task. On one hand, the pressure on natural resources has increased with rise in population of livestock while on the other hand, varying climate and recurring droughts have had adverse impacts on the flora in the region. As a result the Marwar has become an ecologically sensitive zone.

The project has supported community institutions including *Jal Sabha*, *Jal Mandal* and *Jal Dal* to initiate land development and management programs to maintain a natural balance of biodiversity. With this, a campaign called 'one family one tree' has been undertaken in all the villages and plants were distributed to households. Furthermore, the tree plantation campaign also included *Jal Mandal*- women self help groups aiming at women's participation in addressing climate change. Each *Jal Mandal* has been provided with tree saplings and 80% of them have survived. School children particularly *Jal Dal* members were mobilised to plant tree saplings in the school campus. With this initiative, more than 3000 saplings were planted creating a greater awareness among communities.

In addition to the campaigns, an innovative agro forestry model of developing pasture lands was experimented with the support of Arid Forest Research Institute, Jodhpur. Grass seeds of *'Dhaman'*- (a high protein fodder variety) were sown in a selected plot of land with the participation of *Jal Sabha* and community members. It has generated considerable interest among the target communities as it would help them to feed livestock in summer months.

Women Empowerment

Women being primary stakeholders are most affected by the water crisis. They spend one third of their lives collecting water, walking up to 4 kilometers a day, under the scorching sun. Moreover they are excluded from decision making; their pivotal role as providers and users of water is seldom reflected in the planning process. Therefore it is critical to ensure women's access to and control over natural resources and enhance their inclusion in the development

processes. The project has facilitated an enabling environment for women empowerment by ensuring their participation in *Jal Sabhas* and creating a platform to ensure their concerns are addressed in project planning, execution and management. This has been a major achievement as in multi-caste villages it is difficult for women to actively participate in forums that are dominated by men, given the semi-feudal social background in the project area.

The project has focused on capacity building of women by formation of Self-Help Groups or '*Jal Mandals*' to ensure women's access to economic resources. These groups consist of 10-15 women who come together for the common purpose of thrift and credit activities. Their role in natural resource management program has been highlighted and recognised through tree plantation initiatives. The *Jal Mandals* are also encouraged to take up variety of other income generation activities. They are capacitated in vocational training programmes, designed to develop and enhance marketable skills, as well as links with formal credit institutions so that group members can augment family incomes through micro-enterprise activities.

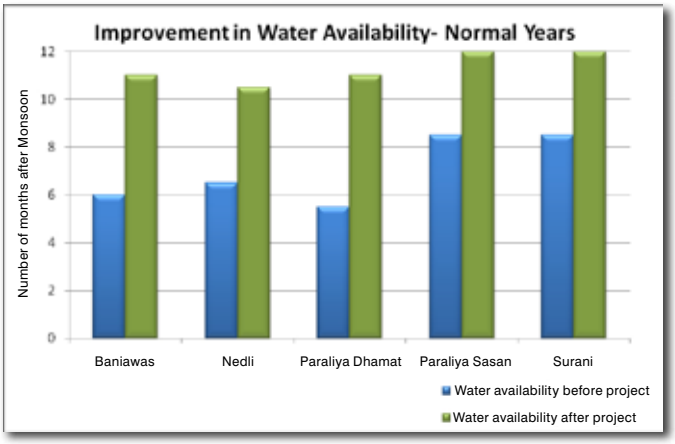
His Excellency Timothy Roemer, US Ambassador to India, interacting with *Jal Sabha* members at Surani

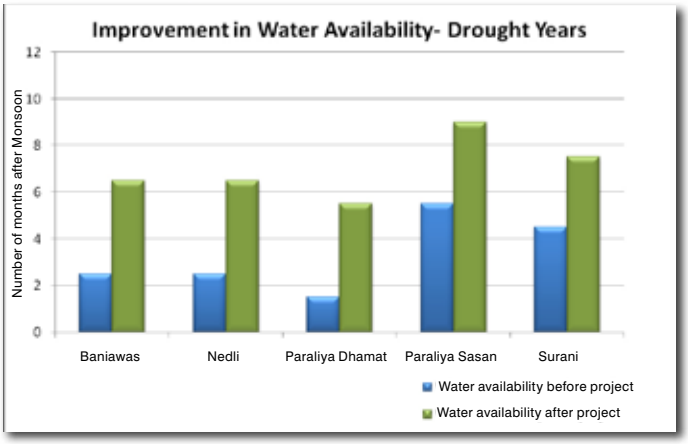
8 Outcomes: Promising Progress

Improved Water Availability

A recent evaluation of project activities shows that the water availability in the villages has increased considerably. With an increase of 3 to 6 months of water retention in all the village water harvesting structures, communities can now access drinking water throughout the year. People are able to cope during the driest months (which have now reduced to less than two months) by storing water in household and community tanks, when water is available in the ponds. However, communities have realised the need to increase the water harvesting capacity further, to bring water security even in drought years. *Jal Sabhas* in the project villages are developing plans to further increase the capacity of the water harvesting structures. Furthermore, more than 60% of the sample households that participated in the evaluation reported that they have saved money as their expense on purchase of water has reduced by Rs. 150 to 300 per month, paid for transporting 4000 litres of water. Also 100% respondents have reported that the project has helped women considerably as the time spent for fetching water has been reduced by 3 to 4 hours every day. Increase in water availability has also impacted livelihood with increased water availability for livestock.

Village	Scenario	Water availability before project	Water availability after project	Avg. Increase in water Availability
Baniawas	Normal years	5 to 7 month	10 to 11 months	5 months
	Drought years	2 to 3 months	6 to 7 months	4 months
Nedli	Normal years	6 to 7 months	10 to 11 months	4 months
	Drought years	2 to 3 months	6 to 7 months	4 months
Paraliya Dhamat	Normal years	5 to 6 months	10 to 12 months	5 to 6 months
	Drought years	1 to 2 months	5 to 6 months	4 months
Praliaya Sasan	Normal years	8 to 9 months	12 months	3 to 4 months
	Drought years	5 to 6 months	8 to 10 months	3 to 4 months
Surani	Normal years	8 to 9 months	12 months	3 to 4 months
	Drought years	4 to 5 months	7 to 8 months	3 months





Increase in water availability from the village water harvesting structures, based on triangulated estimates of the beneficiaries.

In addition to creating additional water harvesting capacities in the project villages, *Jal Sabhas* have been instrumental in developing community norms for controlling the usage of water. These rules are also adaptive depending on the monsoon pattern and availability of water. For example the *Jal Sabha* in village Surani has set a norm whereby water tankers of 4000 litres capacity will not be allowed to take water from the *talab* (pond) when the water level drops, to ensure that water is available for longer periods. Moreover *Jal Sabhas* have started collecting user charges from tankers so that they can raise sufficient funds to maintain the water harvesting structures on a regular basis. They have also introduced a token system and posted a watchman for regular and reliable collection of user charges.

Inclusive Social Capital and Improved Adaptive Capacity

The project has resulted in creation of an inclusive social capital in the project villages through the establishment and capacity development of community based institutions that facilitate co-ordinated action. It has resulted in setting up of community norms, obligations, reciprocity and accountability in institutional mechanisms, particularly for water resource management, which enable the desert people to cope up with adverse and changing climate.

In a recent evaluation it has been noted that the decisions of *Jal Sabhas* has wide acceptance among the people. People are willing to abide by the norms that get formulated in consultation with different sections of the community. More importantly it is noted that all the people in the village, irrespective of social class and wealth, have financially contributed to micro projects implemented by the *Jal Sabha*, which ensures inclusive ownership.

Moreover, the project has considerably enhanced the capacity of these institutions as well as their consciousness on the issues of environment and development. They have formulated and implemented micro projects on water harvesting and environment conservation demonstrating transparency and accountability. The institutions realise the specific needs and issues of women and the disadvantaged and has undertaken initiatives to support them. For example the *Jal Sabha* in Baniawas has promoted girl children to attend school. They have approached the local government to provide community *tankas* (underground water storage) for the poor and marginalised people so that their women need not walk long distances for fetching water.

Increased awareness and social capital has resulted in enhanced adaptive capacity of communities. For example, the *Jal Sabhas* have special rules made for drought years like restricting tankers of 4000litres to collect water from ponds. Community norms have been established to control usage of water and to ensure everyone in the village gets a minimum quantity of water, particularly when the water level drops. These institutional arrangements have been effective in developing innovative approaches such as constructing channels to enhance the efficiency of water harvesting to address the challenges of change in rainfall patterns and runoff. Most importantly it provides a platform for the people to discuss emerging issues and to develop strategies to address them. Since these institutions are connected to the wide networks of community institutions facilitated by the Foundation and to the Water Resource Centre in Jodhpur, they are able to access support and advanced knowledge, resulting in quality decisions and adaptive management.

School tanka at Paralia Dhamat

Case studies

Unity paves the way in Paralia Dhamat

Paralia Dhamat is a small desert village of 80 households, located in the Barmer district of western Rajasthan with peaceful and serene ambience. However, like many other communities in this arid zone, people have had struggled for survival with limited water resources. Water scarcity in the village translated into drudgery for women, stressed livelihood and loosing school days.

Though the village had two water harvesting structures, the water availability was just for a few months after the rains. The village pond had a huge catchment area to harvest water from but the capacity was limited and precious rain water used to overflow. Moreover, communities in the village were fragmented; this worsened the situation as village level planning for water management became a challenge. Communities spent up to Rs. 150 to 300 every month for transporting water from other villages through tankers of 4000 litres capacity. The poor families who did not have storage facility in their homes and could not afford purchasing of water had to walk long distances to fetch drinking water from nearby village ponds.

Water remains one of the reasons around the globe for conflict and there are many who believe future wars will be fought over water. However, in this small village, water became a reason to be united for. In mid 2009, villagers from Paralia Dhamat learnt about JBF's approach in a meeting facilitated in the village, and became interested in reviving their own water harvesting system. Then followed a process of mobilisation through campaigns, meetings and screenings of films on best practices, this initiated a process of collective thinking on common issues and the potential solutions; the first step being formation of a *Jal Sabha* (water user association) for the village.

The *Jal Sabha* was formed in November 2009, which united the entire village for the first time. The village *Jal Sabha* raised a *Jal Kosh* with contribution of people and formalised it by opening a bank account. The *Jal Sabha* has undertaken three micro projects of water harvesting in the village. First, they have increased the capacity of *Laun talab* (pond) from 6600 cubic meters to 14517 cubic meters. Second, they have constructed a school *tanka* of 24000 litres capacity for the village school to ensure water availability for the children. Third, they have enhanced the capacity of the second *talab* (pond), named *Piplai talab* (pond), from 19286 cubic meters to 23401 cubic meters. In the last monsoon, all the water harvesting structures were filled up with water to their maximum capacity. Thus with the three projects, the *Jal Sabha* has enhanced the water harvesting capacity of the village by more than 12 million litres, which is equivalent to an additional capacity of more than 400 litres per day for each household in the village. As a result of the collective effort of the community, the village has achieved water security.

Building upon the increased water availability, the *Jal Sabha* has undertaken plantation activities in the village. The project has supported them by giving different plants and trees. Each family has planted one tree and plantation activities have been undertaken in the school compound with the support of children.

They have also experimented in developing grasslands with a grass species called Dhaman. Shankalal Dji, who sowed Dhaman grass seeds, hopes "When cows or goats will eat this grass, they provide better milk".

From Non-cooperation to Ownership - Paralia Sasan

Paralia Sasan is a small village with a population of 1000 people, located in Barmer district of western Rajasthan. Being located in a dry arid zone, the village faces acute water scarcity. The sources of water in the village were a small pond and a well. The capacity of the pond was limited and its water used to last only eight to nine months in a year, while the water in the well is saline and unfit for drinking. In times of scarcity, people resorted to drinking saline water.

JBF facilitated meetings in the village to mobilise communities, create awareness and help them to learn about solutions for addressing water scarcity. However it took months to mobilise them to form a community based institution with equal participation of communities. In the initial meetings, people were reluctant to initiate a socially inclusive institution in the village. Many were unwilling to contribute for such a program.

To mobilise cooperation of the communities support of senior community members and volunteers was sought. Most notably, Mr. Hanuman Singh, who is a strong advocate of community based water management, took the leadership of mobilising the village community. After, a series of interactions with the community, he motivated the people to form an inclusive *Jal Sabha* to develop and manage water harvesting projects. The *Jal Sabha* was formed by the end of 2009, and started collecting community contributions to enhance the capacity of the village pond.

By the end of April 2010, they enhanced the capacity of the pond by almost 6000 cubic meters. As 2010 saw good monsoons, the pond is now full and people believe that the water will be available until the next monsoon. As the *Jal Sabha* was proud of the pond, they decided to go further in the improvement of villagers' living condition. To ensure the sustainability of their village pond, the *Jal Sabha* has also come forward to implement a water management system. The *Jal Sabha* has instituted norms and has restricted the use of water tankers from the *talab* (pond) to ensure that the water is used only for drinking.

The *Jal Sabha* also took a lead role in undertaking tree plantation activities in the village. Even though communities have great knowledge about their own environment; plantation was not a priority due to water scarcity. After capacity enhancement of the *talab* (pond) community members decided to plant trees. Plantation was given priority in the catchment area of the pond. In addition household plantation was also encouraged.

Even though it took a long time to mobilise the people in to a *Jal Sabha*, now it has become a strong village institution and stands as a model *Jal Sabha* that engages in development activities of the village.

Gawai Talab at Paralia Sasan

Community Norms for Water Management – Surani

Village Surani is a fairly large compact village in the Dugar Gram Panchayat of the Jodhpur district of Rajasthan. This village comprises of 190 households with a total population of 1300 people. Being a village in the arid zone of Rajasthan, it suffered from acute water scarcity. The water source in the village was a Ground Level Reservoir which received irregular supply and there was a village water harvesting structure called the *Gawai Talab* (pond) which harvested water for a period of eight to nine months only.

The village pond had a huge catchment area to harvest water from but the capacity was limited. The water from this pond was not only used by the people of the village Surani but also by the people from nearby hamlets such as Rabadiya and Vishnu Nagar.

In 2009 a meeting was organised in the village which turned into a campaign inspiring people to adopt community managed water harvesting systems. Best practices of water management were also shared in the meeting. The community members in Surani decided to form a *Jal Sabha* by the beginning of September 2009.

The *Jal Sabha* raised a *Jal Kosh* for capacity enhancement of the *Gawai Talab* (pond), and implemented a micro project that enhanced the capacity of their village pond to 66143 cubic meters. After the last monsoon, the pond has been filled with rainwater.

This success motivated the *Jal Sabha* to set up management systems to ensure efficient water resource management. They have developed community norms and set up a water management system. Now the neighbouring villages have to pay a use charge whenever they take water through tanker's of 4000 litres capacity from the pond. To ensure transparency and accountability, a receipt is issued to tanker driver. The money collected is deposited in the *Jal Kosh* for future maintenance of the pond. Moreover they have decided to restrict tankers from collecting water if the water level in the pond drops. Surani has become a successful example of community management. The *Jal Sabha* has become a platform for community action towards adaptive governance of water management.

9 Emerging Hopes for Adaptive Water Management

The World particularly India, is heading rapidly towards a water distressed future compounded by unpredictable weather pattern caused by global warming. However, the grassroots project implemented by Jal Bhagirathi Foundation with the support of the Hong Kong and Shanghai Banking Corporation Limited (HSBC) revitalises hopes for a promising future. The project has been successful in developing replicable models and strategies for increased water security through sustainable natural resource management as part of integrated approach to address climate change and reduce vulnerability in the Thar desert, which is the most densely populated desert in the world.

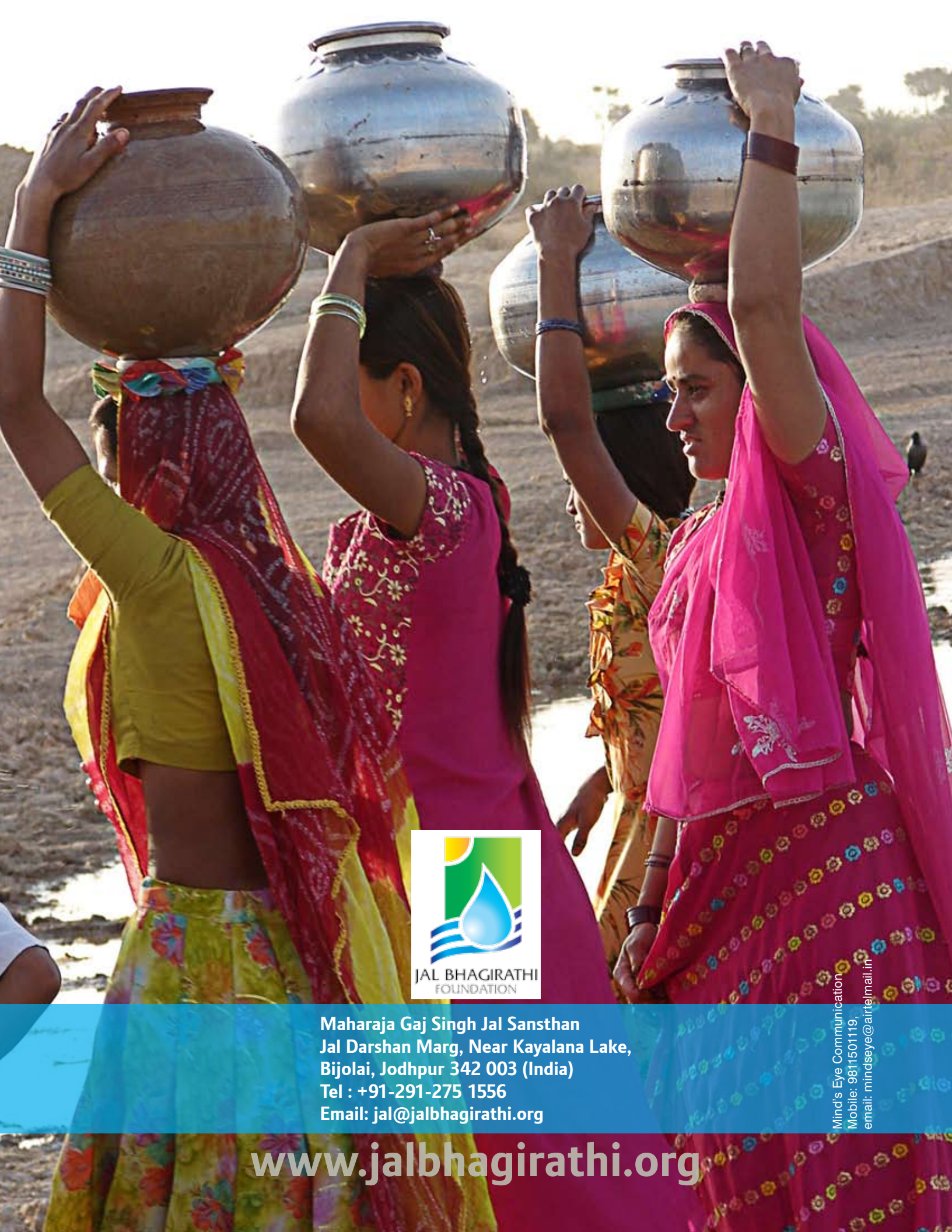
With a participatory bottom up approach that enables communities to enhance their coping capacities towards adaptive local governance of water and natural resources, the project included four major strategic components. First, it focused on creating and strengthening community institutions to effectively manage natural resources, especially water. Second, it focused on capacity development aiming to support village level institutions to adopt a pragmatic approach towards development of common property resources, and adaptive management of ecological resources. Third, the project supported community driven micro projects that aim to enable people to adapt to climate variability. Finally, it facilitated networking and knowledge sharing to replicate best practices and to mobilise support for the rural communities.

As per a recent evaluation, the project has resulted in considerable improvement of water availability. Water availability has increased by three to five months in all the project villages. It has resulted in saving of Rs. 150 to 300 per month in more than 60% of sample households. In addition, all the respondents have reported that the project has helped women considerably as the time spent for fetching water has been reduced by 3 to 4 hours every day. The increased water availability has also benefitted livestock in the village, and eventually contributes to better livelihood. The improved social capital with inclusive community based institutions has resulted in enhanced adaptive capacity of the villagers to cope with emerging challenges.

This approach is worth replicating and up scaling throughout the region and even in other areas facing water crisis. The key advantages of this approach are listed below.

1. It promotes a rights based and community centric approach, which has been recognised as critical in development initiatives.
2. It creates an enabling environment in the villages, with inclusive social capital through community based institutions, to discuss issues and develop strategies to address current and emerging challenges.
3. As the governance of water is directly dealt by people from the grassroots, it promotes decentralised and democratic processes of water governance. Also the community platforms can strengthen the processes of local governance with proactive citizens engaging in development issues.
4. With community norms and management systems that include collecting user charges, the community based institutions becomes financially sustainable to maintain water harvesting structures.

Traditional water efficient method of pitcher plantation



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