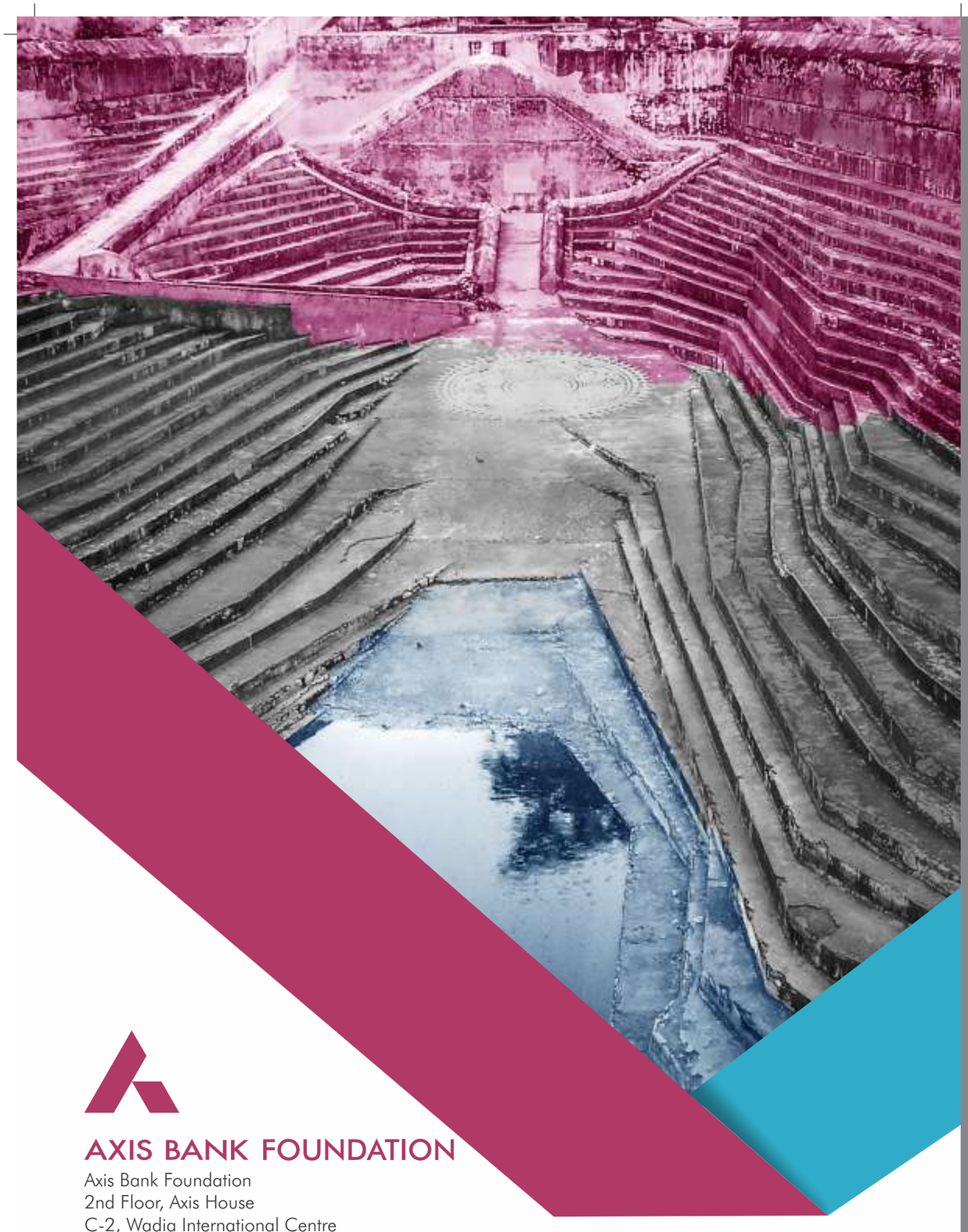

AXIS BANK FOUNDATION

AXIS BANK FOUNDATION
Axis Bank Foundation
2nd Floor, Axis House
C-2, Wadia International Centre
P.B. Marg, Worli, Mumbai – 400025
www.axisbankfoundation.org | foundation@axisbank.com

AXIS BANK FOUNDATION WATER - THE LIFE LINE OF RURAL LIVELIHOOD

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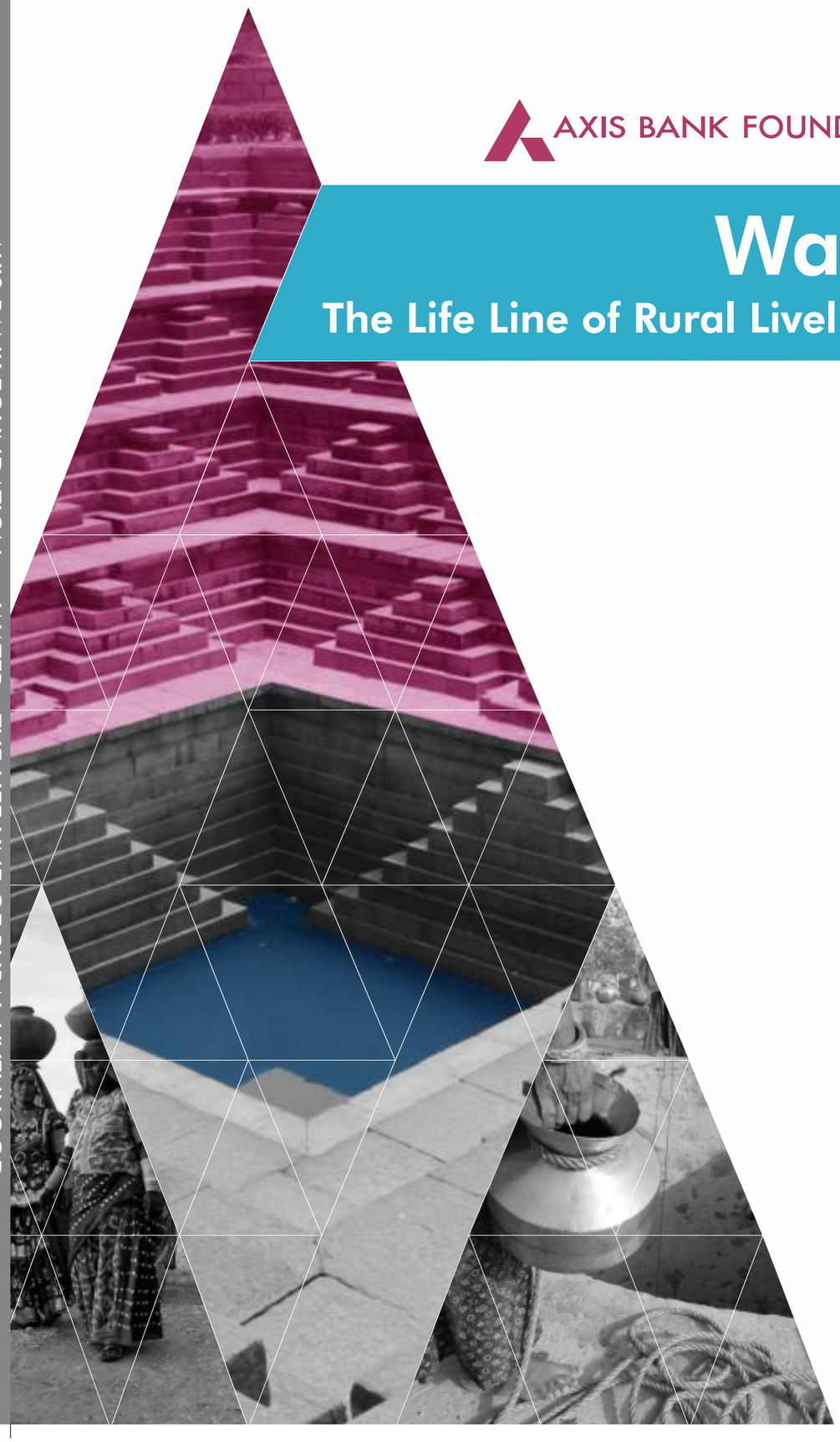
Water

The Life Line of Rural Livelihood



CONTENTS

Foreword

Water security is one of the primary challenges that India needs to address as it is growing rapidly. It is a vital issue as water security becomes the epicentre for many other challenges like food security, livelihood, health, etc. At a time when the availability of water is stressed owing to reasons of pollution and climate change, our demand is consistently increasing. We face challenges from various states related to sharing of river water, and the exploitation of ground water across India. Therefore, water conflicts are becoming endemic in India. It would not be an exaggeration to state that the future of India depends on how effectively we address the current water crisis.

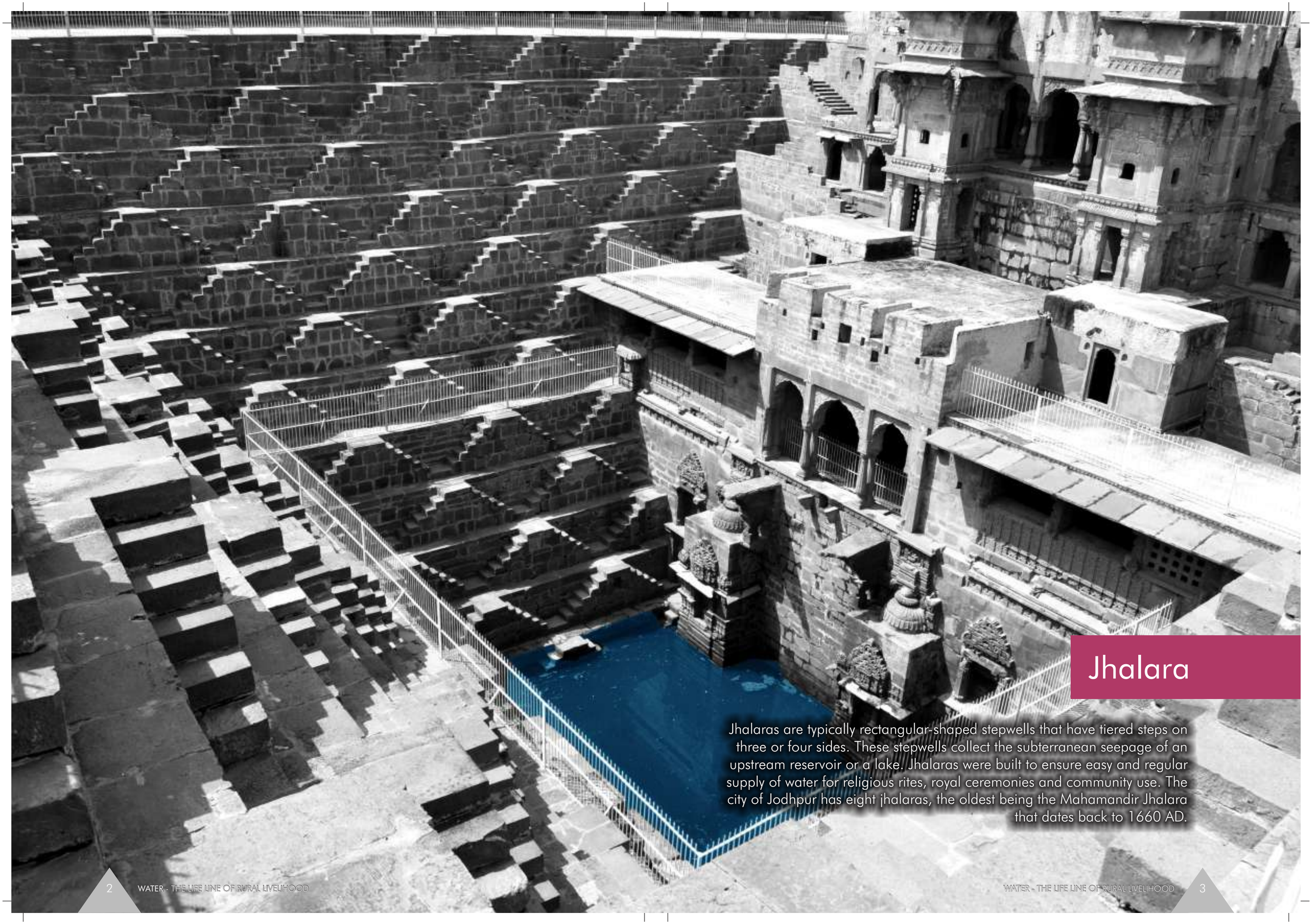
Like every civilisation, the India civilisation developed around water sources. According to vedic scriptures, water is one of the five key elements that the universe is made of. Rigveda also recognises that all life forms on this planet have evolved from Apah (water). Apart from being key for agriculture, cooking, cleanliness and hygiene, it was also the main mode of transport in ancient India. There are enough examples of engineering marvels of water conservation around us, including the traditional systems of water harvesting, such as the bawari, jhalara, nadi, tanka and khadin. Even today this ancient knowledge and wisdom is used as part of water crisis solution.

Although we have a culture that regards water as a sign of purity, the abuse and exploitation over the years has resulted in many available water resources either becoming not fit to use or depleted. India lacks on water efficient technology, policies and process when compared to many developed countries. India's water resource related challenges are diverse. India has a vast landscape with numerous regional variations. Water challenges faced in one part of the country may be very different when compared with certain other parts of the country. Similarly water challenges faced by urban community are different compared to rural populace. Rural livelihoods are more intricately linked to water and face higher risk from water related challenges. To evolve a solution in rural India and one which can be linked to improved livelihood, we need a multi-pronged approach involving the revival of traditional structures as well as creating new infrastructure for water conservation. Further, there is a need to recharge the groundwater level in watershed areas, increase water-use efficiency in agriculture by ensuring the adoption of water management techniques and conserve fertile soil through soil and moisture conservation.

Confronted with this reality, Axis Bank Foundation realises that their goal of sustainable livelihood will be achievable only by focussing on the issue of water and integrating this to activities that they undertake for the society. Axis Bank Foundation along with its partners works in some of the most socio-economic backward states. Axis Bank Foundation seeks to create systems and opportunities which would ultimately lead to employability, better income generation and self-sustenance. Water is one of the key interventions areas and water related elements transcends through most of Axis Bank Foundation supported projects.

This report highlights the importance of water in the road to sustainable livelihood and also showcases some of the case studies that bring forth Axis Bank Foundation's learnings.

THIS REPORT HIGHLIGHTS THE IMPORTANCE OF WATER IN THE ROAD TO SUSTAINABLE LIVELIHOOD AND ALSO SHOWCASES SOME OF THE CASE STUDIES THAT BRING FORTH AXIS BANK FOUNDATION'S LEARNINGS.



Jhalara

Jhalaras are typically rectangular-shaped stepwells that have tiered steps on three or four sides. These stepwells collect the subterranean seepage of an upstream reservoir or a lake. Jhalaras were built to ensure easy and regular supply of water for religious rites, royal ceremonies and community use. The city of Jodhpur has eight jhalaras, the oldest being the Mahamandir Jhalara that dates back to 1660 AD.

1

Importance of water in rural livelihood

India has achieved spectacular successes in many political, economic and social spheres after its independence in 1947. India is home to 1.3 billion people and is the largest democracy in the world. It is world's 4th largest and one of the fastest growing economies. The country has successfully transformed itself from the precarious phase of importing food grains during the early years post-independence to emerge as net exporter of food today[1]. Manufacturing in India has emerged as one of the sectors of economy with high growth potential. India has witnessed a service sector boom in last couple of decades and contributes significantly to the economy as major source of employment.

A VERY LARGE SECTION OF INDIA'S RURAL POPULATION CONTINUES TO RELY ON AGRICULTURE AS A LIVELIHOOD SOURCE.

[1] World Bank, Country Profile, India

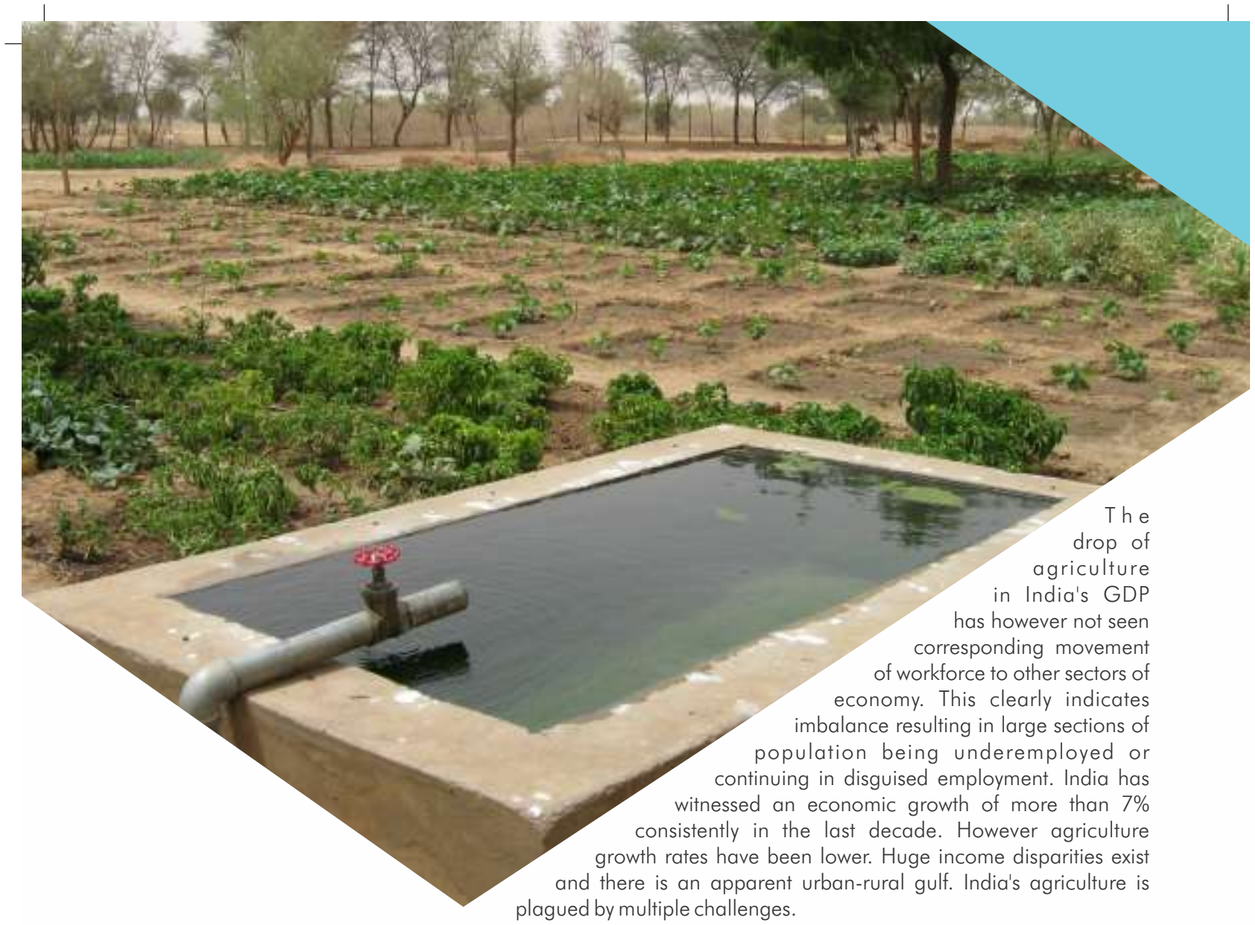
According to conventional economic understanding[2], as countries progress towards development, workforce participation should shift from primary to secondary and tertiary sectors of economy. There is a drift seen from agriculture jobs to non-agriculture jobs in the rural areas. Between 2005 and 2012, 48 million jobs were created which were non-agriculture and pre-dominantly rural in nature. About half of these were construction jobs. During the same time span, manufacturing sector added only 5.1 million jobs. Service sector performed the best in terms of employment with creation of 13 million jobs during the said period[3]. A significant section (about 53%) of the Indian population is engaged in agriculture and related livelihood activities.

Livelihood refers to the means of securing the necessities of life. The conventional list of basic needs of a human include air, water, food, clothing and shelter. Within the list, food and clothing are again linked to water. Water is required by everyone for multiple activities related to our livelihood. This includes water consumption for personal needs like drinking, cooking, washing and sanitation as well as productive needs like practicing agriculture, livestock and allied activities. Rural economies are more closely inter-linked with water as they tend to rely more on the natural endowments for their outputs, primarily through agriculture.

Agriculture has and continues to play an important role in Indian economy. However, Agriculture's contribution to the overall Indian economy is steadily declining. As per Central Statistical Office (CSO) Agriculture's share in GDP was 44% in 1970-71. It declined to 31% in 1990-91 and it has further come down to about 15% in 2009-10.

GDP / Labour Force Participation	Primary	Secondary	Tertiary
1991:	29% / 67%	26% / 13%	45% / 20%
2001:	25% / 57%	25% / 17%	50% /26%
2011:	15% / 51%	30% / 22%	55% / 27%

[2] Three sector theory (Clark et.al)
[3] SOIL report 2014, pp 14



The drop of agriculture in India's GDP has however not seen corresponding movement of workforce to other sectors of economy. This clearly indicates imbalance resulting in large sections of population being underemployed or continuing in disguised employment. India has witnessed an economic growth of more than 7% consistently in the last decade. However agriculture growth rates have been lower. Huge income disparities exist and there is an apparent urban-rural gulf. India's agriculture is plagued by multiple challenges.

Socio economic and environmental issues-waterAn important factor ailing Indian agriculture is size of farm holdings. 67% of India's farmland is held by small and marginal farmers. The agriculture production, most of the times is so low that it is mainly consumed at the household level itself with hardly anything going to the market. High input costs and low economic output affects the financial viability of farming as an occupation for farmers. As a consequence many have been forced to borrow money at very high interest rates and have been caught in debt trap. A combination of multiple factors have resulted in high incidence of poverty for the farming community. Many regions of the country have witnessed acute farm distress resulting in farmer suicides.

A large section of India's rural population continues to rely on agriculture for livelihood. The intrinsic linkages between water and livelihood, hence, is quite evident. Water flows through three inter-linked systems[4] as shown below-

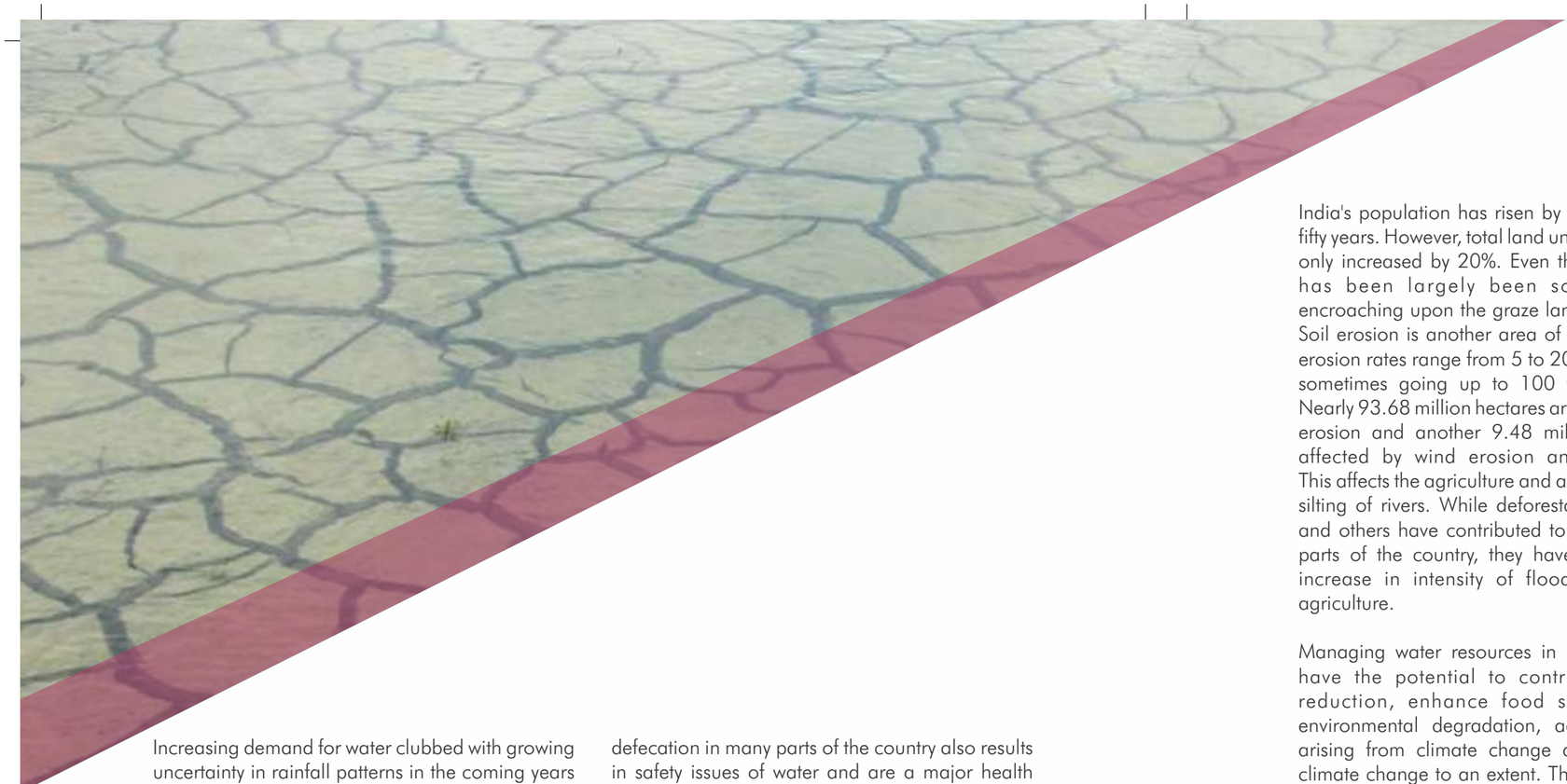
[4](Cook & Gichuki, 2006), cited in https://www.sei international.org/mediamanager/documents/Publications/Sustainable-livelihoods/assessing-water-related-poverty.pdf

The water available is partly determined by two factors: the natural water availability (the hydrological system) and the available water infrastructure (part of the food production system). The available water is then used to produce crops, in an amount determined by the water productivity (the rest of the food production system). The produce is then used to support the livelihood goals resulting in livelihood outcomes. Disturbance to any of the system results in consequences to the other two systems. Food production system is heavily dependent upon water. Agriculture accounts for about 70% of water use globally[5]. In India, the agricultural sector consumes approximately 82% of the total water.

Another important factor seriously affecting agriculture is that about 60% of India's cropped area is rain-fed. Rain-fed regions are also the parts which have relatively higher concentrations of poverty. There are large levels of uncertainty for the output and rain-fed regions have witnessed low productivity. It has been observed that rain-fed regions of the country have experienced multitude of problems. The regions face acute water shortage and water tables have depleted rapidly as a result of exploitation of resources. Rain fed areas mostly have only one crop in a year and for the rest of the year a large number of farmers are forced to work as labourer, migrate to towns/cities in search of work or stay at home. It has several social dimensions too. Because of frequent migration, education of children in families get affected. Similarly many villages are only left with children and elderly with all working members moving out in search of employment. Thus, addressing the issue of water (availability/access/management) shall help towards addressing the overall socio-economic and environmental concerns presented here, in a sustainable manner.

Rainfall pattern in India has temporal as well as spatial dimensions. Majority of the rainfall falls in India in a short period of 4 Months. Coupled with the fact that India has limited storage capacities, most of the rain water gradually drains off in to the sea. Significant costs are involved and would require heavy financial investments in increasing the storage capacity. Furthermore, rainfall pattern in India is very diverse. While eastern India receives heavy rainfall, certain parts of western India receive low rains. Not just the availability of water, the quality of water made available, and the effective and efficient management of water resources are also important for agriculture to continue as a sustainable livelihood option for millions of farmers. Projections of water supply and population growth rate in India are showing a challenging scenario for the future; while the average per capita supply of water would decrease by one-thirds by 2025, water use is likely to increase by about 50% during the same period. Low water productivity in agriculture along with ageing supply infrastructure could lead to significant supply–demand gaps in many basins with currently planned crop choices. The continuance of agriculture as a sustainable livelihood option can become a challenge, leading to social unrest situation — especially food crisis, poverty and mass migration from rural areas.

[5]http://www.oecd.org/agriculture/wateruseinagriculture.htm



Increasing demand for water clubbed with growing uncertainty in rainfall patterns in the coming years pose a challenge to sustainable agricultural practices. Considering the size of the country, its diverse landscape, population and differential progress achieved by different states, it is clear that any water based intervention should necessarily keep local context in perspective[6].

Fertilizer and pesticides enter the ground water through percolation and they are also carried through the water flow. This affects the quality of water seriously and many a times render it useless and harmful at the same time. Water quality is also affected negatively as a result of industrial waste being discharged into rivers, water streams without any form of treatment. This affects the quality of soil as well the produce that comes out of such farms. Domestic usage of water also contributes significantly to the quality of water. Untreated sewage from the cities is discharged into rivers causing heavy pollution. It has been studied that all the fourteen major river systems of the country are severely polluted[7]. Furthermore, practice of open defecation in many parts of the country also results in safety issues of water and are a major health hazard.

Climate change may result in changes in weather patterns and increase in hydro-meteorological events such as Floods, Cyclone, Drought, Avalanche and Heat Waves/Cold Waves. Effects of climate change are increasingly being felt. Rise in temperatures would affect the natural ecosystems, agriculture and human health.

India is the second-largest rice and wheat producing country in the world. The two crops have also been part of India's food security mission. However, both the crops are extremely sensitive to heat. It is estimated that with rise in temperatures wheat and rice production would be severely affected. With the rise in temperatures, vulnerability of agriculture practiced in coastal India is also bound to increase. This would be on account of increase in salinity of soil because of sea-water infusion, loss of land to sea-water ingression and others. Thus the situation gets aggravated due to the predicted climate change.

[6]Water resources of India Rakesh Kumar, R. D. Singh and K. D. Sharma* National Institute of Hydrology, Roorkee 247 667, India
[7]APCSS 1999, Cited in State of India Environment Report 2009

India's population has risen by three times in last fifty years. However, total land under cultivation has only increased by 20%. Even this increased land has been largely been sourced through encroaching upon the graze land and the forests. Soil erosion is another area of concern. In India, erosion rates range from 5 to 20 tons per hectare, sometimes going up to 100 tons per hectare. Nearly 93.68 million hectares are affected by water erosion and another 9.48 million hectares are affected by wind erosion annually in India[8]. This affects the agriculture and also results in heavy silting of rivers. While deforestation, soil erosion and others have contributed to flooding in many parts of the country, they have also resulted in increase in intensity of floods and impacted agriculture.

Managing water resources in a holistic manner have the potential to contribute to poverty reduction, enhance food security, address environmental degradation, adapt to the risks arising from climate change and also mitigate climate change to an extent. There are numerous innovations happening in the space of water management and also on climate resilient agriculture. Besides innovation, there are many avenues to strengthen existing solutions which when implemented well can have both incremental as well as transformational impact. There is lot of scope in strengthening, modernizing and innovative use of the irrigation systems. Most of such new systems focus on effective and efficient usage of water. Furthermore, there are ample opportunities to converge participatory governance measures with water resources management. There are successful models which have evolved in different parts of the country which have decentralized governance structures with communities owning and managing such interventions. Such models also acknowledge and respect the indigenous knowledge existing with the communities.

To create a solution in rural India and improve livelihoods, there needs to be a multipronged approach which involves revival of traditional structures as well as create new infrastructure for water conservation, increase the groundwater recharge in the watershed area, increase water use efficiency in agriculture by ensuring the adoption of water management techniques and conserve fertile soil through soil and moisture conservation. The key for all these efforts to converge to solution is the scale of the activities. Hence it is important to showcase the efforts which has been successful and expand the applicable learnings to the benefit of a bigger population.

[8]National Bureau of Soil Survey & Landuse Planning, 2005 cited in State of Environment Report (2009)

Talab /Bandhi

Talabs are reservoirs that store water for household consumption and drinking purposes. They may be natural, such as the pokhariyan ponds at Tikamgarh in the Bundelkhand region or man made, such as the lakes of Udaipur. A reservoir with an area less than five bighas is called a talai, a medium sized lake is called a bandhi and bigger lakes are called sagar or samand.

2

The road to sustainable livelihood

A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. (Chambers & Conway, 1991).

Demographically, India has a young population. This young population has its advantages. It can productively contribute in expansion of economy and help in socio-economic development. Alternatively, in the absence of livelihood opportunities to a young population can cause social turmoil too.

The Government of India is mindful of the opportunities country has and the challenges it is facing in terms of sustainable rural livelihood. Government is implementing National Rural Livelihood Mission (NRLM) from 2011. NRLM, as the name suggests, has set itself a target of reaching out to the rural population below the poverty line and linking them with sustainable livelihood opportunities[9]. NRLM aims to strengthen the existing livelihood options and opportunities to upscale. It also aims to impart skills to facilitate linkages with job market. Additionally, it intends to support/hand hold self-employed individuals and entrepreneurs[10]. Another important initiative from government is implementation of MGNREGA which guarantees hundred days of employment to rural household members willing to do unskilled manual work.

ENHANCED ECONOMIC RETURNS FOR AGRICULTURE ARE IMPORTANT FOR SUSTENANCE AND FLOURISHING OF AGRICULTURE AS A SUSTAINABLE LIVELIHOOD OPTION

Axis Bank is the third-largest private sector bank in India. It offers financial services to a diverse clientele ranging from corporates to Micro, Small and Medium Enterprises (MSME) to retail customers. Demonstrating strong commitments for the larger good of the society, multiple Corporate Social Responsibility (CSR) interventions were initiated by the bank since it became operational. To bring in more coherence to its initiatives, Axis Bank Foundation was established as a public trust in 2006. The setting up of Axis Bank Foundation in a way is a reflection of the fact that Axis Bank wants to pursue its corporate social responsibility initiatives in a strategic manner. It emulates the confidence of the leadership team to replicate the enormous success it is achieving in the business of banking to address India's development sector challenges. Having evolved from one of the biggest banks in the country, Axis Bank Foundation inherits the necessary knowledge and expertise to excel as a professional entity. Axis Bank's commitment for sustained and assured funding to Axis Bank Foundation is helping it in formulation of a long term vision for itself with an opportunity to implement its initiatives with clear conceptual frameworks, programmatic approaches and an academic rigor. The presence of a Foundation is also resulting in better control on overall projects, effective collaborating opportunities with different NGOs and government agencies. While empowering the communities, Axis Bank Foundation is providing a platform for Axis Bank and group employees to directly engage with the communities. This in turn is helping the employees in understanding the issues affecting the communities and how their organisation is trying to address them.

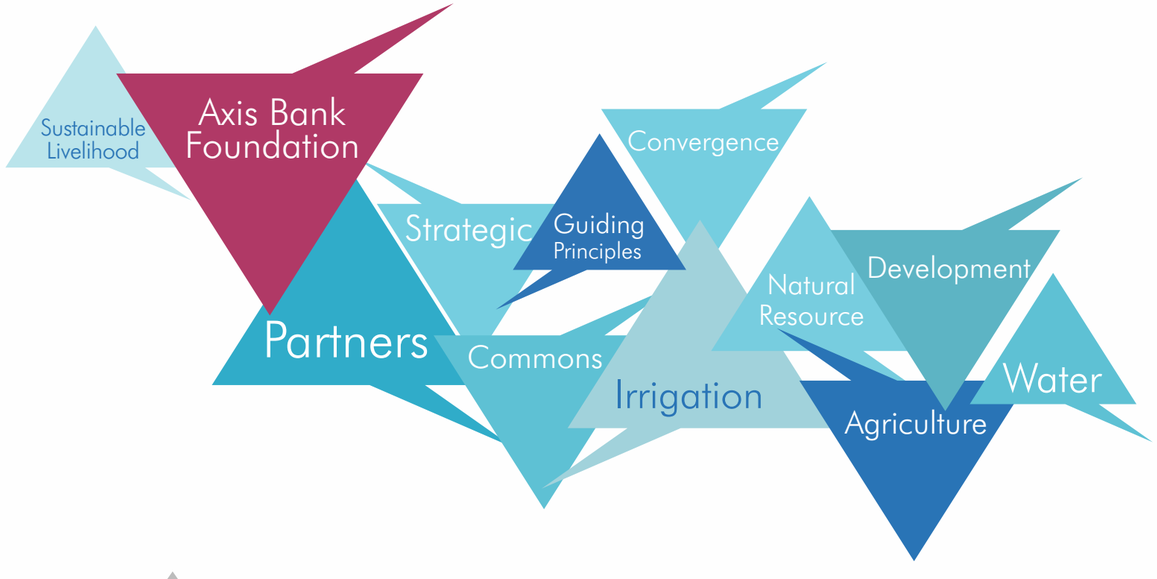
[9]NRLM Vision Document

[10]http://www.pib.nic.in/newsite/PrintRelease.aspx?relid=72...

Considering the high proportion of India's rural population dependence upon agriculture as a livelihood source, sectorial growth in agricultural sector needs to be higher. Higher growth rates would help in making agriculture a more rewarding enterprise. Enhanced economic returns for agriculture are important for sustenance and flourishing of agriculture as a sustainable livelihood option. One of the reasons for low productivity in agriculture is lack of irrigation facilities and singular dependence on rainfall. In Rain fed areas cropping is done only once in a year. Farmers engage in alternative livelihoods like working as labourers locally or migrate to cities for rest of the year or remain under employed. This leads to low levels of productivity both in terms of farm production as well as human capital. Availability of sustainable irrigation measures can help in accessing water in the non-monsoon period and thereby helping farmers in increasing production and better utilization of human resources. Irrigation measures through water resource management would help in effective environmental management with avoidance of exploitation of ground water resources. At the national level, government has launched Pradhan Mantri Krishi Sinchayaee Yojana (PMKSY) to address the issue of lack of irrigation. It is an important scheme and views agriculture and water related issues in an integrated manner. PMKSY envisages convergence of investments in irrigation for a holistic outcome which would include expansion in irrigated land, efficient water usage, scientific agriculture practices and others.

Small land holdings affect the productivity of agriculture. Efforts are being made for land aggregation by farmers which would help in application of improved farm practices at a large scale. Large scale interventions would help in bringing in economics of scale and thereby increase farm production. Farmer groups can help in increase in production and strength for collective bargaining for fair prices for their produce. Government is trying to simplify regulations surrounding leasing of land between farmers. With assured tenure, tenant farmers may get encouraged to make investments for increasing production.

Need for water in India is rising and would continue to rise in coming decades owing to increasing population and energy needs. Per capita availability of water is going down. Un-sustainable use of water in the coming decades may lead to major crises. In such situation, it is important that water is not treated as a commodity but as a critical resource to be used sustainably. National Water Policy (2012) has suggested a slew of measures in this regard. Amongst few, it emphasizes on judicious and sustainable use of water. It encourages supply as well demand side management of water resources. It suggests evolution of a unified water governance framework for the country.



Along with demand and supply side aspects of water, quality of water has a bearing on productivity of agriculture as well as the quality of produce. Release of un-treated industrial effluents in rivers and water bodies, indiscriminate use of pesticides and fertilizers, practice of open defecation and others have potential to affect the quality of agriculture produce as well as cause environmental degradation. Government is working towards strengthening of enforcement of environmental regulations towards treatment and discharge of industrial effluents, it is promoting farming which is less chemical intensive and is also working on programs like "Swachh Bharat Mission" to stop the practice of open defecation.

Sustainability of any industry is dependent upon its ability to withstand shocks (natural and human made) and bounce back to its original or better position. Indian agriculture is vulnerable to shocks which could be nature or human induced. Natural shocks include events like floods, droughts and other extreme events. Human induced shocks include price collapses and others. Government of India has launched Pradan Mantri Fasal Bima Yozana (PMFBY) to mitigate such shocks. Governments have also been offering minimum support prices to farmers from long time to withstand price related shocks. With global warming, there is expected rise in extreme weather events. Various measures in the direction of climate resilient agriculture are evolving with participation from UN agencies, Government of India, academic and research institutions and grass-root based NGOs.

Sustainable livelihood approach was used by Axis Bank Foundation as a tool to address the underlying issues of poverty and unstable income sources. Axis Bank Foundation's mission is based on the classical theory of development wherein sustainable livelihood is defined as the livelihood which can cope with and recover from stress and shocks, maintains or enhances capabilities and assets (social, physical and economic) and creates conditions that are suitable for better education, health and sanitation, seeking behaviour and sustainable livelihoods for the next generation[11]. The Sustainable livelihood framework is used by Axis Bank Foundation as a framework for poverty reduction. It has been cognisant that low incomes alone are not an indicator of poverty[12]. Poor health, low levels of education, susceptibility to threats / events, abilities / challenges faced in capitalizing of opportunities are also indicators of poverty. Axis Bank Foundation acknowledges the multi-dimensional nature of poverty and therefore is more inclined towards the United Nations Development Programme's (UNDP) Human Development Index (HDI), which captures progress through multiple elements like income, health care and education.

Axis Bank Foundation is using sustainable livelihood framework as an instrument for planning as well as evaluating programs. It is applying it in analyzing the issues in livelihoods in an integrated manner and is engaging with partners which it feels are strategically aligned in addressing the critical issues affecting the sustainability of livelihoods[13].

Within the sustainable livelihoods framework, sustainability of rural livelihood was identified as a priority consideration because of the fact that a very large section of the population (about 60%) in India continues to stays in villages and it was also sensed that challenges of rural livelihood were relatively less addressed and needed attention. The focus is towards small and marginal farmers and certain rain-fed regions of the country. Axis Bank Foundation acknowledges the criticality of water for sustainable practice of agriculture and has designed programs accordingly.

[11]http://www.axisbankfoundation.org/about-us/vision-and-mission.aspx
[12]http://www.sida.se/globalassets/publications/import/pdf/en/the-sustainable-livelihood-approach-to-poverty-reduction.pdf
[13] http://www.sida.se/globalassets/publications/import/pdf/en/the-sustainable-livelihood-approach-to-poverty-reduction.pdf

Axis Bank Foundation partnered with Non-Government Organisations (NGOs) who had extensive experience of working in the rural livelihood and water security domain. Partners are mainly the ones who have presence in the specific geographies and relevant expertise in the area of agriculture, livelihoods and water management. The partnership model provides Foundation with an opportunity to engage partners in a non-hierarchal manner. Axis Bank Foundation firmly believes in developing long term partnerships with partners. An important aspect of Foundation's strategy while engaging with different partners is not limiting its engagement by providing financial support alone. It supports partners with the necessary technical expertise and capacity development support.

Most of the projects being implemented are present in one of India's most backward districts. Many of the districts rank are poor and also rank low in Human Development Index (HDI). The focus of Axis Bank Foundation has been to bring about socio-economic transformation in the lives of vulnerable and marginalized sections of the society.

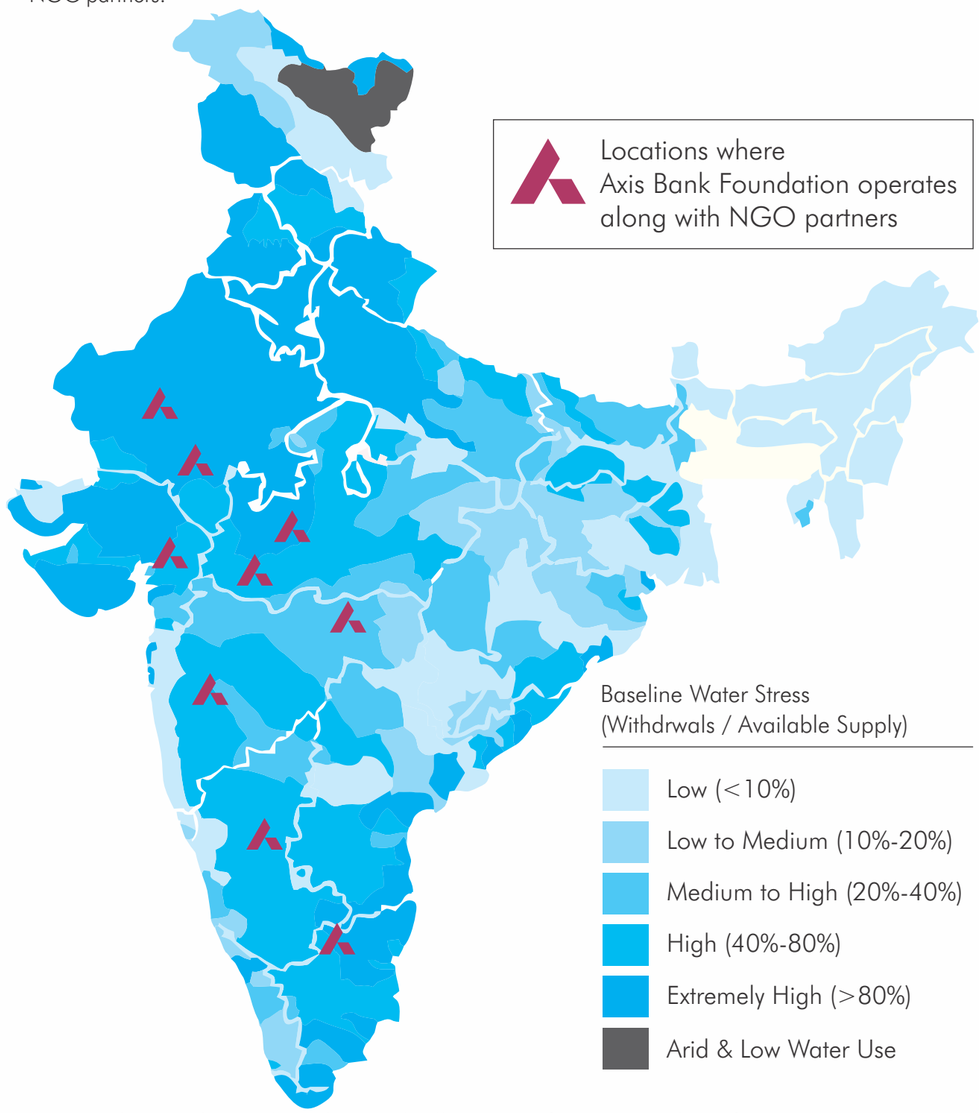
Axis Bank Foundation has formulated objectives for itself which it plans to attain in a time bound manner. They have been listed below-

- **To provide sustainable livelihoods to 1 million by 2017 through partnerships.**
- **Within the larger subset of strengthening sustainable livelihood, the vertical will have a focus on education, natural resource management, agriculture, horticulture and livestock development, micro enterprise, vocational training and skill development.**

Axis Bank Foundation has sought convergence opportunities in its program design to not only create its own outcomes but to augment outcomes being achieved through government and programs from other corporates. The programs of Axis Bank Foundation effectively leverages several government schemes to progress towards fostering and sustaining livelihoods of rural households. Skills development and self-employment components are included in programs to strengthen livelihoods wherever possible. Axis Bank Foundation has focused on rain-fed regions of the country. It has designed programs through which water received through rains is harvested and used during non-monsoon period. Small scale irrigation measures are one the most important interventions of Axis Bank Foundation. These irrigation measures are helping in increasing the coverage of irrigated land. Availability of water is helping farmers to practice multi-cropping and thereby improve incomes of the farmers. Programs are designed with a participatory approach and focus is on water resources management. Innovative techniques and water harvesting approaches are incorporated in programs for effective and efficient utilization of resources. Along with water availability, demand management of water is encouraged in programs, thereby focusing on water efficiency aspects. Crop choices are made based upon water availability for the same. Axis Bank Foundation designs programs with sincere appreciation of traditional knowledge of communities and its inherent strengths.

Axis Bank Foundation has completed 10 years of its journey. Over last 10 years, Axis Bank Foundation is partnering with multiple organization across different geographies of the country and is reaching out to diverse group of people. Axis Bank Foundation is realizing that what it is doing, matters and is encouraged by the results and responses it is receiving. The results have made it take an optimistic view for the future. Axis Bank Foundation realizes the challenges ahead of it and is taking a concerned optimist point of view.

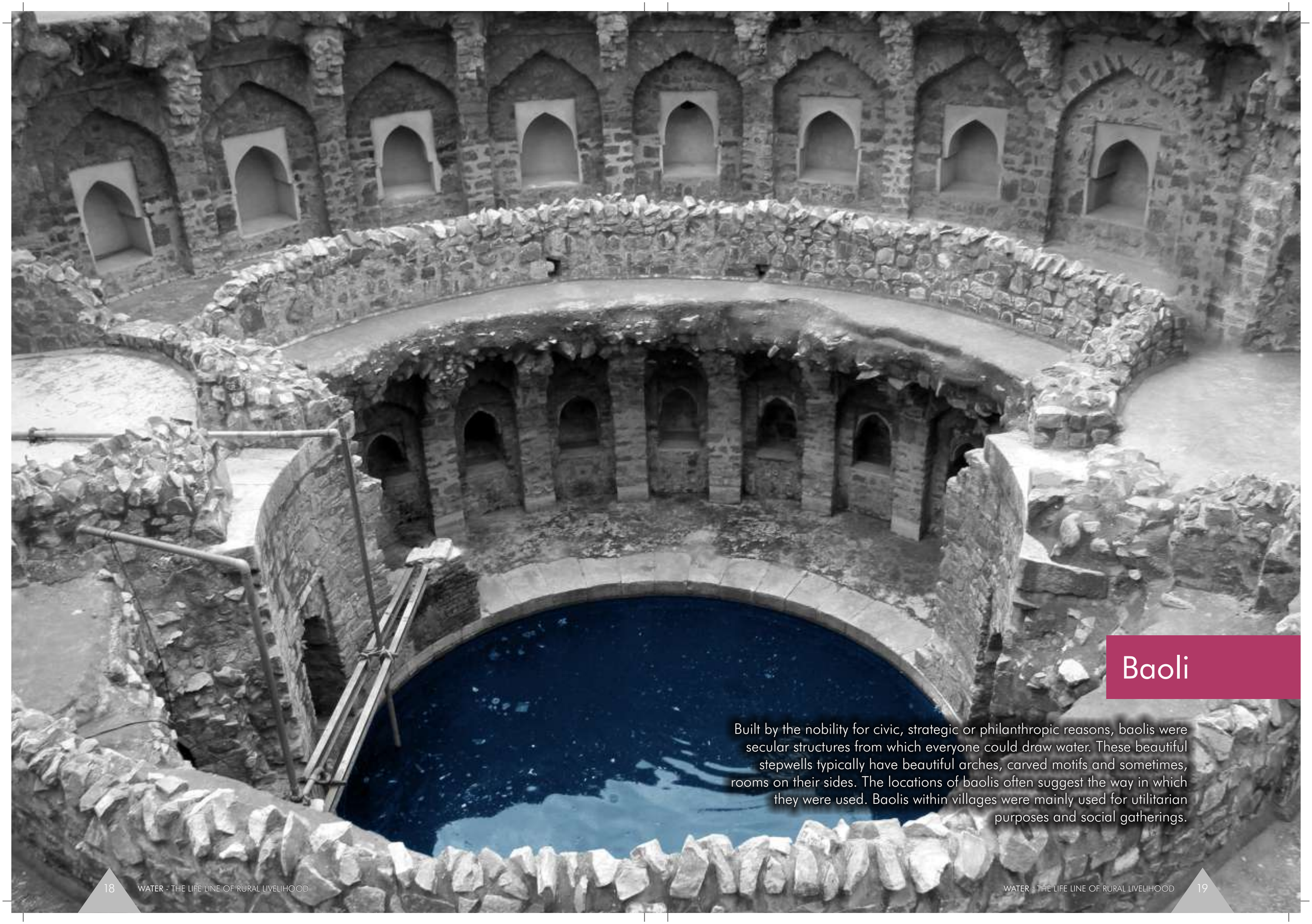
Baseline Water Stress Map[14] India shows locations where Axis Bank Foundation operates along with its NGO partners.



Axis Bank Foundation has designed all its interventions with a focus on scale with long term support. Interventions are implemented on a large landscape for a reasonably long period of time. It helps in creation of a hydrological impact over the environment which otherwise would not be possible.

A few case studies of Axis Bank Foundation's experience in providing support to households with sustainable livelihood sources are presented in the next chapter. Each case study brings forth its uniqueness with regards to the design, execution, approach and context of the intervention and at the same time demonstrates the application of sustainable livelihood framework as a common thread binding them all together.

[14] -http://www.wri.org/blog/2015/02/3-maps-explain-india%E2%80%99s-growing-water-risks



Baoli

Built by the nobility for civic, strategic or philanthropic reasons, baolis were secular structures from which everyone could draw water. These beautiful stepwells typically have beautiful arches, carved motifs and sometimes, rooms on their sides. The locations of baolis often suggest the way in which they were used. Baolis within villages were mainly used for utilitarian purposes and social gatherings.

3
Sharing the experiences

The challenge related to water can be addressed only by involvement of all stakeholders. It also requires an all-round involvement around new water resources, augmentation of available resources, prevention of water pollution and improving the efficiency of water. The interventions are also required to be designed taking into account the local practices and cultures. In this section of the report Axis Bank Foundation has showcased its projects in Maharashtra, Tamil Nadu, Madhya Pradesh, Rajasthan, Karnataka and Gujarat. The case studies showcase the challenge, the project, the community involvement, value of partnership and the impacts created. Interventions are designed with a focus on scale with commitment towards long term support.

IN THIS SECTION OF THE REPORT AXIS BANK FOUNDATION HAS SHOWCASED ITS PROJECTS AROUND MAHARASHTRA, TAMIL NADU, MADHYA PRADESH, RAJASTHAN, KARNATAKA AND GUJARAT. THE CASE STUDIES SHOWCASE THE CHALLENGE, THE PROJECT, THE COMMUNITY INVOLVEMENT, VALUE OF PARTNERSHIP AND THE IMPACTS CREATED.

3.1 Phad irrigation system and Doha model in Maharashtra

The Vidarbha region is in the eastern part of Maharashtra and comprises 11 districts falling in two administrative divisions (Amravati and Nagpur). Vidarbha is considered to be one of the backward regions of the state. Agriculture is the primary source of livelihood for 80% of the population. In an agrarian economy, there is heavy dependence of the community on the natural resources for their livelihoods. 55% of farmers in Vidarbha are small and marginal farmers (land holding less than 2 Ha). 35% of farmers have medium land holding (between 2-4 Ha). Although 33% of the total agricultural land of Maharashtra falls in the Vidarbha region, productivity of the farm land is low compared to other parts of the state. For instance, average productivity of paddy in Vidarbha is 780 kg/ha compared to 1850 kg/ha in Western Maharashtra[15].

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Vidharbha	18731872	70.94 %	76.27 %	64813	70.34 %	15 %	74.87 %	1000 mm	27 %
Marathwada	23012551	75.15 %	83.94%	97404	55.16 %	8 %	71.02 %	600 mm	2 %

[15]http://timesofindia.indiatimes.com/city/nagpur/Farm-income-growth-in-Vidarbha-may-be-negative-over-last-decade/articleshow/45622857.cms

Water is one of the most critical input for agriculture. Vidarbha receives an annual rainfall between 800 and 1000 mm but rainfall pattern is erratic in nature and the land topography is undulating, with slopes. Most of the farming is rain-fed with mono-cropping widely practiced. Small holding patterns limit the usage of technology and modern farming practices that are important for increasing crop productivity. Due to lack of scientific management of soil for many decades, the quality of top soil has deteriorated considerably, which has affected the crop productivity. Compared with other parts of the State, Vidarbha is relatively less industrialised that restricts the livelihood diversification strategies of the communities.

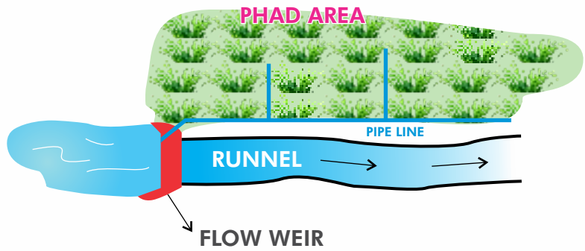
The Marathwada region is in the central part of Maharashtra and comprises eight districts and falls under administrative division of Aurangabad. 70% farmers in Marathwada are small and marginal farmers (land holding of less than 2 Ha). 22% farmers have medium land holding (between 2-4 Ha). A large part of the region falls under rain shadow region and receives annual rainfall between 500 and 600mm. It is one of the most drought-prone region in the state. The availability of irrigation facilities is low with only 8–10% of crop land under irrigation. Frequent droughts and extreme weather events has affected the region badly and continues to be backward compared to other parts of the state. Productivity of agriculture fluctuates with the vagaries of the weather. Only about 2 % of its total geographical area is covered with forests and lot of it is degraded. Despite being part of drought prone region, there is excessive cultivation of sugar cane in the region. There are about 70 sugar factories in Marathwada region. Sugar cane is a water intensive crop. Most of the sugar cane farming is practised through irrigation and ground water has been exploited from decades. Sugar cane has been encouraged in the region (with better returns in short run, farmers compared to other crops) despite it clearly having sustainability challenges to the entire eco system in the region. Sugar cane cultivation has led to chronic water shortage in the region.

Both Vidarbha and Marathwada face acute agro-water crisis from last many years. The crisis has taken significant toll on human lives with a high number of farmers from the region committing suicides.

High dependency on rain-fed agriculture, low irrigation coverage, fragmented ownership of land, vulnerability to drought and other extreme weather events, and uncertain crop prices, are the key factors which have caused severe agrarian distress. In the absence of adequate irrigation, ground water resources have been exploited. Lack of availability of water at a critical growing stage of crop is one of the major reasons for crop failure. For farm based livelihood security, timely availability of water is of paramount importance. In absence of irrigation and incentives available for water intensive crops, ground water is used indiscriminately through extraction. Water levels are going down and are affecting the sustainability of the ecosystem in the region. Market incentives exist for cash crops, which further augment the water stress. Farmers have committed suicides owing to frequent crop failures and the debt trap.

Rampant distress migration to cities for alternate livelihood is prevalent. Household-level food security and education of children is affected due to this turmoil. Youth of the region have got de-alienated from agriculture as a sustainable livelihood option. Natural resources have got degraded which has affected many aspects of life including availability of clean drinking water.

Solution to agricultural problems in Vidarbha and Marathwada require adoption of location specific water resource management measures. This is being done through activities such as widening of rivers and streams, construction of series of check dam, construction of farm pond / farm pits. These are few alternatives for conservation and harvesting of rain water in the water stressed villages of the Vidarbha and Marathwada region. Water harvested is further channelized into the farms through diversion and gravity based irrigation system. Water conservation and irrigation along with appropriate choice of crops is practiced to cope with weather extremes and to ensure agriculture sustains as a livelihood option.



Key water conservation interventions introduced in the region are Phad Irrigation System and Doha Model.

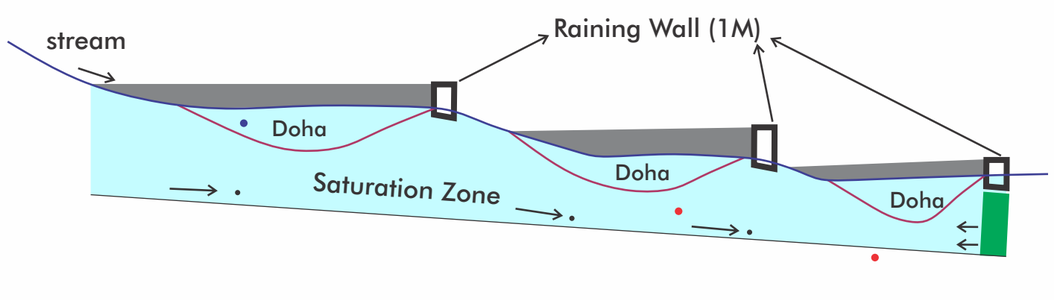
Phad Irrigation System is a low-cost small irrigation system in which the rainwater or flowing water in the river is diverted to a nearby field by constructing diversion weir and contour canal or through PVC pipes. Phad Irrigation System is generally useful for protective irrigation of cotton and other kharif crop, such as Tur. Cotton farming is one of the major rain-fed crop practiced in the region.

To ensure safe crop yield, provision of water at critical junctures is important. Water is required to protect crops in the last week of September or the first week of October. Phad irrigation helps in providing water at this juncture. With an average rainfall between 800-1000 mm in the Vidarbha region, local naalas and rivers have sufficient flows during this season. Through Phad irrigation, water flow is channelized to nearby fields without any usage of mechanical or electrical energy.

Doha is a stream based water storage model. It is a low cost water harvesting structure built in bed level of stream to harvest rain water below ground level. It is aimed at recharging ground water tables of nearby area without construction of any cement structure. A stream is selected which has a minimum length of 1,000–3,000m from the emergence to the junction. The model sites are chosen at the areas in a stream where river bed slope is 2–3% to length of 500m.

The Doha pits (storage tank-depth of usually 2-4m) are created below the stream bed level by excavation of stream (widening and deepening up to 20% of the existing section) in a saucer shape and left natural bunds at regular interval, to minimize siltation process. Underground Bandhara is constructed with black soil at every 1,000m to minimise underground seepage.

Sectional View Of Doha Model



A participatory approach and community involvement throughout the project intervention is ensured. Village watershed committees are constituted which are the apex body for implementation of all project activities. The committees are constituted in Gramsabha. A complete plan of rainwater harvesting technology and improved agriculture plan are passed through the meetings of Gramsabha. Resolution from each farmer is obtained before execution of any of the physical works of the project. Implementing partners plays the role of facilitator. 10% of cost on construction of physical structures are sourced from farmers who get direct benefit from project interventions. This helps in community ownership of the project. Capacity development of Village Institutions like Village Water Committees, Local Governing Bodies, SHGs and others is done.

All beneficiaries are organized under User's Groups (UGs). Formation of UGs help speedy execution of work. UGs are actively involved in the project and are responsible for collection of community contribution, monitoring of ongoing work and also solving the issues during execution of work. UGs contribute 20% of overall cost of work. Appropriate levels of permissions are taken at every step to avoid any issue arising at later stages.

Both Phad and Doha are low cost water structures without any need for electricity. They are effective in recharging the ground water tables with 300mm rainfall. No land acquisition is required. Water logging at nearby land is reduced. The model is replicable at any stream in any region. The costs involved are one-half compared to that of the conventional methods.

The implementation of Phad and Doha interventions have benefitted the farmers. Significant increase in water availability during non-monsoon season is witnessed and has led to increase in coverage of irrigated land. Moisture content of soil has improved. Multi cropping along with adoption of diverse crops is practiced in the region. Crop yield has increased due to availability of water. An increase in incomes of farmers is observed. Appropriate savings and investments towards purchase of consumer goods like TV, cell phones and others is viewed. Credit seeking behavior of farmers has improved. Reliance on money lenders is going down. Borrowing from institutional sources like micro-finance/SHGs and banks is increasing.

Phad irrigation system and Doha model have few limitations. Illustratively, it relies heavily on rainfall. In years with less than 400 mm of rainfall or in case of frequent monsoon failures, affects the effectiveness of the entire intervention. Acceptance for sustainable use of water remains a low priority with many stakeholders. This hinders smooth implementation of projects. Sensitivity and awareness of different stakeholders and community members towards criticality of long term water security remains low which can affect the sustainability of the entire intervention. Fragmentation of society based upon socio-economic differences affects equal and equitable distribution of water within different sections of the society. Government policies encouraging/incentivizing promotion of water intensive crops like in water stressed regions conflicts with sustainability goals.

Partner - Dilasa Sanstha

Dilasa Sanstha is a non-governmental development organization established in 1994. Farmers, women and youth are the social groups which Dilasa specially focuses upon. It has a large presence in Vidarbha and Marathwada regions of Maharashtra state. It is working in eleven districts of the region. It has reach in 1200 villages of the region. The organization is working towards creation of sustainable livelihoods through working towards making water available for drinking and irrigation. It makes use of innovative means and measures to reduce the suffering of the communities. Community driven, cost effective and water efficient models have been developed for irrigating lands.

In its presence of last two decades, Dilasa has been successful to reach out to 410000 beneficiaries in the state of Maharashtra. About 10504 Ha of land has been brought under cultivation. Dilasa is trying to strengthen the livelihood sources of farming communities through its water based interventions which are cost effective, simple to implement and have demonstrated promised returns on investments.

3.2 Revival of traditional tank based irrigation system in Tamil Nadu

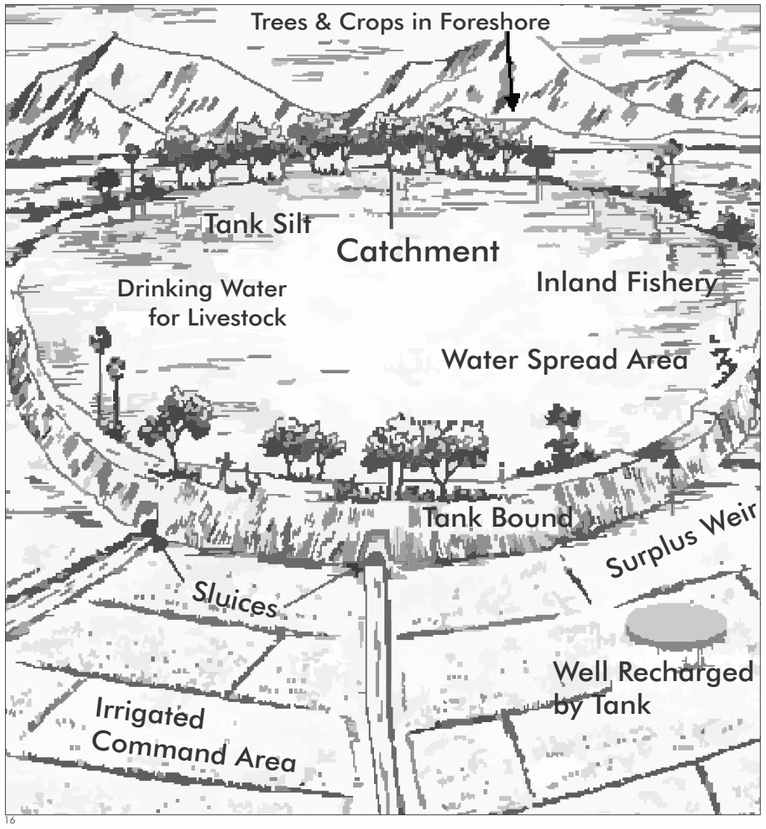
Pambar-Kottakaraiar river basin has four blocks namely Natham, Kottampatti, S. Pudur and Ponnamaravathy, situated on contiguous basis. These four blocks fall under four different drought-prone districts of Tamil Nadu. The monsoon rain water drains through Pambar–Kottakaraiar river basin. This region is endowed with hundreds of small scale water bodies namely irrigation tanks, village ponds and others. These irrigation tanks and village ponds were constructed centuries ago. They were constructed to fulfil the needs of water requirements of the community since the area does not have any perennial river.

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Dindigul	2159775	62.59 %	76.26 %	6036	40.5 %	19.90 %	57.31 %	940 mm	22.16 %
Madurai	3038252	39.22 %	83.45 %	3710	40.9 %	38.58 %	34.32 %	873 mm	12 %
Sivagangai	1339101	69.17 %	79.85 %	4233	28.8 %	19.02 %	54.92 %	823 mm	3.91 %
Pudukkotai	1618345	80.45 %	77.19 %	4644	34.4 %	6.13 %	67.53 %	897 mm	5.04 %

This entire belt is known for intensive tank-fed agriculture and most families that reside here are small and marginal farmers, and they mainly depend on agriculture for their livelihood. These small-scale water bodies are the primary sources for irrigation, agriculture, drinking water and other needs. During the past years, these water bodies were maintained and managed by local village community through Kudimaramth system, by contributing voluntary shramadhan as collective action. People owned and shared the benefits from these resources collectively through community system of management for centuries. However, situation changed during the British period with transfer of management of these water bodies from the communities to the state. The situation has aggravated further in the last 3–4 decades because of the management issues of these water bodies that threatened the survival and sustainability of these systems. It has also been noticed that because of the poor management of tank system, many tanks got breached during the floods in 2005 and 2007, and many tanks continue to remain non-functional.

Water is one of the most critical input for a farm based livelihood. In the absence of assured water supply, even if other conditions are conducive for agriculture, viable practice of the same is not possible. Practice of agriculture in such situations leads to un-secured livelihoods. Such livelihoods are low in productivity with poor crop yield and low incomes. Communities pursue such options in absence of other livelihood options. In such an environment, people are forced to migrate to cities and outside in search of jobs and stability. To reverse this trend and to strengthen existing livelihood options, measures are required which provide certainty of availability of water and a practice of agriculture which is productive and sustainable. It should lead to rise in agriculture incomes and reduce the risk of losses due to weather or market related un-certainty. This is done through a systematic and a planned approach. While lack of water is the most critical risk for a farming venture, availability of water can also act as an opportunity and a strong entry point for sustainable agriculture based livelihoods.

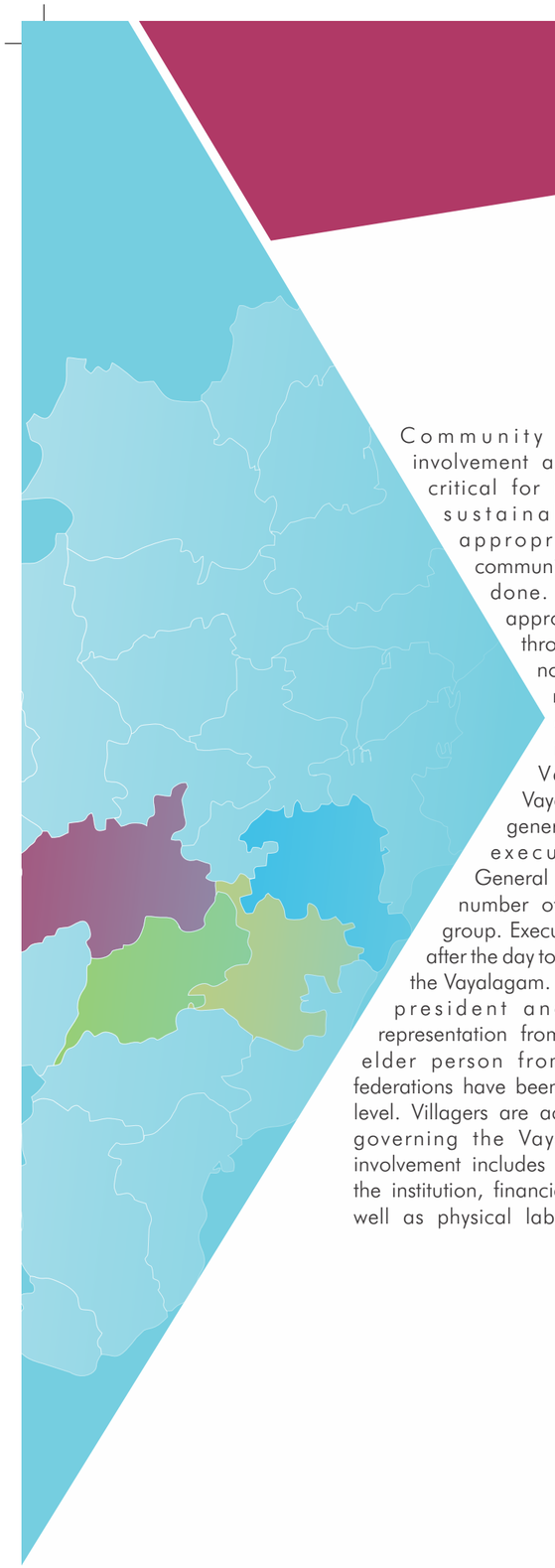
Key water conservation interventions (Tank and Village Pond Interventions) introduced in the region are as presented below-



[16]

Conservation of water is done through construction and renovation of water bodies including tanks and village ponds. These structures provide water for personal consumption as well as irrigation.

[16]http://www.dhan.org/development-matters/wp-content/uploads/2012/10/article05_07.bmp



Community acceptance, involvement and ownership is critical for its success and sustainability, hence appropriate levels of community involvement is done. A participatory approach is followed throughout. Tanks are now managed and maintained by community institutions called Vayalagams. A Vayalagam includes a general body and an executive council. General body has a large number of villagers in the group. Executive council looks after the day to day functioning of the Vayalagam. The council has a president and it also has representation from panchayat and elder person from village. Five federations have been formed at block level. Villagers are actively involved in governing the Vayalagams. Their involvement includes in governance of the institution, financial contribution as well as physical labour contribution.

Physical labour involves activities related to desilting of tanks, strengthening of bunds and others. While working on providing irrigation access to small and marginal farmers, work is also done to strengthen formal credit linkages for the community and identifying and developing measures to support women with different occupations.

Revival of traditional water storage and harvesting structures and localized management have benefitted farmers. Amount of water available and the period for its availability has increased. With the increased availability of water and its duration, farm production has increased. Area under cultivation has increased. New crops have been introduced and all of this has helped in increased farm production. This has helped in rise in incomes for the farmers. Soil made available because of desilting of tanks is further used in farms. Availability of water for drinking water needs and other household use has improved.

Partner - Dhan Foundation

Development of Humane Action (DHAN) Foundation is non-governmental development organization founded in 1997. It has focused its efforts in the direction of capacity development of poor communities and poverty reduction. It follows an innovative approach to bring about changes in the livelihoods of the poor. It has presence in multiple states of the country. Through a series of programmes, Dhan Foundation has been able to reach out to more than 8,00,000 families. It has multiple donor partners who have supported Dhan in its initiatives.

Axis Bank Foundation along with Dhan Foundation are working towards watershed based livelihood interventions in certain drought prone regions in the state of Tamil Nadu. Most of the famers are small and marginal with low incomes. The region has high incidence of poverty induced migration. Dhan foundation is trying to strengthen the livelihood sources of socio-economically poor communities through its water based interventions through developing and renovating the traditional water harvesting structures.

[17]2010 figures

3.3 Irrigation development in Madhya Pradesh

Dewas and Khargone are two districts located in western-central part of state of Madhya Pradesh. Dewas is part of Ujjain and Khargone is part of Indore administrative divisions respectively. The region is one of the most backward, remote, drought-prone parts of the country. The region has a high incidence of poverty and low levels of human development. Landlessness is low in the region but most of the farmers have small land holdings. Demographic pressures and falling land-man ratios are further aggravating the problem of small land holdings. In many blocks of the two districts, gross irrigated area is less than 20% of the cropped area. With most of the area mainly rain-fed, only a single crop farming is possible.

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Dewas	1563715	72.37 %	69.35 %	7020	88.96 %	31%	76.86 %	1083 mm	29.43 %
Khargone	1873046	84.04 %	62.7 %	8025	62.70 %	36.65 %	81.95 %	835 mm	25.96 %

The area witnesses high levels of migration by the communities during the agricultural season. Migration largely happens to more developed Malwa region where more water is available and means of irrigation are better. There has been a high reliance on money lenders for credit support, which have been mostly highly exploitative in nature. Communities undergo severe exploitation in the hands of money lenders and rich farmers. Debt spiral and exploitation has resulted in extreme distress to the tribal community. Many families have effectively lost ownership of their land and thereby their traditional livelihood sustenance options. There are cases of bonded labour in the region.

Average rainfall of Dewas district is 1083 mm and that of Khargone district is 835 mm[17]. The region witnesses high inter year fluctuations in annual rainfall. Rainfall in this region is low, highly erratic and characterized by long dry spells between rainy days. The multiple long dry spells (gaps) in the rainy season are a major concern. These spells result in moisture stress which can lead to crop losses through wilting especially in soils with low water-holding capacity. Occurrence of groundwater in the region is highly unpredictable. Owing to unpredictability, there is the danger of both over-exploitation of groundwater as well as well failures. Parts of this region have rock formations which are good aquifers but once they are dewatered, due to the hard rock nature of the geology, ground water recharge takes a long time. The region has witnessed high levels of ground water exploitation in last four decades. Along with hydro-meteorological susceptibility, the area also has a large section of the population who are socio-economically vulnerable. The region is facing acute agro-water crisis. Un-sustainable water use practices are threatening the availability of water (drinking and irrigation) in the medium to long term.

[17]www.cgwb.gov.in

High dependency on rain-fed agriculture, erratic rainfall, low irrigation coverage, small land holdings, lack of availability of credit support ,debt spiral and exploitation from the rich farmers have resulted in extreme form of distress in the region for the communities.

Solution to agricultural problems in Dewas and Khargone require adoption of location specific water resource management measures. An integrated approach is required to address the livelihood challenges.

Land and natural resource based livelihoods is the primary source for food security and livelihood for the resident communities. Water is a critical element for sustenance and development of such a livelihood. In the absence of irrigation and sufficient water resources, productivity of livelihood gets affected and distress migration is seen in search of alternative livelihoods. Livelihood interventions require efforts in the direction of conservation of natural resources and putting them to more productive use. This is done through several planned interventions.

Water is one natural resource which flows through multiple ecological and human sub-systems. Intervention through means of water provides an opportunity to address the fundamental issues of livelihood.

Certain key water conservation interventions like watershed development, dry land agriculture have been implemented in the region. As part of strengthening of livelihood based interventions, initiatives like crop aggregation, livestock management have been incorporated. Government schemes like MGNREGA have been leveraged and SHG-Bank linkages have been established to address the livelihood issues in a holistic manner.

Watershed development

Checking and harvesting water and using it in the non-monsoon season is one way of augmenting livelihood options to communities. Watershed work involves construction of series of water harvesting structures. These structures helps to provide critical irrigation for kharif crops and water supply for Rabi crops. Availability of water is helping in prevention of kharif crop failure and is also helping in practicing multi cropping. This is helping farmers with food security and is also providing economic benefits with additional sources of income through multi-cropping. Watershed development is incentivising private investments by even the poorest farmers on their own lands. With significant expansion in irrigated area and crop productivity, high labour absorption in agriculture is visible even after the watershed programme has closed. This "sedimented employment" is reducing the external migration from the area in the long run.

Hundreds of farmers who have grown a single rain fed crop all their lives are now cultivating 2-3 crops. Many have returned home after years to reclaim land they had virtually given up for good. MGNREGA funds are leveraged for watershed related construction. This is giving dual benefits, with community members getting employment through MGNREGA and assets created for overcoming water crisis.

Dryland agriculture

Not just the availability, efficiency of water use is also paramount. Work on innovative measures is done and are customized for them to suit to local conditions. Improved crop varieties, better seeds and other agricultural practices which are less dependent upon external supplies are encouraged. Low water requiring crops are promoted. Soil fertility management is done through a range of composting and organic waste recycling methods, which improve soil fertility and texture. In addition to raising agricultural productivity, these methods improve the water holding capacity of soils. This reduces the need for external water through irrigation. These agriculture practices are helping farmers in increasing their incomes, reducing input costs and in decreasing the risks associated with agriculture.

Organization of small farmers is done to strengthen the forward linkages. These forward linkages help in ensuring better negotiation power and enhanced returns on the basis of economies of scale. Strengthening the livelihood sources through introduction of livestock management practices which include goatery, poultry and dairy is done. These measures not only help in increasing incomes but also enhance the livelihood diversification strategies and reduce risk.

Irrigation development and management interventions have benefitted the community. Land under irrigation has increased significantly. Increased land under irrigation and increased availability of water has helped farmers in practicing multi-cropping. Incomes have risen for farmers. Irrigation related employment has also gone up. Large tracts of land have been brought under innovative agricultural package and huge number of crop variety trials have been conducted. Numerous soil improvement measures have taken place. Farmers have benefitted through introduction of livestock management practices. Farmers are sensitized towards sustainable dairy practices and many dairy cooperatives under the leadership of women have been formed.

Irrigation development through watershed development and allied interventions is helping farmers in increase of their incomes.

Partner – Samaj Pragati Sahyog

Samaj Pragati Sahyog (SPS) started its work in 1992 in Dewas. SPS is a grass root organization working in the 72 central and backward districts of India. Central Indian tribal belt continues to be the focus area of the organization. SPS has set itself a goal of development of an alternate path of inclusive and sustainable development. This goal is based upon principles of equity, sustainability and empowerment of the most disadvantaged sections of the society like the poor, women and SCs/STs living in backward districts of India. Another goal set by SPS is to build and strengthen people's institutions with women in leadership for supporting participatory, transparent and decentralized governance. SPS aspires to put forward an alternate development model through which many other parts of the country can be similarly transformed.

Generation of livelihoods is one the most important aims of SPS. It tries fulfilling this aim through interventions like watershed development, agricultural interventions, social entrepreneurship, films and SHGs. SPS has been involved in watershed related initiatives from a very long time. SHG program ties all of its other livelihood programs together. Income generated through interventions like watershed, agriculture, livestock, kumbaya and others are saved and re-invested for commencement of a positive cycle of prosperity.

SPS has been able to irrigate 45324 Ha of land covering 81 villages. It has helped in creation of storage capacity of over 25 million cubic meters. It has helped in generation of 1.2 million person days of employment.

3.4 Natural resource management system through development of “Commons” in Rajasthan and Karnataka

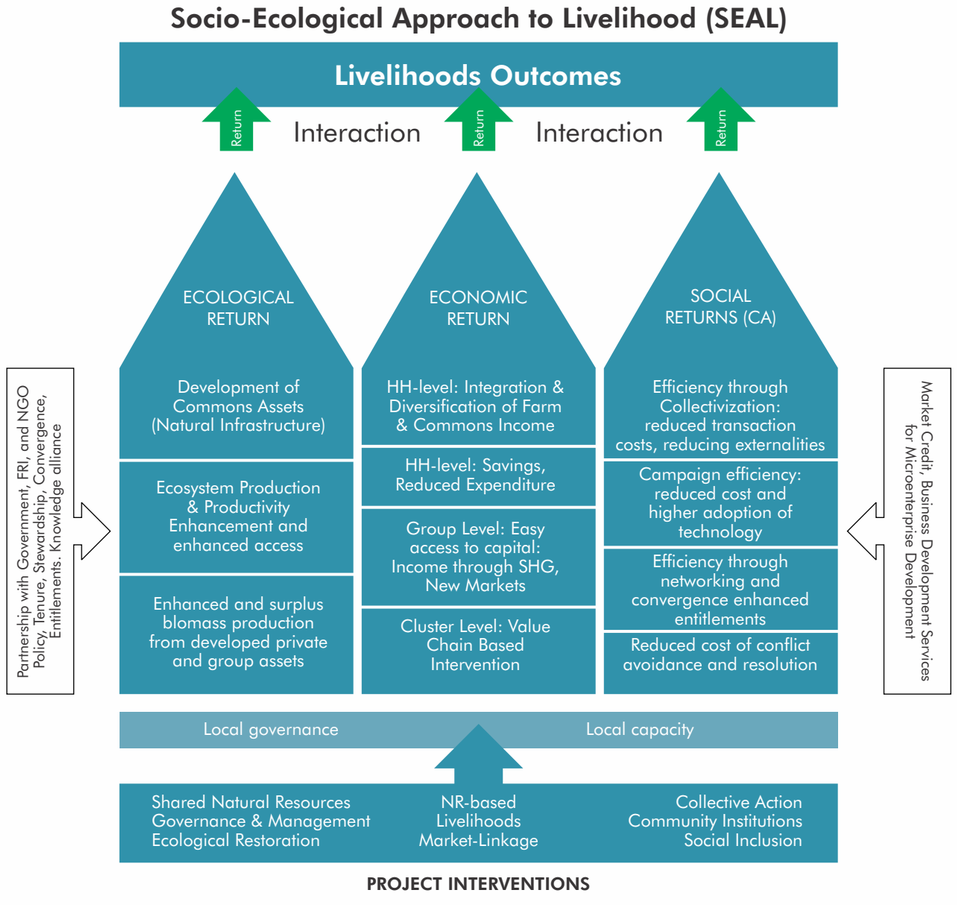
Jhadol and Gogunda blocks are part of Udaipur district in Rajasthan. Forests and common lands occupy significant part the area. The area is ecologically distinct with it positioned between the forests of South Rajasthan and the grasslands. Forests of the Aravali hills in the region prevent eastward flow of Rajasthan desert. Pratapgarh district of Rajasthan is located at the junction of Aravali hill and the Malwa Plateau. Large part of the district is covered with the commons land. District has high levels of poverty. Illegal tree cutting, weak protection systems, difficult land tenure arrangements and other factors have led to severe environmental degradation in the area. Bhilwara district in Rajasthan has high presence of common lands and forests. Forests are mostly thorny scrub forest. The area is drought prone with poor annual rainfall and rain-fed farming and animal husbandry are major source of livelihood. Certain parts in Chikaballapur district in Karnataka has common lands and forests lands. Weakening of traditional water harvestings structure and over exploitation of ground water for cash crops has led to severe depletion of ground water resources in the area.

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Udaipur	3068420	80.17 %	61.82 %	11724	16 %	7.7 %	61.7 %	650 mm	27.7 %
Pratapgarh	867848	91.73 %	55.97 %	4449	42.30 %	40.47 %	83.8 %	846 mm	29.38 %
Bhilwara	2408523	78.72 %	61.37 %	10455	48.27 %	30.64 %	62.6 %	657 mm	7.14 %
Chikaballapur	1255104	77.6 %	69.76%	4244	40.27 %	23.7 %	65.5 %	756 mm	11.8 %

'The commons' (common lands) have had a long and intrinsic linkage with the rural livelihood. They have acted as 'safety net', especially for the poor. Poor have relied on commons for food, fuel and fodder. It has been studied that the poor derive some proportion of their household incomes through the commons. Rearing livestock in the commons has been a common feature across many parts of semi-arid parts of the country. However, management of 'The commons' has been a concern for a long period of time and has also been prone to over-exploitation. The governments, administering these lands from the distant headquarters lack the reach, incentive and real-time information to effectively manage them. The local villagers, despite relying on these lands for their livelihoods, have no legal title to them and thus also lack means and incentives to address them. As a result, commons tend to be neglected to the point of degradation. At the same time, commons are disappearing due to illegal land grabs or legal sales; India's commons have shrunk by more than 30% over the last 50 years. As observed in many parts of the country, semi-arid regions of Rajasthan and Karnataka are facing environmental degradation within their common lands. This is resulting in negative social as well as ecological impacts. While resource poverty is being experienced by communities in these regions, intrinsic ecological value of the commons is also wasted.

In rural livelihood systems, infrastructure consists of soil, water, nutrients, biomass and biodiversity which are fundamental for the viability of farming systems and thereby the rural economy. Solutions to livelihood challenges of communities residing in common lands of different districts of Rajasthan and Karnataka require location specific natural resource management measures. An individual, household and community interests are all encompassed within the overall framework of natural resource management.

Alignment of activities to enhance production and productivity of the farming system and safeguarding the stability of the ecological base is done. Access to information and capital is provided to communities and community based institutions like Panchayats, Farmer Groups and Self-Help Groups (SHGs). This access helps in improved mediation between human-nature interactions. Capacity development is done for stakeholders to help them realize the linkages between the natural resource management based livelihoods and their sustainability. Work towards securing tenure of local communities over forests and commons is done to ensure sustained commitment of communities towards conservation. Governance institutions are developed for effective management of natural resources. Work towards restoration of water structures is done. Interventions in farming systems are done to improve the productive capacities of farmlands through land development and soil moisture conservation measures. These are complimented by efforts to increase farm biodiversity, mixed cropping and crop diversity. Collaboration and partnerships are formed for effective leverage of resources. Government schemes like MGNREGA are used for creation of productive assets required for water storage. Interventions are designed to strengthen and supplement existing livelihood options. Development of access to micro credit and promotion of micro enterprises is done. Establishment of forums for women to interact, share information and identify common interests for collective action are done.



Community based institutions protect and manage common land. These institutions have evolved and take financial and non-financial support from other programs and government for enhanced functioning. Traditional as well as contemporary community based institutions are brought together for strengthening and increased acceptance for interventions amongst the communities. Collaboration with Panchayats are explored. Depending upon the local needs sub-committees like Village Forest Committee, Charagah Vikas Committees are formed. Convergence opportunities with different legislative Acts like MGNREGA, Forest Rights Act and Panchayat Extension to Schedule Areas (PESA) are explored to strengthen community governance.

Natural Resource Management channelized through the commons land have benefitted the communities. Natural infrastructure has developed with water conservation, forest protection, moisture conservation of soil and others. This has helped in increased carrying capacity and resilience of natural systems. Forest degradation has reversed to some extent. Enrichment of degraded grasslands has happened. Intervention has helped in strengthening of community based institutions and increased community participation in decision making on issues affecting their lives and livelihood, thereby promoting stronger local democratic governance. Biologically diverse cropping is helping in addressing nutritional challenges faced by the communities. Technological inputs have helped in efficient management of resources. Overall, agricultural production has increased which has resulted in improved incomes for the community members. Diversified cropping is also resulting in reduced risk of crop losses and helping in resilience for the communities.

Foundation for Ecological Security (FES)

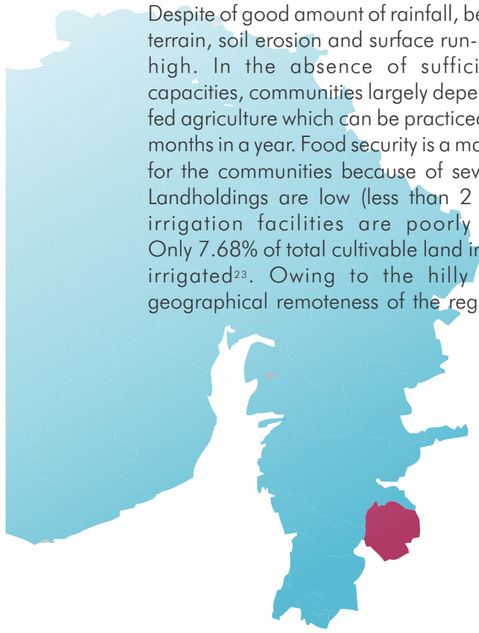
Foundation for Ecological Security (FES) was set up in 2001. FES works towards centre-staging ecological agenda alongside priorities of economic growth, reorienting economic progress with a perspective of nature conservation and helping the rural poor. Working with village institutions as partners, FES aims to decentralize the top heavy approach to environmental management and demonstrate the strength of local communities to collaborate and deploy local knowledge to cost effectively manage shared resources. FES's operations are spread across six eco-regions of India, in 32 districts of 8 states, collaborating with more than 9500 village institutions, reaching over 4.2 million people, spanning more than six million acres of forest, common lands and farm lands. Axis Bank Foundation along with FES are trying to improve rural livelihoods in semi-arid areas of Rajasthan and Karnataka. This is being done through strengthening of rural livelihoods through measures on natural resource management with a focus on vulnerable sections of the society like poor, small, landless farmers and women. Three important components, ecological restoration, local governance and livelihood improvement are focused.

3.5 Participatory irrigation management in Gujarat

Dang is a district located in the southern part of state of Gujarat. The Dang region of Gujarat is characterized by hilly terrain and thick forest cover. Out of the total geographical area, 77.64% of Dang is covered with forests[18]. Forest area includes reserved and protected forests. Reserved forests are located near the stiff hills and protected forests are located near the lower hills, low lying area and plateau[19]. In 2003, Dang was ranked number one in backwardness among the 447 districts of India. Parameters like poverty, unemployment, agricultural wage rate, per hectare agricultural productivity, productivity per agriculture worker, SC/ST population, drought proneness and rural connectivity were used to determine backwardness of districts[20]. As per the census 2011, Total Population of Dang is 2,26,769. 94% of the district's population is tribal. Tribes in Dang also belong to category of Particularly Vulnerable Tribal Groups (PVTGs). High incidence of poverty is seen in the district with about 73.84% of the district's population living below poverty line[21].

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Dang	228,291	89.11 %	75.16 %	1,766	33 %	7.68 %	87.94 %	2491 mm	77.64 %

Average rainfall in the area is 2491 mm[22]. Despite of good amount of rainfall, because of hilly terrain, soil erosion and surface run-off of water is high. In the absence of sufficient storage capacities, communities largely depend upon rain-fed agriculture which can be practiced only for four months in a year. Food security is a major challenge for the communities because of several reasons. Landholdings are low (less than 2 HA) and the irrigation facilities are poorly developed. Only 7.68% of total cultivable land in the district is irrigated[23]. Owing to the hilly terrain and geographical remoteness of the region, sufficient market linkages are absent. Increase in the frequency of drought events and environmental degradation has also affected the traditional livelihoods of the communities. In the absence of regular livelihood options in their villages, high levels of seasonal migration is seen in the villages with communities, who migrate to neighbouring districts to work as farm labourers. This frequent migration has had a detrimental effect on the education of children, and also had other adverse fallouts.



[18]http://gujenvis.nic.in/PDF/FOREST.pdf
[19]http://dcmsme.gov.in/dips/dip-dang.pdf
[20]Planning Commission, 2003
[21]https://dangs.gujarat.gov.in/about-dang
[22]http://raijmr.com/wp-content/uploads/2015/04/4_13-23-Umesh-Desai-et-al.pdf
[23]http://www.cgwb.gov.in/District_Profile/Gujarat/The%20Dangs.pdf

Solution to livelihood challenges of Dang district need adoption of location specific water resource management measures. As large part of the district is covered by the forests, land and natural resource based livelihoods is the primary source for food security and livelihood for the resident communities. Livelihood security therefore mandates conservation of natural resources and providing them with options and techniques for increased income from agriculture. This is done through several planned interventions, water security being the starting point. Awareness is created in the communities about water and land management, soil and water conservation and development through check dams, naalas plugs etc., plantation and fodder management, creating farm ponds and using lift irrigation methods to lift water to higher grounds and using gravity to distribute to farmland. If the irrigation structures are not maintained properly effectiveness and efficiency of structures are compromised. There are many such structures in Dang district whose water storage efficiency has gone down and there were opportunities for their revival. Key water conservation interventions introduced in the region are as presented below-

Boribandhs

Boribandhs are walls built by plastic sand sacks against the water flow not only to reduce the flow, but also to store water for support irrigation. This is not only cheap, but also affordable to the farmers to undertake this intervention by themselves without any need for external intervention.

Revival of check dams

There are significant numbers of check dams that were constructed about 30 years ago by the irrigation department. Due to excessive run off there has been damage in the end wall and body wall, and has seepage below the structure. These can be brought back to their original form for optimum usage.

Construction of mini lift irrigation schemes

To reduce the operational and maintenance charges, mini lift irrigation schemes have been constructed with pipe lining up to the agricultural land. This is not only cost effective, but could also be done in the interior part of the villages to create access to farmers who never get access to irrigation otherwise.

Gravity-based irrigation

To avail irrigation through natural flow, a gravity-based irrigation scheme also has been tried upon in Dangs.

Solar-based irrigation schemes

To reduce the operational and maintenance costs of irrigation, solar-based irrigation schemes have been introduced in Dangs.

Drip irrigation system

To increase the efficiency of irrigation practices, drip irrigation system has been introduced with the tribal farmers. This intervention has not only increased the efficiency of irrigation, but also has supported in increasing the production, and hence increasing the income too.

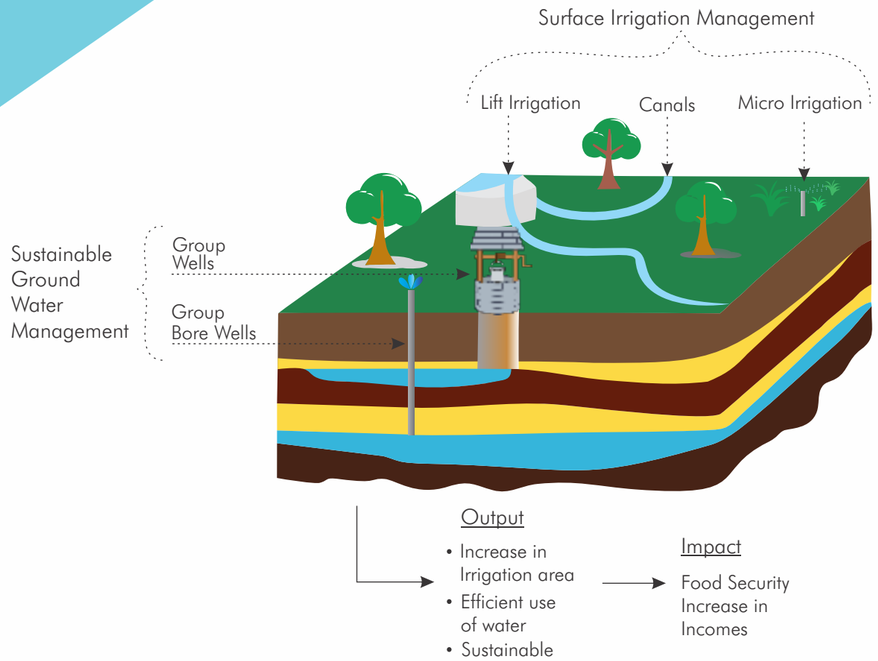
Group wells and lifting devices

Private Wells are deepened and repaired to make them usable for irrigation; agreements are signed with the owner of the well to share water with the nearby farmers. A mobile pump-set along with connecting pipes is also provided for widening the reach of the irrigation facility

An illustrative example on the approach and Irrigation support model has been presented below-

AKRSP (India) APPROACH

Water Resource Development



participatory approach and community involvement throughout the project intervention is ensured. Village level institutions are mobilized for planning, implementation and maintenance of the project. Gram Vikas Mandals (GVM) are formed. Their primary responsibility is mobilization of the targeted community and to ensure 100 per cent participation from the households.

GVMs has representation from both male and female community members and they also take part in project related activities. Village development committees are formed further which take part in project implementation. Institutions like Canal Irrigation Society, Lift Irrigation Society, Group Well Users, Check Dam User Group are formed which involve management and maintenance of the project. Pani Samitis are formed which has representation of Village Sarpanch. Pani Samitis mainly look into delivery of drinking water at village level.

Water availability when combined with other income generating opportunities and participatory governance measures leads to improved outcomes. The focus is therefore given to four key components - economic development, social development, access to basic services and improved governance.

Economic development envisages achieving economic development through agriculture and non-agriculture interventions by working toward food security, increasing agricultural income and reducing vulnerability to economic risks of the communities. Social development envisions social development through its work toward reducing social issues like inequality perpetuated through caste, gender and others. It does this through inclusion of the vulnerable and the marginalised groups in decision-making processes. Access to basic services like drinking water is given to communities. Construction of the necessary infrastructure is done. Communities are provided with the necessary knowledge and technical expertise for its maintenance. Improved governance plays an active role in strengthening participatory governance at community, village and higher levels. It aids in community ownership, management and empowered local governance systems.

Participatory irrigation management interventions and allied activities have benefitted the farmers. Water harvesting structures have prevented surface runoff. Availability of water has helped in increase of irrigated land, more land has been brought under cultivation. Soil fertility and moisture have improved. Multi-cropping and change in cropping pattern have helped in increase of production. There is significant increase in Paddy and Chickpea production. Increased production is helping farmers with increased incomes and household level food security. Water management has improved. Coordination between government and farmers has improved. Behavioral change is sensed amongst farmers. There is increase in sensitization amongst farmers and they have started practicing concepts like water budgeting.

Partner - AGA Khan Rural Support Programme (India)

The Aga Khan Rural Support Programme, India (AKRSP) is a non-denominational, non-government development organization. AKRSP was set up in 1984 and has a reach in over 1400 villages. It has a presence in three states of Gujarat, Madhya Pradesh and Bihar. Rural India has been the focus of the organization. Strengthening of Agriculture based livelihood is one of the most important thematic areas of its interventions. The support is largely provided to farmers through providing access to water through innovative irrigation measures. Participatory Irrigation Management (PIM) has been one of the key strengths through which it has implemented programs for livelihood security. In last three decades of its existence, AKRSP has worked on multiple issues affecting communities. It pioneered community based water management through formation of "Pani Samiti", a mechanism through which committee members take charge of funding repairs and maintenance of water system. Over 4000 drinking water sources have been developed or restored and over 10000 roof rainwater harvesting structures have been set up. AKRSP has now a reach to over 1,000,000 beneficiaries spread over different parts of the country.

3.6 Check dam and lift irrigation model in western India

Dahod district is located on the northern part of state of Gujarat. The district shares boundary with states of Rajasthan and Madhya Pradesh. The district has mixed topography which includes undulating plains and rugged topography. Agriculture continues to be major source of livelihood for its people. District fairs poorly on several socio-economic indicators and is one of the backward regions in the state. Panchmahals district in Gujarat is situated in the northern region of the state and shares boundary with states of Madhya Pradesh and of Rajasthan. The district has varied topography. The northern, eastern and southern part of the district have topography which is undulating in nature. The western part of the district is largely constituted of Pedi-plain. The district is rich in forests. Agriculture is the main source of livelihood for the population in the district. The district is considered to be one of the backward regions of the state. It has issues related to poverty and ranks poorly on several socio-economic indicators. Mahisagar district is located on the eastern side of state of Gujarat. Land in the district is largely Sandy, Sandy loam and saline soil. Topography in the region is varied with presence of Pediplain in the western region of the district. Northern, eastern and southern parts of the districts have undulated topography and southern boundary has presence of hill ranges. Agriculture is the main source of livelihood in the district. Panchmahals is one of the backward regions of the state. It lags behind in several socio-economic development indicators.

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Bhaswara	1797485	93%	56.33 %	4522	66 %	33 %	81.4 %	628 mm	20 %
Jhalawar	1411129	84%	61.5 %	6219	71 %	50 %	78.5 %	844.3 mm	20 %
Dungarpur	1,388,552	94%	59.46 %	3770	61 %	17 %	64.2 %	607.8mm	18.37 %
Kota	1,951,014	40%	76.56 %	5217	63 %	74 %	48 %	598.1mm	25.34 %

Banswara district is situated towards the southern part of Rajasthan. The district boundary coincides with the state boundary of Madhya Pradesh in the east and Gujarat in the south. Most parts of the district have a rugged topography. Eastern part of the district has flat-topped hills and The Aravalli's are present in the southern side. The district has a difficult terrain consisting of forests, mountains and ravines. Agriculture is the principal source of livelihood in the district. The District has high levels of poverty and has several socio-economic indictors below the state level average. Dungarpur district is located in the southern part of Rajasthan and borders state of Gujarat. District is surrounded with hills. Northern and eastern parts of the district have a rugged topography. Large population of the district depends upon agriculture as their principal livelihood source.

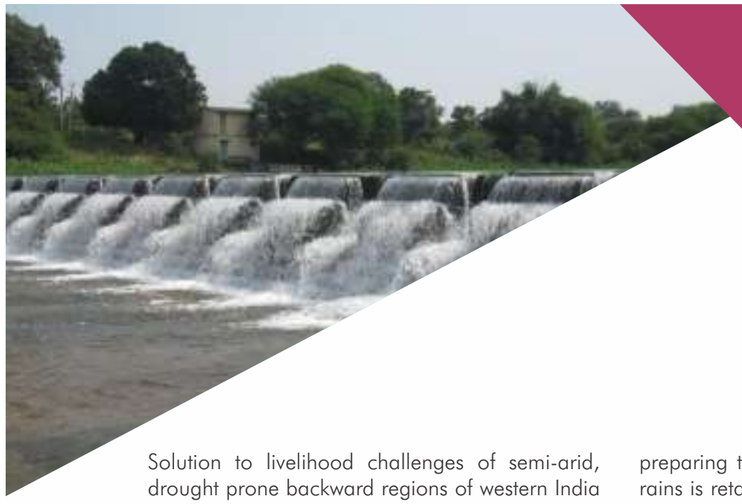
Forest produce related work and animal husbandry are also important livelihood related activities pursued in the district. Poverty levels in the district are high and the district is one of the backward district of Rajasthan. It performs poorly on several socio-economic indicators. Jhalwara district is located on the south east region of the state.

The Aravali hills pass through the district and divide it between plains and Malwa plateau. Soil present in the region is rich and supports practice of agriculture. Economy of the district is largely dependent upon agriculture. Kota district is located on the eastern region of the state. There are hills present in the southern, north and eastern part of the district. Reliance on agriculture as a source of livelihood is less in the district.

Parameter / District	Population	Rural Population	Literacy	Area Sq. Kms.	Agriculture Land	Irrigated Land	Workforce in Agriculture	Annual Rainfall	Forest Area
Dahod	2127086	91 %	58.82 %	3642	57.7 %	9.04 %	82.79 %	575mm	24.27%
Panchmahals	2390776	86 %	70.99 %	5231	58 %	13.79 %	75.88 %	792mm	23.26%
Mahisagar	2390777	86 %	70.99 %	5231	58 %	13.79 %	75.88 %	792mm	23.26%

In 2006, Banswara and Dungarpur districts of Rajasthan and Dahod and Panchmahals districts of Gujarat were categorized as one of the country's 250 most backward districts. Significant parts of the above mentioned geographies are drought prone and semi-arid in nature.

Extreme levels of poverty exist in many parts of the region. Most of the community members depend upon agriculture as their principal livelihood source. However, productivity of agriculture and the overall returns for the investments (financial/non-financial) are poor. This is owing to varied reasons. Most of the farmers in the region are small and marginal with low levels of land holdings. Adoption of modern farm practices is less and there is substantial reliance on traditional farming methods. Most of the agriculture is practised based upon the availability of rainfall. Very often, erratic rainfall not only affects the overall deficit in the availability of water but un-availability of water at crucial junctures affects the crop productivity. Lack of sufficient irrigation measures compound the problem. Absence of options to practice different crops and introduction to diversified cropping pattern limits the overall potential to make agriculture productive. Owing to geographical remoteness and topography of the regions, market linkages are poorly established. These factors have resulted in very low levels of income for the households. The low levels of income are not sufficient for meeting the needs of the family and force them to migrate outside for work. Low income levels have had an effect on the overall quality of life of the resident communities with poor socio-economic conditions reflected through indicators like education levels, nutrition levels, housing conditions and others.



Solution to livelihood challenges of semi-arid, drought prone backward regions of western India require location specific water resource management measures. Owing to land topographies and traditional livelihood patterns there are intricate linkages between the natural resources like land, water and forests and the occupational activities pursued by residential communities. Improvement of living conditions of communities and their livelihood security require designing of environmentally sound Natural Resource Management (NRM) programmes. Water is a critical entry point for designing of NRM programmes. Programmes are designed with the aim of improving the socio-economic status of communities and strive for overall development. In the absence of sufficient conservation and storage facilities, most of the water received drains off without any productive use. Community engagement and conservation of water are the most important aspects of the program. Programs are designed which involve construction of water harvesting, storage and distribution measures. Communities are key stakeholders in the entire intervention. A needs assessment of the communities and their priorities are studied. They are mapped against the availability of natural resources in the region and programs are implemented. Appropriate technology which suits the local context is incorporated in the intervention. Key water conservation and distribution interventions in the region are as presented below.

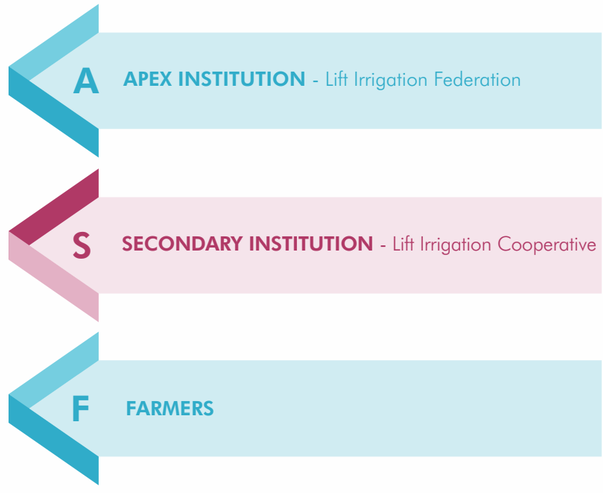
Check dams: These are water conservation structures constructed by erecting small barriers across the river by blocking the water flow. Elements like stone, cement, and steel, concrete are used in preparing the barriers. Excessive flow during the rains is retained with the help of check dams and water gets accumulated. These check dams are designed as per the Grant Anicut Model. There are a few important steps which are followed to comply with the design requirements. The check dam site should have maximum rock formation and catchment should be least degraded. Sediment load on the river on which check dam is being constructed should be less. The cross section of the river should be chosen in such a way that length of the barrier can be kept small. Drainage channel's bed gradient should be straight with maximum storage capacity. The entire structure should be designed in such a way that it does not submerge nearby farms. Geological conditions in the downstream should be such that aquifers get recharged and ground water levels increase. A series of check dams should be constructed covering the chosen river system. A check dam should be constructed at the source of the river and a series of check dams need to be constructed. The series should be constructed in such a way that water storage capacities are created and water is made available to communities who would have been deprived of it otherwise.

The conserved water is used for irrigation purposes after the monsoon season and can also act as water supply source for household and livestock needs of the community. Availability of water also helps in replenishment of water table which helps in increasing the water availability in sources like wells and others.

Along with making water available in the reservoirs, it is important to have distribution mechanisms to ensure water reaches to the farmlands of the communities. Many a times, communities having lands close by to rivers, reservoirs are the only ones who get irrigation benefits. Communities having lands faraway and at higher levels than that of water stream fail to get any benefits. In many parts of western India, land topography is such that it is very difficult to take water to the farms through the natural gravity based flow. It is in this context that lift based irrigation system is introduced in the region. Water is lifted up with usage of pumps and distributed through a network of piping system. The entire system is designed in such a way that water flow is regulated and distribution of water happens in an appropriate manner. This approach helps in having an inclusive approach with marginalized farmers getting access to water and taking benefits of irrigation.

These interventions are part of a model. It is a decentralized model with primary involvement of farmers. Secondary institutions like Lift Irrigation Cooperatives help in organizing farmers for the water based interventions. Federations like Lift Irrigation Federation are apex level institutions which act as collective tertiary level bodies. Model is presented below-

REACHING CHANNELS



Overall objective of the intervention is to improve the socio-economic status of rural communities and strive for their overall development. Active involvement of the communities is important for sustainability of outcomes in the long run. This is promoted by facilitating the growth of local institutions that support and sustain the NRM programmes. A participatory approach and community involvement throughout the project intervention is ensured. The farmers and the community members are organized for managing the assets through institutional arrangements such as users' cooperative in form of irrigation cooperatives. These village level institutions have been further promoted to form apex level institutions like Federations of cooperatives.

Local level governance measures have helped the overall management of the intervention. Programs are designed based upon the demands of the community members. Management of the system is transferred to the communities who look after the overall governance. User charges are levied and mechanisms are established for collection of funds. Community level involvement in designing of the program, implementation and maintenance is helping to keep the whole intervention financially viable.

Check dam and lift irrigation model in western India have benefitted the farmers. Water has reached to the vulnerable and the marginalized sections of the society. Access to irrigation has increased. Access to water has increased in both temporal as well spatial scale. More land has come under cultivation and multi-cropping has become possible. Productivity of land has increased. Farmers have been able to change to more rewarding cropping pattern. High value produce like vegetable and horticulture practices have started. Incomes of farmers have increased. With rise in incomes farmers have invested in income enhancement activities like dairy and livestock development. With availability of livelihood options locally, distress migration has reduced. Availability of water for household level consumption has increased. Farmers have also accrued non-financial benefits because of the program. Knowledge and capacities of farmers and communities have developed. Through community based management of resources, participatory governance measures have strengthened.

Partner – N M Sadguru Water and Development Foundation

N M Sadguru Water and Development Foundation (Sadguru) was set up in 1974 and is a non-government organization and is non-political and secular in nature. It has extensive presence in western semi-arid parts of the country. Sadguru has implemented numerous projects in states of Gujarat, Rajasthan and Madhya Pradesh. Rural development departments of the aforementioned states recognize Sadguru and its work and have funded projects. Sadguru has received funding from Indian corporates, Indian and international donors for its projects.

One of the principal objectives of Sadguru Foundation is to improve the living conditions of rural and tribal communities through natural resource management programs which are ecologically sound and rewarding at the same time. Communities are at the centre of all of Sadguru Foundation's interventions. Active participation is sought from communities in all stages of program. It involves right from the design of the program till its implementation and maintenance. Sadguru Foundation aims for a holistic development of the communities. Sadguru Foundation has worked with the vulnerable and marginalized sections of the society like Tribes. Sadguru Foundation extensively works on water resources, agriculture and forestry, community building, training and education. Sadguru Foundation now has presence in sixteen districts of states of Gujarat, Rajasthan and Madhya Pradesh. It covers about 483444 households, about 2900665 people in 1539 villages through its programs.

Key outcome of the partnership between Axis Bank Foundation and its partners are presented below-

Realization of the importance of water as one of the most critical elements for sustainable livelihoods.

Coverage of a huge landscape thereby helping in creation of hydrological impact on the environment.

Development of programs in a holistic way as a result of long term and assured support provided.

Effective and innovative implementation of programs because of ample flexibility provided.

Strengthen the linkage between natural resource management and sustainable rural livelihoods through the thread of water management resources.

Scaling up of the programs, enabling more number of beneficiaries to be reached out because of sustained support.

Johads

Johads, one of the oldest systems used to conserve and recharge ground water, are small earthen check dams that capture and store rainwater. Constructed in an area with naturally high elevation on three sides, a storage pit is made by excavating the area, and excavated soil is used to create a wall on the fourth side.

4

The way forward

India is going through an important transition with regards to its economy and demography. This transition has its own set of opportunities and risks associated with it. India is a country with high proportion of young population. A higher proportion of working age population can positively contribute to economic development and progress. It is important to create adequate number of livelihood opportunities to capitalize on the massive availability of young and working age population. There are concerns pertaining to the number of livelihood opportunities being created and the quality of such livelihood options. Certain sectors of economy like agriculture have witnessed widespread distress. Agriculture's overall contribution to GDP has consistently gone down, however the corresponding movement of workforce to other sectors of economy has not happened. About 53 per cent of Indian population relies on agriculture and related activities as a livelihood source. This indicates towards under-employment and disproportionate share of agriculture in GDP.

WATER BASED INTERVENTIONS HAVE OPPORTUNITIES TO CONVERGE WITH DIFFERENT GOVERNMENT LIVELIHOOD SCHEMES LIKE MGNREGA, NATIONAL RURAL LIVELIHOOD MISSION AND OTHERS.

There are multiple factors ailing sustenance of livelihood in Indian agriculture. One of the most critical reason is lack of water resource management. There is heavy reliance on monsoon rains for agriculture in many parts of the country. This increases their susceptibility to drought. In absence of sufficient water resource management measures, farmers are forced to work under sub-optimal conditions with poor economic returns to their financial and labour investments. Many are forced to borrow money from lenders and get caught in debt trap. Many a times, push factors compound themselves and farmers are forced in to distress migration. Migration happens to towns and cities and most of the farmers work as daily wage earners/labourers and live in informal settlements. Non-availability of rewarding livelihood options within villages, multiple pressures to migrate outside have a social impact on the families. It disturbs the household level dynamics, affects the education of children and the overall quality of life. Programs designed with water resource management measures have the potential to address the livelihood challenges being faced by people engaged in agriculture by making it a viable and productive endeavor.

It is important to realize that water is a scarce resource and its use needs to be done in a judicious and sustainable manner. Water is a complex issue and needs to be seen through a multidisciplinary prism. A techno-centric approach involving construction of big dams and canals network without active and meaningful participation of the communities has not yielded desired outcomes. This approach has helped in increasing the water storage capacities but has not resulted in increased access to water for small and marginal farmers. A multi-discipline approach is required with involvement from professions like engineering, social sciences, public administration and others. Along with treatment of water as a multifaceted issue, it requires collaboration and cooperative efforts from different stakeholders like the Government, NGOs and Donors (Multi-laterals/Bi-Laterals/International NGOs/Corporates).

It is imperative that water based solutions are not seen in isolation. Water transcends through multiple systems. It is necessary that water based solutions are designed keeping in mind the local social, economic and environmental characteristics of the region.

It is important that more avenues are identified to increase the availability of water. Surface water in the form of rivers and ground water are the major source of supplies in India. Rivers receive water through glacial melts and monsoon rains. On an average, India receives 4000 BCM of rainfall. Indian rivers have a high percentage of ecological flows. This is because most of the precipitation happens in India within a short period of four months. Rainfall has spatial as well as temporal dimensions. India has limited live storage capacities and as a result most of the river water drains off to sea. There are many regions in the country which face the problem of flooding and drought in the same year.

Water is one of the most important Common Property Resources (CPR). Water needs to be seen through the dimensions of intra-generational commons. With effective use and systematic management of water resources, needs of future generations can be met while meeting the needs of current generation. Similarly, water should be seen as a community resource for the larger good of the society and its individualized commoditization should be discouraged.

Ground water resources in India are an important source of water supplies in India. With a burgeoning population, industrialisation and urbanisation, the demand for water has increased significantly. This has put enormous pressure on our ecosystem. In the last couple of decades, making water available to meet the demand seems to have been prioritised without due considerations to long-term sustainability of water resources[24]. Over exploitation of ground water resources is one such example. Under the Indian laws, ownership of land entails ownership of water beneath it. Over extraction of water resources has led to severe depletion of water tables in many Indian states. Such exploitative use of water is a serious challenge to viability of agriculture as a sustainable livelihood option and also presents grim threats to the larger ecosystem. It is important that ground water is treated as a community resource rather than individual property. Legal and regulatory mechanisms governing water (especially ground water) need strengthening.

Micro irrigation options provide an alternative model of water resource management. It is especially important in the context that water interventions in rain-fed areas are relatively low cost compared to high costs of investments required in irrigation through other means like dams, canals network and others. Micro irrigation measures typically involve water harvesting through construction of series of small structures like check dams and others. This approach has distinct characteristics. It has the potential to act as a critical entry point in the paradigm of a rural livelihood. It can act as a catalyst and accelerate agriculture development while laying strong building blocks for a thriving rural economy. With increased availability of water, farmers can start practicing agriculture for multiple seasons in a year. It can keep them engaged throughout the year with local livelihood opportunities and reduced need to migrate outside. Increased incomes can have cascading effects at household level with enhanced spending towards health and education.

Besides the economic and social outcomes of a micro irrigation based intervention, the approach itself can result in multiple benefits. In this approach, solutions can be designed locally with active participation from community. Local governance measures help in community level management of resources. This approach provides an opportunity to integrate community development measures. Capacity development measures can be initiated which can help in increased capabilities of community members to manage water resources locally. With a decentralized approach, communities can make plans for collection of user fees, equitable distribution of water. Overall, it would aid in sustainable management of water resources. Besides the economic outcomes derived from agriculture, community management of resources can provide employment opportunities to the local youth. Opportunities may include work related to repair, maintenance of water structures and Managerial Information Systems (MIS) around them. Water based interventions have opportunities to converge with different government livelihood schemes like MGNREGA, National Rural Livelihood Mission and others. There are two important factors which are important for effective functioning and sustenance of community based water interventions. Firstly, only a long term and sustained support will help in evolution of a robust local level institution. Capacity development through trainings and other mediums need to be done on a regular basis. Avenues for vocational education in areas of water and agriculture can be identified and strengthened. With increased availability of livelihood options within the village, there can be a reduction in push factors and thereby result in reduced distress migration.

[24]Siddiqui, M, Water Policies and Legal Framework in India

Increased availability of water and community based water resource management are important for a thriving agriculture based rural livelihood. However, unless demand management of water is not addressed, sustainability of the entire endeavor would be suspect. Therefore, effective demand management of water resources is an important area that can help ensure the sustainability of water resources. Efficient utilisation of available water resources is one of the important aspects of demand management. Efficient management of water resources would entail reduction of costs as well as more availability of water for different competing sectors of the economy. It is estimated that out of the total water used in India about 83% of it is used in agriculture. The remaining water is used in industrial and domestic use[25]. There is substantial efficiency potential available to be harnessed through improvised irrigation. This can be achieved through technological inputs, regulatory measures and capacity development of farmers. Technological inputs may include provision of advanced weather-related inputs, quality seeds, agriculture techniques and others to farmers. Regulatory measures may include incentives to farmers for local-climate suitable crops and dissuasion for water-intensive crops.

Capacity development of farmers may include training them on modern farming practices and techniques. Training may include teaching farmers about the right time of sowing, timing and quantity of water to be used to reduce wastage and ways to increase efficiency. Transitioning from flood-type irrigation, which is low in efficiency, to alternative models like drip-irrigation, sprinkler irrigation, etc., can help India enormously in achieving water efficiency. In many parts of the country, there is a substantial demand for water-intensive crops like sugarcane, banana, cotton and others. Farmers prefer such crops even in the absence of sustainable sources of water since they provide higher economic returns in the short run. Forward linkages of crops which are suitable to the local climatic conditions and are not water-intensive but have sufficient demand in the market need exploration and strengthening. There are further opportunities available in industrial as well as domestic water use, which can enhance water efficiency and aid in water management.

[25]Teri, Perspectives of Water Policy in India

For any livelihood to be sustainable, it should identify risk and implement measures through which the risk can be mitigated. If the risks are not managed well, they threaten to reverse the development gains made and jeopardise the overall intervention and its outcomes. Agriculture as a livelihood enterprise faces multiple risks. First set of risk are the weather related risks. Extreme weather related events like floods, drought can have a serious bearing on the agricultural output. Along with extreme weather events, agriculture has high levels of weather sensitivity. Slight variations in heat, vapour content and other factors can dis-proportionately affect agriculture yield. Farm based Insurance can help in mitigating this risk. Assured water supply can help in limiting the vagaries of weather. Non-realization of fair prices for the agriculture produce is another important risk which threatens the viability of agriculture as a sustainable livelihood option. Assured market and support prices for produce can further help in reducing the financial risks faced by the farming community.

India has a growing population and needs to identify means through which it would continue to feed a billion plus population. Along with the food security needs, livelihood challenges for a huge working age population needs to be addressed. Investments in strengthening of water resource management measures have the potential to contribute to poverty reduction measures, provide livelihood options, address environmental degradation and add to overall sustainable development.

Climate change has emerged as one of the biggest risk to sustainable development. It has the potential to compound the current challenges. Water is one of the most critical link between sustainable development and climate change. Effects of climate change can severely exacerbate the water distress in many parts of the world. This water distress can severely hamper the agriculture production. With a rising global population, addressing the current and the future food security needs can emerge as a major challenge. While there are serious water related risks, water also provides opportunities for a sustainable development journey. Investments in efficient, equitable, effective water resource management measures can contribute to economic growth and at the same time adapt to a changing climate. It is in this context, any water based intervention program should not only address current needs but also anticipate adaptations required for a changing climate and design programs accordingly. Integration and management of anticipated climate change risks within the program design can help in building of resilience for the overall outcome.

Bamboo Drip Irrigation

Bamboo Drip irrigation System is an ingenious system of efficient water management that has been practised for over two centuries in northeast India. The tribal farmers of the region have developed a system for irrigation in which water from perennial springs is diverted to the terrace fields using varying sizes and shapes of bamboo pipes.

Notes