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Surviving Droughts

Recollecting Replicating Drought
Mitigation in the Thar Desert (RDMT) Project

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2018

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FOREWORD

Deserts and droughts are deeply inter-connected. Communities living in deserts have survived droughts over a long period of time. Amid other disasters, droughts are less attended and addressed natural calamity. Droughts do leave a significant impact on communities, their well-being, development and overall growth of the region. Since its inception in 1983, GRAVIS has continuously battled with droughts and has helped communities to survive droughts. Over this period, significant successes have been achieved and there have also been several challenges and lessons learnt for future.

In the most arid villages of Thar, Replication Drought Mitigation in the Thar Desert (RDMT) project was implemented by GRAVIS funded by EdelGive Foundation. The project educated GRAVIS and communities on the ways to mitigate droughts and enhanced bonding between GRAVIS and drought impacted desert communities. A significant focus of the project was on water conservation, horticulture and women empowerment.

This publication is collection of experiences gained from the project. I thank Dr Neetu Sharma for compiling these best practices with the support of GRAVIS team and desert communities, and EdelGive Foundation for their support and guidance. Drought mitigation is all about exchanges and collective learning and that is exactly what this document is about .

Shashi Tyagi

Secretary of GRAVIS

AUTHOR'S NOTE

Scientific and technological advances in various sectors have enhanced human capacity to deal with the climate related exigencies. However, drought as a climatic phenomenon remains a challenge especially in arid areas where agriculture and consequently food production remains highly contingent on rains. In such regions, investment in community's capacities for drought preparedness and creation of sustainable drought mitigation models are the most viable options that also account for community resources.

GRAVIS' work with the communities in dry region of the Thar is an assemblage of several time tested and sustainable practices that are grounded in the philosophy of peoples' participation and community environment. These practices draw upon community resources and community aspirations and EdelGive-GRAVIS collaboration towards combating drought in the Thar region of western Rajasthan has acted as a propeller in the process of peoples' pursuit to address drought related crises.

Creation and rejuvenation of water bodies, and building community's capacities in utilising and maintaining rainwater harvesting structures, have lent sustainable impact on the communities. Revival of the traditional occupations – agriculture and animal husbandry – which is a direct result of the availability of water, has resulted in improved food security and better quality of life for the people in the dry region of the Thar.

Replicability of the practices introduced and encouraged through EdelGive-GRAVIS partnership is a crucial aspect of the interventions and potentially a critical component of the drought mitigation strategy in the Thar region. In subsequent phases, the experience gleaned from this partnership may be utilised for the entire Thar region and a multiplier effect may be achieved.

The author is extremely grateful to GRAVIS' project and field staff for sharing their views and enabling visits to the project villages. The author particularly expresses her heartfelt gratitude to the men, women and children in the rural areas who, despite facing the day to day challenges associated with water scarcity, were kind enough to spare time for discussions and shared their impressions about the interventions.

Neetu Sharma

I Drought and Drought Mitigation

Humanity has been grappling with natural disasters of various kinds. All these disasters have challenged human capacity and endurance to combat and cope with calamities. Given that most of these calamities are not preventable, disaster risk reduction and preparedness have been the key areas of intervention for policy makers, development agencies and the government and non-governmental organisations. However, these interventions need to be determined by their nature, type of onset, triggers as well as the factors that exacerbate them. Drought as a natural phenomenon stands out among others owing to several reasons. It may be seen as just an extension of a dry season and may not be recognised as a natural disaster, although sufferings of rural agricultural communities may be as severe as in the case of declared drought. Further, its impact may vary across a smaller geographical area too; within same district/administrative unit, some areas or villages may be more affected than the others.

Another characteristic that makes drought a difficult phenomenon to deal with is its elusive nature -- onset, duration, intensity and conclusion are hard to identify - yet it affects more people than any other type of hazard. Often detrimental environmentally, socially, and economically, drought remains a poorly understood weather incident. Drought years frequently occur in clusters, and thus the costs of drought are not evenly distributed between years. The impacts of drought are diverse; they ripple through the economy and may linger for years after the termination of the period of deficient precipitation. Because of the number of groups and economic sectors affected by drought, its geographic extent, and the difficulties in quantifying environmental damages and personal hardships, the precise calculation of the financial costs of drought is difficult¹.

Drought is an omnipresent natural hazard and a normal part of the climate of nearly all the regions across the world. But there are certain groups and population clusters that are exposed to greater threats and damage caused by droughts. For instance, communities that are entirely dependent on agriculture and associated activities are the first to get affected by the wrath of drought. Water shortage and droughts have been defining factors for peoples' livelihoods, and their social-cultural and economic life especially in rural areas because of their dependence on agriculture. Within these communities, population that is entirely dependent of rain-fed agriculture in arid and semi-arid regions are most vulnerable to drought. Desired coping and response mechanisms to deal with drought need to take cognizance of the unique nature of drought as a natural phenomenon. While preparing for or attempting to address the drought

¹ Donald A. Wilhite, Mark D. Svoboda, and Michael J. Hayes, Understanding the Complex Impacts of Drought : A Key to Enhancing Drought Mitigation and Preparedness,

like situation it is also equally critical to factor in the pressing needs of humans, and other living beings. Drought is not merely a physical phenomenon, but a result of interplay between scarce rains and the demand placed on water and other natural resources by humans and other living beings. The fact that absence of water even for short duration subjects human life to risk requires coordinated planning and preparedness to deal with it.

It is only where the communities have been resilient enough that in regions with perennial and acute water scarcity, people have been able to survive and continued to make a living from agriculture and other associated activities such as animal husbandry and horticulture. There is a persistent need to investing in building such resilience in the communities and provide them with tools to minimise the potential damage from drought.

II The Thar Desert: A case of perennial drought

Thar Desert is a one of the most difficult climate zone for human population; it witnesses recurrent droughts and acute water shortage. It forms part of the arid region of western Rajasthan and shares an international border with Pakistan to the northwest and borders on the Indian states of Gujarat, to the southwest, as well as Punjab and Haryana, to the northeast. The Thar Desert covers 11 districts in western Rajasthan, comprising 57% of the state's surface area. Spread over 342 lakh hectares of land, out of which 60 per cent constitutes of the Thar



Thar Desert landscape

Desert, many districts of Rajasthan face acute water shortage as it suffers from the lowest amount of precipitation in the country throughout the year. In spite of this, Thar Desert is the most compactly densely populated desert in the world with more than 83 people per square kilometres, and home to about 24 million people.

Droughts, or low precipitation is not an alien phenomenon in most regions, however frequency and intensity of droughts in the Thar region are alarming. Due to its high incidence of drought the arid zone of Rajasthan is classified as a region chronically prone to droughts, making local agriculture an unviable business. Chronic aridity of the region has rendered this area as one of the poorest areas of India. Inhabitants of the Thar make a living by the small scale agriculture and animal husbandry that dependent on scarce rains and a perpetual crisis situation prevails due to the increased impact on both the human and livestock population which continues to put tremendous pressure on land, surface and groundwater resources. For the people who inhabit the region, rain is the main source of fresh water, and it is vital to agriculture throughout this part of India, as most of the underground water is saline, and there are no freshwater sources nearby. Yet droughts are and have always been a part of local reality². In addition, when irrigation is based on ground water—which is saline in most of the Thar Desert—it does not represent a solution that is beneficial over the long term, since it can lead to the salinization of land and the loss of soil fertility.



A naadi

² Gone with the Trees: Deciphering the Thar Desert's Recurring Droughts Karine Gagne, Current Anthropology Volume 54, Number 4, August 2013.

The acute problem of water scarcity, particularly the low rate of annual rainfall, and subsequent lack of crops grown in the region, have made it difficult for people to develop agricultural land and survive solely off the income it provides. It is pertinent to note here that even the ground water situation in the Thar is alarming. Safe, drinkable ground water is becoming increasingly scarce. More than half of the total ground water in the desert region is brackish, highly saline and unsuitable for human consumption. Due to the loss of natural watersheds, poor mining practices and large-scale tube-well exploitation for agri-business, the water table continues to fall at an unprecedented rate. Water scarcity has taken the shape of a water emergency over the past couple of decades. There are pockets in the 12 western districts where rainfall over the last few years has been less than 30 mm and where near famine conditions prevail. The villagers are dependent on rainwater, which meets their needs for about 2 to 3 months only of the year. Rest of the year, they bring water from distances of between 3 and 40 kilometres. Water is collected by private water tanks or by purchasing water from water carriers using tanks on camel carts or tractors. With dwindling productivity owing to less rains rural poor is already under a financial crunch and that gets further aggravated with the expenses on water purchase. In the most rural areas of Western Rajasthan about INR 500 is paid for only 500 litres of water that lasts for only few days. For those who do not have facility to store water the struggle becomes even more taxing. Women and girls in the household having no facility to store water spend half of their life only on collecting water. Dependence of ground water also is neither feasible nor sustainable. Not only, ground water in most of the areas is saline and wherever it is not, water extracting has pushed water table even further down.



Women fetching water

Water scarcity affects the rural poor in multiple ways. In addition to the constant threat to their food and nutrition security, maintenance of hygiene remains a challenge in the Desert that further leads to disease and poor health. For women and young girls water fetching means deprivation from social, economic and educational opportunities. Social and economic profile of the state of Rajasthan portrays a very gloomy picture of the region. Health, education, access to services and gender equality related indicators are quite despondent.

Quality of life for people in any region gets determined by various factors including their financial condition, health status, socio-cultural factors as well as physical environment. It is important to note that aggregated situation in the state of Rajasthan also does not tell the entire tale of rural communities languishing in penury. To an extent, the severity of several issues gets masked in some of the districts by the better performing districts. Jodhpur and Jaisalmer are two of the largest districts of Rajasthan and cover major part of the Indian side of the Thar Desert.

Both Jaisalmer and Jodhpur are among the largest districts of Rajasthan and also in the country. There are several things that are common in them apart from the fact that both share a border with the neighbouring country. Jaisalmer District, with population of about 6.7 lakh is Rajasthan's the least populous district. According to the latest census figures available, almost 87% of population in Jaisalmer is located in rural areas. Jodhpur, on the other hand has a much higher population with 36.9 lakh people. The majority of the population, nearly 66% (about 24.2 lakh) live in Jodhpur District rural part. The economy of Jaisalmer district is mainly dependent on agriculture as 61.1 percent workers in the district are either cultivators or agricultural labourers.

The region where these districts are located has very dry climate with very hot summer; a cold winter and sparse rains. The climate is extremely hot during summer with maximum temperatures between 45-49 degree Celsius and extremely cold during winter with minimum temperature as low as 1 degree Celsius. The variation in temperature from morning to noon and the late midnight is a sudden phenomenon. The average rainfall in these two districts is also much lower as compared to state average. Ground and soil in most of part of these districts is sandy, dry, scorched and land is largely barren, undulating with its famous sand dunes and slopes towards the Indus valley and the Runn of Kutch. With no perennial river in the district and very dry weather, even the underground water level is very low, vegetation is sparse and human as well as animal life is always at the margins with lack of water and food. Despite the presence of belligerent climatic conditions and the sandy soil, conditions that not very

suitable for agriculture, the economy of Jaisalmer district is largely dependent on agriculture as 61.1 percent workers in the district are either cultivators or agricultural labourers. In both Jaisalmer and Jodhpur most of the rural workers are either cultivators or agricultural labourers. Rural areas that are located remotely witness multidimensional hardships. Access to basic amenities and services is a challenge for the rural community in these areas. Families staying in the far off villages do not even have access to basic health facilities and middle and higher education. Their financial conditions do not allow them to incur expenses on transport for reaching out to these facilities. The priority remains water and the means to access water. All endeavours by impoverished people get negated by the disproportionate expenses on water. Education, health, nutrition, everything gets affected. Even for young girls continuing education becomes a luxury because they are most of the time busy filling pitchers for the family. This also reflects in status of literacy rates in these districts. The literacy rate in Jaisalmer district is 57.2 percent which itself is lower than the State average and gender gap of the literacy rate is 32.3 percent in the district. Literacy rate in Jodhpur is 66% with only 52% of females being literate as against 79% of male literates.

Water, and its scarcity determined the way of life of people and addressing water related problems remains the key to transform their lives. GRAVIS, a non-governmental organisation working with the most impoverished communities located in remote areas of the Thar Desert towards integrated community development with a focus on enabling access to water for drinking, personal use, household use and agriculture

III GRAVIS and its work on drought mitigation

Several problems and issues encountered in the personal, household and community life are either offshoots of get further complicated in the want of water. Hence drought mitigation is at the centre of all the efforts made by GRAVIS to protect, promote and rejuvenate rural livelihoods in the Thar. Drought mitigation efforts of GRAVIS are based on the philosophy of integrated community development that derives its impetus from the inherent strength of people's participation in the process of development. With a strong belief in traditional wisdom, GRAVIS has relied on the time-tested technologies and strategies to compact drought while also ensure that these technologies are also refurbished with the technological innovations.



A meeting with community

IV Replication Drought Mitigation in Thar : Rejuvenating Rural Lives

In pursuit of its vision to create drought resilient communities, GRAVIS, in collaboration with Edel-Give Foundation conceived a project Replicating Drought Mitigation in Thar (RDMT) with focus on increased access to water resources, ensuring food and nutrition security and building capacities of the community to be able to combat drought and drought like situations. The project was designed to address the fundamental issue of water scarcity by focusing on three major aspects – making enhanced quantity of food available, addressing the problem of drinking water, and empowering local community and local organisations by building their capacities. The project was implemented in ten villages, 5 each in Jodhpur and Jaisalmer districts of Rajasthan state.

Figure 1 - Ten project villages in Jaisalmer and Jodhpur Districts

Jaisalmer	Jodhpur
<ul style="list-style-type: none"> • Dujasar • Kahalaa • Khabia • Jajiya • Meghwalon ki Dhani 	<ul style="list-style-type: none"> • Harlaya • Indo ki Dhani • Karnaniyo ki Dhani • Shiv Nagar • Bhihadiya

Both Jailsamer and Jodhpur, despite being known as tourist destinations, are inhabited by a large rural population that is dependent on agriculture and animal husbandry. Poverty, illiteracy and locations that are difficult to reach are common characteristics of most of the rural areas in these villages.

All the villages selected had no access to a fresh water resource and were located 10 to 15 kilometres away from health facilities. However, one common phenomenon that exposed them to the perils of livelihood insecurities was low rainfall. Low education levels and lack of any other options for alternative location pushed young males to seasonal migrations. Even lower literacy rates among women, most of the being illiterate or completed only primary level of education was also one of the factors responsible for low social status of women and their inability to participate in decisions within household and community.

All the ten project villages received very low rainfall ranging from 100 mm to 120 mm in an entire year, which is even lower than the state average rainfall. Jaisalmer and Jodhpur also witness high temperature and open terrains allow all the moisture to evaporate, rendering the land dry and soil devoid of any moisture. Agriculture produce remains low even to fulfil the household need. In such situation prolonged dry spells result in large-scale food insecurities for impoverished communities. Construction of khadin, establishment of agri-horti units (AHU), and de-silting of village ponds were major activities of the project for enhancing food production and ensuring food security in the ten identified villages.

ACCESS TO DRINKING WATER AND REGENERATION OF NATURAL RESOURCES

Water for human and animal consumption is the most fundamental issue in the Thar. Through RDMT project EdelGive-GRAVIS sought to resolve this issue in the ten identified project villages, by reviving natural community resources.

Naadis or village ponds in the rural area of Thar Desert are community source for drinking water and water for the cattle. A naadi acts as a major source of water in the Thar during droughts and are natural or very old village ponds that used to get filled up during rainy seasons and served as useful community water resource. However, these naadis get silted and require a process of de-silting every 4 to 5 years or so to recharge the water and revive naadis.

Naadi or village pond comprises a large sized catchment area; the down slope is excavated into a big pit to store the runoff. The excavated earth is piled up as a semi-circular bund along the edge of the pit to check water flowing out of the pit. Naadi or village pond have a natural catchment area of 100 to 500 hectares with a collecting pit of 200 meters across and be four to six meters deep with a capacity of 20,000 to 40,000 cubic meters. Once constructed or de-silted naadis; remains functional over several years and able to serve as a great water resource for the villages meeting the drinking water needs of over 4,000 humans and over 8,000 cattle.



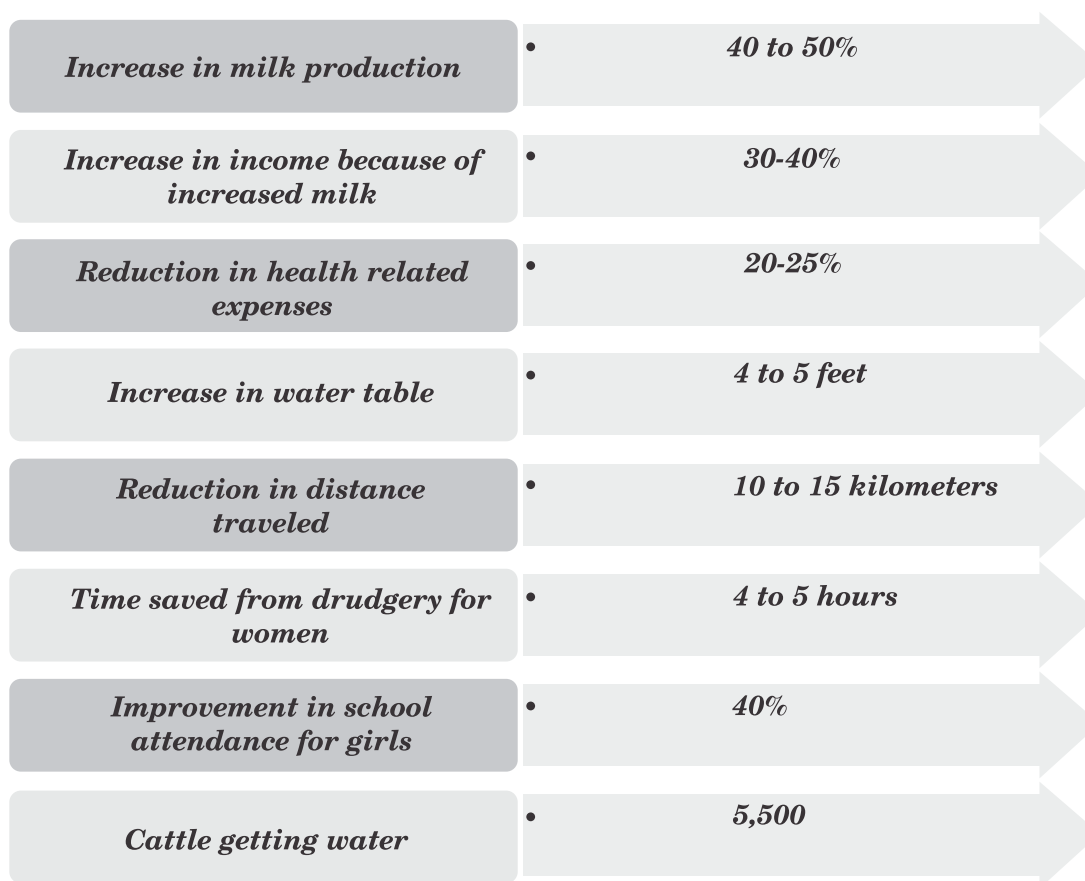
Naadi in Jajiya village

As part of the EdelGive-GRAVIS partnership de-silting of four naadis was undertaken in the villages Indo ki Dhani, Meghwalon ki Dhani, Jajiya and Kahala.

These naadis got revived after de-silting and again became the source for water of fresh water for about 3500 people from six villages who are completely relying on these naadis for their own consumption as drinking water and to fulfil water needs of their cattle, this number is expected to go up with the fourth one getting completed and rain water getting accumulated in it.

Water from these naadis also fulfils the needs of about 5,500 cattle in these villages. People in three of these villages also use this water for horticulture activities that enables extra food, nutrition and in some cases extra nutrition for their families. Soil around naadis also retains moisture in which grass and other desert plants grow. These plants and shrubs serve as fodder for cattle. Milk production increased after cattle starting getting sufficient water and fodder. Availability of ample water and fodder for cattle has resulted in increased milk produce and proportionate increase in average household income. For the entire population making use of water available through naadis, this has also meant better hygiene and consequently better health. Community members also reported better quality of water available through naadis and earlier the ground water that they were using was saline in nature.

Figure 2 - Quantifying the impact of various practices on peoples' lives



Assessment of the impact of de-silting of naadis was undertaken through FGDs with the beneficiaries and members of the village development committees (VDCs). Responses accumulated from these FGDs were compared with the baseline. Figure 3 represents the changes that naadis brought about in the lives of rural community.

Social impact: Empowering women and young girls

Water plays central role in defining the social architecture of the society and its impact on women and young girls transcends generations. During the base line survey conducted before the implementation of the project, it was found that women and young girls were spending three to five hours per day to fetch water from distance sources, and water fetching duties were the primary factors preventing girls from regular schooling. Young girls were either reaching school late and/or leaving early to assist their mothers in providing for water for household.

Life has changed in multiple ways for Rani and her family: Impact of regenerated community water resource

Rani is too busy herding her cattle back to her home. Its already later afternoon and she needs to be back before dusk, since she wants to study for a while before its already supper time.

She is in class VIII and goes to a school close to her house. "My teachers are very happy with me now, I am putting in a lot of efforts in my studies and getting good grades too. I want to become a teacher when I grow up, and make sure that all the girls of my village and all nearby village, have opportunity to not only attend school regularly, but sufficient time for their studies too."



Rani at her home after finishing school

Not very long ago, things were quite different. She had to travel almost 10 kilometers in hot sun both ways with cattle so that they could drink water. 'I used to be very exhausted at the end of it and did not have energy to go to school. Even on the day I managed to reach school. I was always late. I never had time to study after the school. About one and half years ago, an old naadi was de-silted and after the rains, it got filled up with fresh water. This naadi is right outside my village, which is a boon for all of us. I and many other young girls, who used to travel long distance earlier and had to miss the school, no longer spend hours together on fetching water and rearing the cattle. Our teachers are also happy with our performance in school.

Rani's family is also very happy that she can continue her studies without any disruption. But for him what is equally important is the fact

that availability of water for cattle has resulted in about 40% increase in production of milk. Not only children in the family enough milk to drink and they are healthier now, the proportion of the milk that is sold in market has also gone up and so is our income. I really wish that we had understood the importance of this community source of water much before. Now, all of us are committed to taking care of naadi in our village for collective benefit.

I have also been part of the training organized by GRAVIS on the importance of rainwater harvesting. I now know that we need to capture rain water as far as possible to be able to take on the challenge posed to us by dry spells."

With de-silting of naadis, distance to water resources has already reduced substantially for more than 2500 women in the ten project villages. Reduction in drudgery of women and young girls has meant not only physical energy saved but also utilisation of saved time for productive activities. Additional disposable time has been one of the key factors encouraging women to participate in SHG activities. There has been an upward trend in the membership of SHGs, regularity of meetings of SHGs and participation of women in the trainings organised for SHG members. However, most critical gender dimension of de-silting of naadis has been increased attendance of young girls in schools and improvement in their academic performance. 40% improvement in schools attendance of girls was reported by most of the members of village development committees (VDCs).

Investment made by EdelGive-GRAVIS in terms of material resources and time spent on de-silting of naadis has proved to be a crucial investment in altering the way of life for people in these ten villages under RDMT project villages. In addition to better quality of life for the people, this change has economic, social as well as political dimensions too that have manifested in increased disposable income, women's empowerment and increased participation of people in community life and local self-government.

ENSURING FOOD SECURITY, NUTRITION AND BETTER HEALTH

All the activities that helped in enhancing the food production and nutrition will be discussed in this section. In addition to the outcomes of de-silting of naadis resulting in increased milk production and reference to construction of khadins and increased crop output, arid-horti units (AHU) and their impact on food security and economic empowerment will be discussed.

Limited produce coupled with mono cropping that farmers are coerced into because of less rains, that too only for a limited period, are the major challenged that required to overcome for ensure food security and nutrition for the people in ten villages in Jodhpur and Jaisalmer districts. Since both these districts also witness high temperatures too, open terrains allow all the moisture to evaporate, soil becomes dry. Agriculture produce remains too low for the farmers even to ensure two square meals for the family. In such situation prolonged dry spells result in large-scale food insecurities for impoverished communities. Through the RDMT project EdelGive-GRAVIS under two distinct measures to address the issue of food and nutrition related insecurities. These were: construction of khadin and establishment of arid-horti units (AHU).



Khadin in Karnaniyo ki Dhani village

Food Security and enhanced income for Desert families

I have never been so content with the produce of grains in my farm. Not only I have harvested wheat in a good quantity, I am also expecting another crop during winters since the soli still has lots of moisture. It is possible only because of the khadin that was constructed last year in my farm. Earlier, most of ten hectares of my land was almost barren and we could not even grow enough that could feed my family of ten. My elder sons had to go to the neighbouring town in search of daily wage most months of the year.

Says Rewat Ram, a 55 year old farmer and resident of Bhihadiya village in Jaisalmer district, a district that witnesses drought and water shortage for a major portion of the year.

Initially, Rewat Ram was a bit sceptic about the efficacy of khadin and was also worried about losing a part of cultivable land to construction. However, all his doubts were resolved, not only for himself but all other villagers when they saw Rewat Ram getting the benefit of multiple harvests in a year. After the construction of khadin, his farm filled with rainwater and it remained moist for many months. He grew wheat in the farm and has enough to consume now for the entire family for the whole year. For the subsequent seasons, he grew cluster beans and reaped good quantity of that too. He sold most part of cluster beans and got good returns.



Rewat Ram with a ready to harvest crop in his farm

Khadin, has not only resolved the issue of food insecurity for Rewat Ram's family, its impact can also be seen on the quality of life for them. With the enhanced income, the family's ability to access health, education facilities and buy other necessary things has increased considerably.

Because of the moisture in the soil, he doesn't need to water the farms very often and this has saved him and his family of hard labour. The family is spending more quality time together and are also engaging themselves in productive and creative endeavours.

The story of Rewat Ram and his family is not an isolated one. Like Rewat Ram, today 150 families in remote area of the TharDesert are becoming part of the change that has brought about food security, prosperity and wellbeing.

Khadin, is an ingenious construction designed to harvest surface runoff water for agriculture. Its main feature is a very long (100-300 m) earthen embankment built across the lower hill slopes lying below gravelly uplands. Sluices and spillways allow excess water to drain off. The khadin system is based on the principle of harvesting rainwater on farmland and subsequent use of this water-saturated land for crop production.

Inching ahead towards prosperity: The Impact of Khadin

Amba Ram, has a very small land holding in Jajiya village that he ploughs and is barely able to grow enough food grains for his family of six. With his 13 beegha of farm he used to produce, 12 to 15 quintals of pearl millet and no other grains during entire year. Amba Ram and his family used to find it difficult to make the two ends meet given that they didn't have enough to sell in market to be able to take care of other expenses.

Last year, GRAVIS constructed a khadin in my field; I was not very sure about how it is going to help since it is just the rainwater that we have to depend on. However, during the rainy season, soil in the field retained lots of moisture that was suitable crops other than pearl millet too. I sowed chickpea and within few months my field was green with the chickpea plants. Best part was that I didn't have water them later. I produced 30 quintals of chickpea that is double the produce I used to get without the khadin. I have also been able to grow beans and pearl millets for my own consumption. This means that I can sell most part of chickpea and get additional income.

If I am able to save enough money after household expenses, I plan to buy few cows and goats. With the crop remnants now cattle can be fed well and I can get sufficient milk for home and for selling

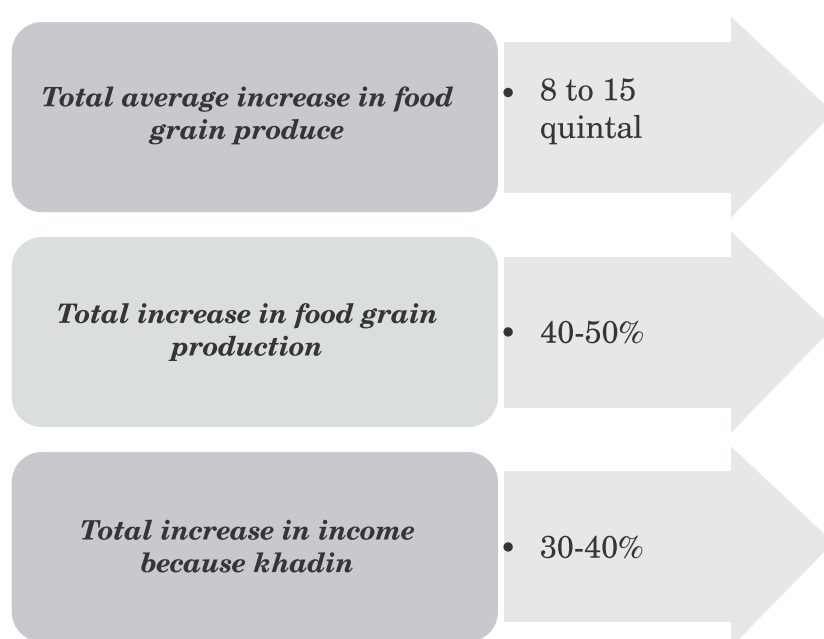
Amba Ram in his field with beans and pearl millet grown in the background

I attended school only till V standard and my exposure to world outside my village is very limited. In this situation, the trainings conducted by GRAVIS on various aspects of agriculture were quite useful. I was able to learn various water saving techniques, use of bio fertilisers, organic manure and also the quality of seeds. I attended all these trainings and found them every useful. I underwent training on the technique used in khadin and am in a position to take good care of my khadin.

I can now see how khadin is going to change mine and all others; lives who have got khadin constructed in their field. I don't think there was any other economical ways we could accumulate water for our crops.

As part of RDMT project 150 khadins were constructed in ten villages that helped retention of moisture in the field after the rains. This moisture not only leads to higher yield of crops but also allows farmers to cultivate multiple crops in a year.

Figure 3 - Impact of khadin on production and income

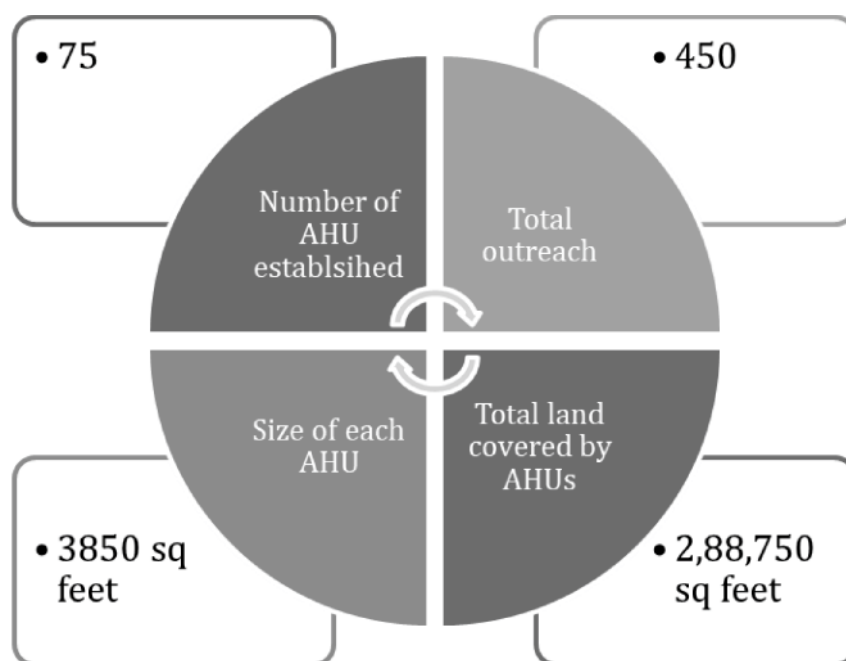


Nutrition security through AHUs

Given a single cropping season that prevails in most of the Thar Desert and paucity of water rural population has remains deprived of diversified food that is crucial to get balanced diet and nutrition. Arid Horticulture Units (AHUs) consume less water and yet may become an economical source of fresh fruits and vegetables. AHUs are established in arid regions with fruit plants to provide nutrition security through access to diverse food. These units consume less water and can survive hot and dry weather of deserts.

EdelGive-GRAVIS supported establishment of 75 such AHUs as part of RDMT project. This support included provision of fruit plants; provision of material for fencing; and trainings on technical aspects of nurturing various varieties of plants, training on preparation and use of bio fertilisers, and judicious use of water for these AHUs.

Figure 4 - AHU outreach



Establishment of AHUs has provided them opportunity to grow additional diversified food, especially fruits that ensure nutrition security for all the family members. Excess produce can be sold in market. Fruit trees such as pomegranate, desert plum, lime and guava, which can survive the desert climate have been planted in these AHUs.

By the end of project period, fruits trees had grown and harvested fruits were being sold in market by some beneficiaries. This became an extra source of income for the household without making any substantial investments. Women and older people in the family tend to these productive units and this has contributed towards better social status for them. As part of RMDT project, EdelGive - GRAVIS supported establishment of 75 AHUs, converting 2,88,750 sq. feet of land that was lying fallow into cultivable land, to be used for growing fruits. Only through AHU this much of land was also converted into greener land. Planting of trees has prevented soil erosion for an even larger area.

Some of the AHU beneficiaries made use of the available know how, and material support in terms of fencing etc. and grew vegetables too within the same area. Most of these were able to grow 8 kgm 12 kilograms of vegetables that they consumed within the households. As a combined impact of both khadin and AHU, the project contributed towards availability of more food per capita and diversified food and nutrition for a total number of 1350 people, going by a conservative estimate of 6 persons per household.

Devi is planting happiness and wellbeing in her backyard

After her husband migrated to the city every year for daily wage, Devi used to spend most of her time either fetching water or doing other household chores. She was initially unsure about the growing plants in the barren land next to her house. On a mid summer evening, she was watering her plants in her orchard. *“Watering the plants in evening ensures its retention in soil for much longer time and plants get the moisture for a longer time. Earlier, I used to water my plants in the morning or midday, it was only when I attended a training conducted by GRAVIS on maintenance of arid-horticulture unit that I realised that all water gets evaporated in no time at that time”.*



Devi of Karnaniyon ki Dhanis is growing vegetables in AHU along with desert plum

Fruits and green vegetables are expensive commodities in the Thar Desert. With low production, low access and much shorter life of these perishables in the hot desert region that only few privileged can afford. Sparse and negligible vegetation in the region doesn't allow people to get sufficient amount of nutritious food. When Devi decided to establish an AHU, members of the family approached the village development committee (VDC) that decided to provide her with basic support. She was given 20 plants and fencing material to establish an orchard near to her house. She now devotes her time taking care of the plants. She uses

organic manure and herbal pesticides for rich growth of the plants. She has provided shade to the plants to protect them from extreme heat and cold. Now she started growing vegetables in space between two plants. She grows tomatoes, chilly, onion, eggplant, okra and coriander in her small orchard.

“I save a substantial amount of Rs. 2,500 every month by producing 12 to 15 kilograms of vegetables. Not only the money is saved, I and other family members are able to consume nutritious food every day, which was not possible earlier given the cost of vegetables.” She has also harvested ber (desert plum) and distributed it to among family and friends. Other plants are also ready to proliferate. She is hope full of getting good fruits harvest and plans to sell it too, that will become an additional source of income for her. While financial gains are the most tangible form of attributes that define the change in her life, the confidence that she has gained is the most valued outcome of the whole endeavour. She says, *“I feel so happy when people come to visit my orchard and say how I am managing it in water scarce place. They make me feel proud when they praise my plants.”* Devi has development expertise in horticulture and a newfound confidence can be traced in her persona. Her gardening skills and ability to grow vegetables and fruit plants have got her popular in the surrounding area. She feels lot more accomplished now.

In addition to direct benefits, AHUs are ushering in a major qualitative change in the lives of people. Regular consumption of fruits and vegetable is leading to better nutrition level, better resistance to infectious diseases and consequently better health. This also means that people have to visit the health facilities and access medical services less often. Considering the remote locations of the villages, lesser number of such visits translates into substantial savings on travel expenses. Coupled with the savings on medicines and consultation fee etc., this offloads rural population from a major financial burden.

ENVIRONMENT FRIENDLY SUSTAINABLE PRACTICES

Construction of khadin and naadis address the fundamental issues of food and water availability that the poverty stricken rural communities have to face. There are several tangible immediate results of these interventions for each beneficiary and their households that can be measured such as food production, water availability, and improved nutrition etc. Quality of life of people, however, also gets determined by natural environment, climate and community resources.

Construction of khadin on one hand resulted in improved food grain production, percolation of water in the low lying area has led to increase in water table in the surrounding areas. In the areas surrounding khadin and naadis, water table has elevated by 4 to 5 feet in the area surrounding these structures. Many of the khadin beneficiaries, have dug small wells to water their vegetable garden alongside *khadin*. Fresh water could be found at a depth of about 10 to 12 feet and that is exceptional in the Desert. Area around the fields also gets moistened and become fertile enough for natural vegetation. This vegetation not only helps increasing the ground water levels and making the environment surrounding *khadin* greener, it also help keep the temperatures in moderation, However, most importantly the vegetation around *khadins* prevent soil erosion and help retain the fertility of the land. Incremental improvement in the quality of soil and prevention of its erosion, along with the expansion of greener pastures that provide ample fodder for cattle, is environmentally sustainable too.

Increased food grain production, enhanced food availability, fruits grown in AHUS, and extra milk produce from the cattle, all have contributed towards increased income for people. Increased disposal income is also attributable to expenses saved on health services. Better hygiene being maintained with availability of water, and improved nutrition as a result of diverse food, have contributed to better health and reduction in instances of infections and illnesses. Expense on health services, medicines and the travel to access health facilities, are all saved. This leads to enhanced disposable income for the households.



SHG Meeting

Availability of sustainable livelihood options and a better quality of life have a direct impact on checking migration of people towards urban areas in search of daily wages. A combination of all the interventions made through EdelGive-GRAVIS partnership is driving people from penury to prosperity in the Desert region. In general, people are becoming environmental aware about their surroundings and need to conserve nature owing to several rounds of meetings, discussions and trainings that they attend.

COMMUNITY OWNERSHIP, EMPOWERMENT AND CAPACITY BUILDING

In a largely uneducated population with very low literacy rates, especially among women, introduction and implementation of any interventions as well as its sustenance required a significant amount of investment in capacity building of the local community and other stakeholders. EdelGive - GRAVIS recognised this need at the onset and built in a strong component of capacity building of a range of stakeholders, project participants and end users of the project. These training catered to various needs such as awareness and sensitisation on the importance of rain water harvesting, technical expertise for maintaining rainwater harvesting structures, various innovative agricultural practices, and livestock management. The trainings were also used as opportunities to address some of prevailing social issues such as gender empowerment.

Table 1: An overview of capacity building endeavours

	Number of trainings organised	Males	Females	Total	Aspects of trainings
Training of VDCs	6	110	90	200	Crop Management, Organic Farming, Exposure to Khadinsites, Maintenance of AHUs, Livestock Management for livelihood
Trainings for SHGs	6		72	72	
Trainings for Grass-root NGOs and CBOs	3	40	35	75	Watershed development, Livelihood approach,
Exposure visits of community					Exposure to CAZRI for AHU management

Mobilisation of people and their participation in decision making in community related matters is critical to the objective of empowerment of people. Community based organisations provide an opportunity for people to participate effectively in this process. GRAVIS has endeavoured to strengthen community participation by strengthening existing institutional spaces, such as Village Development Committees (VDCs). VDCs are basic units of self-governance at the village level play a critical role in the development of village. However, these VDCs did not exist in the villages identified for the project. Hence, formation of VDCs was the first step towards community mobilisation. Through a number of interactions and meetings people were encouraged to be part of these VDCs. Formation of VDCs was followed by trainings on leadership, management of the committee, its role and responsibilities, interaction with the local self-government and authorities.

As part of the overall objective of building local capacities to sustain the impact of interventions 6 trainings were conducted for approximately 200 members of VDCs. These trainings also built capacities of members of VDCs on various aspects of rain-fed agriculture including crop management, organic farming, khadin and AHUs maintenance, and livestock management for livelihood. All the members found these trainings quite useful and have also started observing all the suggestions as per the guidance that they got during these trainings. Technology transfer of the rainwater harvesting structures and various other technical issues pertaining to rain-fed agriculture ensures sustainability of the impact of interventions. People are already becoming less dependent on external support in application of these technologies and maintenance of structures.

Empowerment of community based organisational structures creates indigenous support system for people in remote rural areas. Over a period of time these structures assume the capacity to respond to various needs of the community. VDCs in the ten project village now have the potential to lead the process of social development and negotiate with the local authorities for support to these villages. These VDCs are also carrier of information and knowledge on technical aspects of rain water harvesting and maintenance and repair of rainwater harvesting structures, for others in the village.

Resilient and empowered communities

Ten villages where RDMT project was implemented are exemplar of extreme poverty, low literacy and education levels and lack of awareness about various technologies for enhancing agricultural produce. While *khadin* and AHUs are adding value to various aspects of people's lives, the need to sustain this change is equally critical. Provision of trainings on technology of

rainwater harvesting and maintenance of these structures was an integral component of the project that ensures that the end users are capacitated themselves to be able to take care of the structure even after withdrawal of support from outside. Content of these trainings largely focused on rain fed agriculture, crop and seed management, organic fertilisers and pesticides making and their use, rainwater harvesting and its various types, maintenance of rainwater harvesting structures

Such initiatives were further complemented by capacity building of community based groups, and women's groups that also function as local support groups in the community, share knowledge that they get from structured programme and generate awareness among larger community. This process results in creation of empowered and drought resilient communities.

Creation of opportunities for women through formation of self help groups

Social and cultural milieu in rural areas of the Thar creates constant challenges for the empowerment of the women in this region. Illiteracy, ignorance, non-recognition of economic contribution made by women one hand; and restrictions on mobilisation, limited opportunities for completion of education, and responsibility of fetching water or all household needs on the other, have prevented women from socialising and interaction with the world outside their households. At a minimum, rural women may be said to be mobilised when they begin participating in social action outside the family even sporadically.

Women's mobilisation in the rural communities of the Thar region gets constantly challenged by the conservative social cultural norms lack of mobilisations prevents them for accessing any opportunities of social interaction, exposure and financial self-reliance. Self-help groups of women (SHGs) provide opportunity for women in villages mobilise themselves into groups, and get exposed to the world outside their homes. Trainings conducted members of SHGs exposed all the SHG members to a range of options available to them to initiate any vocation. Subsequent to these trainings all SHGs have started savings and internal loaning. Two SHGs are involved in craft making that generates a profit of Rs. 1200-1500 per month for each member. One SHG has initiative dairy production has in its initial stages started earning a profit of Rs 6000 to 8000 per month. However, the most valuable contribution of these trainings was generating awareness on many social issues that define their context and opportunities. Training of women on issues such as importance of girls' education, consequences of early marriages among girls that are rampant in the rural areas of the Thar, old age care and importance of communal harmony, have led to creation of a female population that is aware and empowered to claim its share in the development outcomes in the community.

The commonality of interests, and the ability to organise them into a set of common issues intended to be resolved by collective action are the immediate outcome of formation of these groups. The groups now have the ability to act as a co-ordinated constituency, asserting its combined strength towards the fulfilment of its aims.

Naadi and self help group enabling women to explore their potential

A group of young and older women in Khabiya village in Jaisalmer district has been meeting for the past almost two years now and have named their groups as Bhoorababa. They have been discussing problems and issues of various kinds that they face, from finances, to water shortage and livestock management. Twelve members of the group have been making a monthly saving of Rs 100/- per month and have opened a bank account in the name of the group. The groups started internal loaning among the group members. Kamla Devi, President of the group informed, “a collective decision with participation of everyone in the group and based on the urgency of the need is taken regarding loaning.” Kamla Devi says, “all women in the village used to spend a lot of time, almost 3-4 hours a day, collecting water for household use and cattle and used to be exhausted by the end of the day. We had a naadi (village pond) nearby but because of silt, the water had become unusable even for cattle. In 2016, after the naadi was de-silted, it got filled up with fresh water following the monsoon rains. Women fetch water for drinking, household use as well as for cattle from this naadi now. I and other women in the village have much more time now to socialise and meet with each other, and discuss matters of common concern. With the formation of our group, we are also able to get together to help each other during the times of crisis. Both naadi and self help group have inculcated a sense of belongingness in the community.”

Radha Devi and Kamla Devi conducting a meeting of Bhoorababa Self help Group in Khabiya village

She says, “if the members of our group did not have access to the revived naadi, they wouldn't have got time, energy and interest in undergoing the trainings conducted by GRAVIS for them - on leadership, management of group, financial literacy management. Since most of them women in our village are illiterate, these trainings have been very useful in bringing all the women at the same level of understanding about the functions of our groups”. In consultation with the members of the group, it was decided to conduct

trainings on various vocations that women could take up later as alternative livelihood options. Radha Devi, the Treasurer of the group, says, “all of us have received trainings in making pickles and decorative stuffs, and we are planning to start a collective enterprise, make it profitable for all us, and make contributions to our household incomes”.

Women of the groups are also looking forward to get trained in tailoring and embroidery, that will not only save additional expenses on tailoring but may also become another opportunity to set a small tailoring shop. Radha Devi, says, “naadi in our village and coming together of women to form a group, have had ground-breaking impacts on women's lives, its upto all of us now to capitalise on the skills we have gained, and through our endeavours motivate women in other neighbouring villages too to make difference in their lives.

Facilitation of replication of drought mitigation model

Thar Desert is a vast expanse and home to about 25 million people and a sizeable portion of this population is in need of the support similar to what has been facilitated through EdelGive-GRAVIS. Coordinated efforts along with organisations, institutions and individuals having a mandate akin to GRAVIS are needed to build this support.

With a vision to disseminate the information and technical knowhow on various aspects of community based drought mitigation, EdelGive-GRAVIS undertook capacity building of a wide range of CBOs acting on different projects in with common focus of drought mitigation. Given the institutional gaps that exist in capacities and resources, such trainings had the potential to amplify the outcome and impacts of achievements from RDMT. Concept and methodology of watershed development in drought prone areas, judicious use of water for agriculture, and drought resistance was undertaken. This process magnifies the efforts being done through RDMT project and has the potential to lead to an effective demand for such initiatives to be carried out at larger scale.

V Building on the Successful Practices

A holistic approach towards integrated community development in a region constantly under the shadow of drought, accounts for various elements of social and economic challenges faced by people emanating from water shortage. EdelGive-GRAVIS collaboration epitomises this approach and manifests in a range of practices adopted to counter the climate challenges for the rural communities living in most difficult circumstances. All these practices have the potential to trigger larger systemic change towards drought preparedness and risk reduction. There is a need to develop a follow up plan to further augment, intensify and replicate these practices.

Documentation and dissemination

Practices adopted as part of RDMT project are informed by the local situation in the Thar Desert. Process documentation of all these practices, along with the preparations required, methodology followed, challenges faced at various levels, learnings from the exercises, technical details pertaining to products, etc. will be quite useful in building the communication material about the project. This documentation if disseminated to a larger audience having interest in the development of the area can follow the footprints and make valuable contributions.

Linkages

Interventions to combat drought are multi-dimensional and this multi dimensionality is also an opportunity for value adding to the interventions by bringing in more number of stakeholders into the process. Government agencies and institutions can be brought on board to institutionalise some of the practice conceived or innovated through EdelGive-GRAVIS collaboration. These linkages can be leveraged in various sectors including agriculture, education, vocational skills, women empowerment, and most importantly water shed development. Infrastructure development for agriculture, provision of seeds, support prices for crops, transportation, access to technical resources, and access to financial services, are some of the areas that require immediate support from the state machinery in arid zones. Similarly, access to equitable quality education for all, especially girls is a long term investment in human resource development that needs to be invested in. Health and creation of alternative occupations are areas that need to be looked at in conjunction with the government initiatives, to translate the vision of creation of drought resilient societies.

Horizontal and Vertical Expansion

Transformation of a larger population is contingent on replication of the models in larger geographic areas witnessing similar issues associated with water scarcity and skewed social and economic progress. A multi-pronged strategy needs to be adopted to reach out to larger number of communities, villages and people living in the Thar to make the change comprehensive and all encompassing. The islands of prosperity can be looked up to motivate this change but the penetration of practices to other areas must keep inspiring the thinking.

There also exists a potential for qualitative expansion, in terms diversification of the rainwater harvesting structures, for instance to household level structures, and reaching out to specific groups to address specific issues faced by them. Adolescent girls, older people, and out of school and malnourished children are other such groups that require focused attention.

Gender Mainstreaming

Women constitute almost half of the population and yet their share in decision making remains negligible. While formation of SHGs has given women a platform to deliberate various issues, the approach should go beyond in the subsequent phases, with inclusion of women in decision making at village level, facilitating the process of their inclusion by holding dialogues with the males, and creation of enabling environment for women to make use of opportunity. Water fetching and child care duties are traditionally attributed to females. RDMT project liberates women from water fetching, support needs to be provided for child care to enable their participation in the interactions aimed at building their natural capacities.

Advocacy for Institutionalisation

Sustenance and expansion of the impact of interventions that support community and help them evolve and adhere to a robust coping mechanism, are contingent on their institutionalisation. This entails that the best practices evolved and adopted as part of the project becomes integral part of the institutional mechanism that has mandate to address water scarcity and droughts. Government programmes that aim at combating drought should build these practices into overall response. It is important to network with other institutions and advocate for these demonstrated successful practices to be included in the disaster risk reduction plan of the government and other technical public agencies. In a democratic *welfaristic* state, such institutionalisation can be achieved by policy reforms.

As mentioned at the onset, drought is a complex climatic phenomenon that has severe implications for indigent population engaged in rainfed agriculture. Variety of its effects on human life and its various aspects - social, economic, political – call for a set of practices that in combination of each other form a coordinated strategy. In order for the strategy to be tangible and successful, all the practices need to be in tandem with each other. EdelGive-GRAVIS association is a leap forward and a hope for better quality of life for people affected by drought most part of the year. This continued partnership has the potential to alleviate drought stricken people from the shackles of poverty, ignorance and powerlessness.

ACRONYMS

AHU	:	Arid Horticulture Unit
CBO	:	Community Based Organisation
GRAVIS	:	Gramin Vikas Vigyan Samiti
NGO	:	Non-Governmental Organisation
RDMT	:	Replicating Drought Mitigation in Thar
SHG	:	Self Help Group
TAC	:	Technical Advisory Committee
VDC	:	Village Development Committee

Glossary

AHU	:	Arid horticulture units are established in arid regions with fruit plants to provide nutrition security through access to diverse food. These units consume less water and can survive hot and dry weather of deserts
Bigha	:	Measure of land (6.25 Bigha = 1 Hectare)
Khadin	:	Khadin is a rainwater harvesting structure constructed in the fields by providing a slope in low lying areas and a bund to prevent water loss during and after the rain, to keep the soil moistened for an extended period of time
Naadi	:	Village Pond
SHG	:	Groups of women in villages, typically having about 12-15 members who come together for savings and collective enterprise
VDC	:	Village Development Committee is the lowest rung of community based local self governance, consisting of about 8 to 10 members of the village, that looks after community related and development issues within a village

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Gramin Vikas Vigyan Samiti (GRAVIS) or Center of People's Science for Rural Development is a non-governmental, voluntary organization that takes a Gandhian approach to rural development by working with the poor of the Thar Desert to enable them to help themselves. Since its inception in 1983, GRAVIS has worked with over 65,000 desert families across 1500 villages in Rajasthan reaching a population of over 1.5 million, and has established over 3,100 Community Based Organizations (CBOs). Through its dedicated field work, as well as its research and publications, GRAVIS has come to occupy a leading position amongst the voluntary organizations in the region.



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