

ROOTS IN RESILIENCE



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Enhancing rain-fed Agriculture led by Older People





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Enhancing rain-fed Agriculture led by Older People

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Supported by
HelpAge International

ISBN 978-81-978288-0-5

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Executive Summary

In the desert regions like Thar, rain-fed farming plays a key role in climate change adaptation. GRAVIS, an NGO based in India, has been working to strengthen rain-fed farming systems since its inception in 1983. It has built upon the traditional knowledge base with modern technical inputs to develop a cost effective and sustainable model for climate change adaptation in desert areas. The model comprises of innovated design *taanka* (rainwater harvesting tank), optimum size and design *khadins* (farming dykes), arid horticulture units to increase food security, setting up village level common seed banks of traditional seeds, renovation of older village ponds and common pastures – *orans* and *gauchars*. The Expanding Older People led Climate Action (EOPC) project expands upon the earlier project Water, Health and Nutrition in Thar that brought the older people in the forefront of Climate Change Adaptation work.

The project is being implemented in six villages of Chohtan sub division of Barmer District, an extremely dry area with low rainfall at the Southern edge of Thar desert bordering Pakistan, over an eighteen-month period. Older People Associations (OPAs) were set up in all six villages to manage the project. The OPAs are socially inclusive with due representation from women and People with Disabilities. The project seeks to construct 96 *taankas* with water filters, 96 *khadins*, 96 AHUs, renovate two village ponds and set up two agro farm forestry units. It has undertaken capacity building trainings in leadership, self-care, health, and natural resource management. The project has disseminated the findings in the civil society and State machinery.

The project interventions have proved their effectiveness, are sustainable and replicable.

The project interventions have led to increased bio diversity, checked land degradation, reduced poverty, ensured food, fodder, and water security, contributed to improvement in health status of the community especially the older people, are likely to lead an improvement in education indicators, have led to improvement in social psychological well-being of old people, reduced gender inequity, and led to reduction in seasonal migration. The documentation process undertook an impact assessment survey to quantify some of the benefits. The Project Impact Assessment survey estimates that each *taanka* adds INR. 30,200/- annually to the household income besides providing water security and relief from distress caused by uncertain availability of water in a dry region. Each *khadin* contributes INR. 20,400/- annually to the household income besides contributing to the food and fodder security of the household.

Project processes have accommodated diversity and gender concerns. The historically marginalised communities and women are represented well in the project decision making structures and beneficiaries. The older people are in the forefront in project management.

The project interventions and outcomes are sustainable - ecologically, institutionally, and financially. The interventions are highly replicable as seen by their adaptation by the community and the State. These provide good value for money. The capital cost is compensated in the very first years while maintenance is low and far exceeds annual benefits of interventions.

Acknowledgements

The consultant would like to acknowledge the support received by the target communities in the project villages and the GRAVIS staff in compilation of this report. The project staff include :

- Mr. Rajendra Kumar : Senior Program Coordinator
- Mr.Hukma Ram Panwar : Project Coordinator
- Ms. Champa Devi : Field Supervisor
- Mr. Maneesh Balotiya : Field Supervisor



Section 1 : Introduction

GRAVIS has been implementing the Expanding Older People led Climate Action (EOPC) project in six remote and needy villages of Chohtan area, Barmer District, Rajasthan, India covering a population of about 12,000 including about 1,500 older people. The project seeks to expand the earlier work done by GRAVIS with support from Age International during 18-month period from April 23 to September 24. The earlier work under the broad heading of Water, Nutrition and Health in Thar (WNHT) sought to improve the well-being of older people in project villages by improving nutrition and water availability through a series of Natural Resource Management (NRM) interventions like construction of *Taankas*, *Khadins*, and Arid Horticulture Units. The emotional and psychosocial needs of older people were met by giving them a leading role in decision making about these physical interventions through formation of village level Older People Associations (OPAs). The health needs were met through suitable training and regular health camps and distribution of aids critical for old age. The project seeks to build sustainability through linkage with Government programs and capacitating the OPAs to the extent where it can continue to be effective beyond the project period.

It is to be noted that the NRM interventions carried out under the project form a package that strengthens rain-fed farming and facilitates Climate Change Adaptation in the Thar desert. The interventions seek to revive traditional eco-friendly farming practices and promote rain-fed farming.



A taanka with silt trap constructed under the project and the beneficiary family



The overall primary goal of the project is to expand older people led climate change adaptation in six villages of rural India and to create and advocate for a scalable model benefiting a larger population in future. The sub-goal of the project is to contribute in improving the health and living conditions of about 1,500 older people and their 10,500 family members (living in six villages) within the Thar Desert by focusing on water, nutrition and health aspects, and to demonstrate the effectiveness of an older people led water, nutrition and health model.

This independent documentation seeks to document and validate the effectiveness of the model for further expansion and scale up in arid zones. It is divided into three sections. After the first introductory section, the second section gives the Objective, Methodology. The third section is the main body of the report. It is divided into following sections.

- Results and benefits
- Integrated approaches and key features
- Lessons learnt
- Challenges
- Sustainability
- Replicability



Another taanka in project area



Section 2: Objectives and Methodology

Objective of the current documentation: Document and validate the effectiveness of the model for further expansion and scale up in arid zones.

Documentation is an important project activity. The purpose of this mid-term independent documentation is to document and validate the effectiveness of the model for further expansion and scale up in arid zones. Sound, replicable and sustainable project management processes provide a framework for new projects based on what has been successful in the past and lessons learned from what has not been so successful. It is proposed to assess the experience of Older People led rain-fed Farming during project implementation in the first year with a view to document the lessons emerging from the project. The exercise will assess (i) the effectiveness of the project interventions (ii) the sustain ability (iii) the replicability of the model. These three elements are further described below

Effectiveness: The exercise will assess effectiveness of project interventions along following criteria

- 1) Have the project outputs achieved their stated objective of promoting rain-fed farming?
- 2) To what extent is the project coordinating and collaborating with state programs to increase its effectiveness and impact?
- 3) What are the main factors –internal to the project and external- that have facilitated or hindered the project's ability to reach the desired results thus far?

Sustainability : The concept of sustain ability in climate change adaptation projects is different than in other projects. The reason for this is that adaptation projects seek to raise adaptive capacity to long-term climate change. Raised adaptive capacity implies, fundamentally, sustain ability. That is, the project's very raison d'être is sustain ability and this is central to its strategy and approach.

The documentation will look at following aspects of sustain ability

- Ecological Sustain ability
- Institutional Sustain ability
- Financial/Economical Sustain ability

The documentation will explore

- To what extent are the 'Older people led rain-fed farming processes' likely to be sustained after the project period is over by the stakeholders?
- What further concrete steps could be taken to increase the sustain ability of the results?

Replicability : rain-fed farming is especially crucial for arid zones that have low water availability. The documentation will capture the innovative mechanisms used by Project to promote rain-fed farming leading toward adaptation to climate change in arid zones. These mechanisms will be of interest to other



areas and countries facing similar challenges. The project is explicitly designed to facilitate the replication of successes and lessons learnt. The interventions undertaken are in the nature of pilots that may be further replicated.

David P. Racine laid out four dimensions of replicability of any social intervention in his article 'Replicating Programs in Social Markets' <https://search.issuelab.org/resources/12059/12059.pdf> The four dimensions are program product, program process, environment support, environment constraints. The GRAVIS model as implemented in the EOPC project will be analysed along these four dimensions.

Methodology

The review is based on a participatory approach, involving key stakeholders, taking into account the need for adequate gender representation, representation of persons from vulnerable socio-economic backgrounds (SC/ST/ OBCs/ Minorities) and representation of persons with disabilities (PWD), to the extent possible. The documentation has used both primary and secondary data sources for probing the progress and for generating evidence in support of the findings. To the extent possible, quantitative and qualitative data has been collected, validated, analyzed, and triangulated.

- Desk review to understand the interventions carried out to strengthen rain-fed farming and to collect relevant secondary data
- Designing of survey tools
- Orientation and training of GRAVIS field team on required data collection
- Analysis of data collected and writing report draft
- Final report writing



Discussing setting up an agrofarm forestry unit

Section 3: The findings and way forward

This chapter presents the results of the exercise undertaken. It starts with a description of the results and benefits accruing from the project. This is followed by identifying the integrated approach and key features of the project. The lessons learnt are discussed next followed by sections on sustainability and replicability of the project. The last section looks at the challenges.

Results and benefits

Increasing Biodiversity: The project contributes to bio diversity through its Arid Horticulture Units (AHU) and AgroFarm Forestry Units (AFFU). A number of fruiting trees are supplied in AHUs. These include Gunda/ lasoda (*Cordia dichotoma*), Ber (*Ziziphus mauritiana*), Drumstick plant (*Moringa oleifera*), Lemon (*Citrus limon*), and Karonda (*Carissa carandas*). Diverse species of plants have been carefully selected and planted within the AFFUs to serve multiple purposes. The species selected are local in contrast to state sponsored plantations that often focus on quick growing exotics like *Prosopis juliflora*. The plants provide fodder for live stock, fruits for consumption or sale, and firewood for cooking and heating. Additionally, certain species are chosen for their potential use in timber production, supporting local furniture-making industries. The medicinal and other uses of plants planted in AHUs and AFFUs are given in Annexure 2.

Checking Land Degradation : The *khadins*/ farm dykes check soil erosion and make the farm land more fertile. The plants in the AHUs and AFFUs will play a crucial role in mitigating the effects of climate change on soil quality, livestock, and human well-being. Their root systems help stabilize soil, preventing erosion, while their canopy provides shade, reducing ambient temperatures and offering protection from windstorms and heat waves.



An AHU

AHU for Karima



Karima is 76 years old and comes from Muslim community. She has four children.

The family's economic situation is weak. It has one *pucca* and one *kutchha* room. Her husband Mr. Hakim is a farmer. The two sons are both married and live separately. The daughters are also married and live at their in-laws' place.

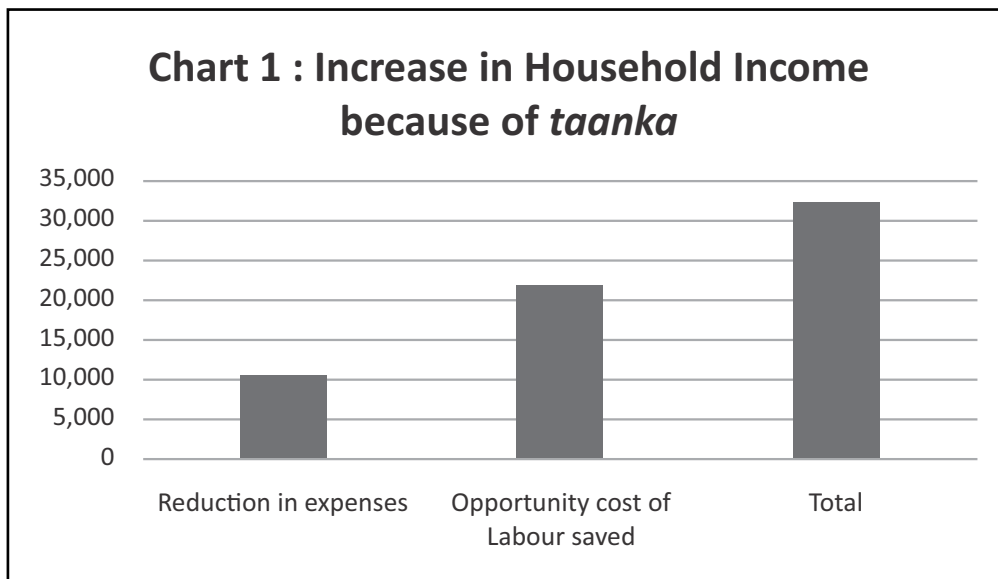
She owns two cows and nine goats. Agriculture and animal husbandry are the main sources of income. She learnt about the GRAVIS program when she participated in the Village Development Committee meeting. She found out that GRAVIS organization is supporting the needy people in village through construction of *taankas*, *khadins*, and horticulture units. After becoming aware of this, she applied to the VDC for a horticulture unit, sharing her current status and the economic difficulties faced by her. The VDC members assessed the ground situation, verifying the details given by her. She qualified on the criteria set up by GRAVIS and VDC for allocation of AHU. After this the VDC sanctioned an AHU for Ms. Karima.

The AHU unit was planted in the year 2023. There are seven saplings of goonda, seven of ber, three of lemon, one of drumstick, one of *khejdi*, and one of tamarind. GRAVIS sponsored training of Ms. Karima in horticulture practices. She was very happy to undergo the training. She realized that horticulture can be a source of livelihood. She plans to use the fruits harvested this year for consumption at home and selling in the market if surplus. She feels that she will be better able to run her house and improve the economic situation of the household.



Poverty Reduction : The project contributes to poverty reduction through (i) reduction in household expenditure on getting water and (ii) augmenting production on agriculture fields (iii) augmenting production from AHUs. The AHUs are yet to become productive, but the benefits from the first two interventions have started flowing.

Availability of *taanka* is a major boon as water is a key and scarce resource in arid areas. Data was obtained from five *taankas* from five project villages to estimate the benefits that have accrued because of construction of *taankas*. Data shows that the *taankas* were able to supply water for six months a year. This led to significant reduction in the cost incurred to get water. Average annual household expenditure on getting water came down from INR. 14,800/- to INR. 4,600/- This translates into an average annual household saving of INR. 10,200/-, a significant amount. In addition, the *taankas* also result into significant savings in time spent per day in getting water. Data from the five households where *taankas* were constructed shows that the time spent per day in accessing water reduced from 3.6 hours to 1.2 hours. If this reduction in time is considered in monetary terms with the opportunity cost of labour at INR. 25 per hour, this amounts to a saving of INR. 21,900 per year. Thus, the total incremental value of a *taanka* in monetary terms is INR. 32,100/-. The benefits accrued are shown in the following chart



Source : Project Impact Assessment Survey



Nathu Devi and her taanka

Nathu Devi is 70 years old and comes from Meghwal Community. She has two children.

Nathu Devi is a resident of Sumar ki basti village in Chohtan tehsil of district Barmer. The village is located amongst sand dunes and population is scattered. Her husband Aidan Ram was a farmer. She has one son who is married and lives separately. Her grandson and his wife stay with



Nathu Devi doing farming and wage labour. The two daughters are married and live at their in laws place.

Nathu Devi stays in her kutchha house. She has 15 hectares of land. She also own four goats, two cows, and one buffalo. The main sources of livelihood are rain-fed farming and animal husbandry. Earlier the household did not have a *taanka*. She had to fetch water from two to five kms away in extreme heat and windstorms even at her advanced age. After she attended a VDC meeting, she found out about the EOPC project and the interventions being undertaken under it. Then Nathu Devi applied for allocation of a *taanka* and gave details of her economic situation to the VDC.

After assessing the ground situation and the criteria for selection of beneficiaries, the VDC sanctioned a *taanks* for Nathu Devi with assistance from EOPC project. This was constructed in the year 2023. The *taanka* has been constructed in front of her house. She does not need to travel long distance for fetching water. She is relieved from the mental tension that she suffered from earlier because of the constant thinking about water. It is expected that the rainwater in her *taanka* will last for six months. She had to pay INR. 700 per tanker earlier. This expenditure is saved now. This is also clean water and she is protected from sickness. She is able to maintaing better personal hygiene because of easy availability of water. Thus she is able to lead a healthy life because of the *taanka*. She is proud of it and hopes that other needy households will also receive similar benefit.

Data from four *khadins* in different project villages showed that the area under cultivation in these *khadins* went up from 6 hectares to 9 hectares, a hike of 43 percent. The total food grain production went up from 7.5 quintals to 36.7 quintals, an increase of 389 percent. Similarly, the fodder production went up from 12 quintals to 53.8 quintals, an increase of 348 percent. If the increase is considered in monetary terms, assuming an average rate of INR. 25/- kg for food grains and an average rate of INR. 2/- kg for fodder, the increase in food grain and fodder translates into an average increase in annual income of INR. 20,400/- per year.

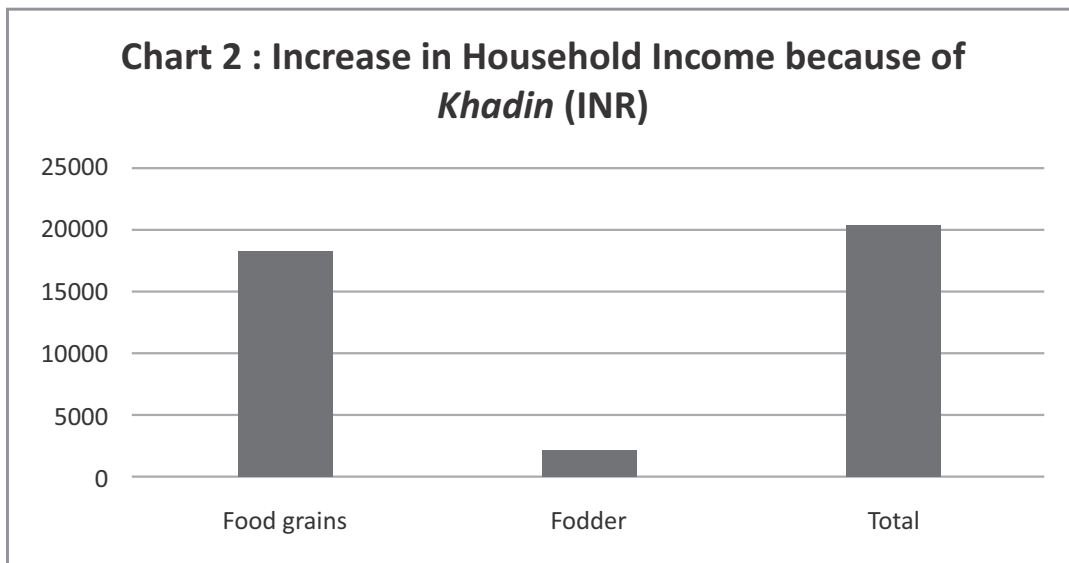


Table 1: Increase in food grain and fodder production because of *khadins* in project area

Indicators	2022	2023	Increase	Increase %
Area under cultivation (in hectares)	6	9	3	43
Grain production (in quintals)	7.5	36.7	29.2	389
Increase in fodder production (in quintals)	12	53.8	41.8	348

Source : Project Impact Assessment Survey

The increase in household income because of project interventions can be shown graphically below



Source : Project Impact Assessment Survey

Food Security : The project contributes to food security by increasing production on agriculture land where *khadins* are constructed and setting up AHUs that will provide nutritious addition to the household food basket. While it will take some time before the AHUs become productive, the *khadins* constructed in the first year have augmented food production contributing to food security. The Table 1 above shows that food availability of food grain per household increased by more than seven quintals. This is a significant hike and will contribute to the food security at household level.

Fodder security : Livestock is a key component of the livelihood system of desert areas. When crops fail because of scarce rainfall, livestock continues to provide support to household livelihood. The project interventions lead to substantial increase in fodder availability for livestock. The increase in agriculture production directly leads to increase in fodder production also. Data given in the table above shows that in the *khadin* areas fodder production increased substantially. As shown in Table 1, availability of fodder per household increased by more than 10 quintals.



Cultivation in a khadin farm

Livestock development : The availability of sufficient water from *taankas* and increased availability of fodder has encouraged community members to invest in livestock, as they no longer face challenges in providing water for their animals, thereby promoting live stock development and economic sustainability.

Socio-economic Benefits : There are multiple socio- economic benefits from the project.

- **Physical Strain and Health :** The physical strain and health issues associated with water collection, such as tension, back pain, and headaches, have significantly decreased among women beneficiaries, leading to improved overall well-being.
- **Social Cohesion and Status :** Taanka serve as a symbol of pride and ownership in the community, elevating the social status of beneficiaries and fostering a sense of unity and pride among villagers.
- **Increased Social Interaction :** The time saved from water collection is now utilized by beneficiaries to engage in social activities, fostering stronger community bond and relationships.

Health : Access to clean water from *taankas* has enhanced community health by providing a reliable source of safe drinking water and facilitating regular personal hygiene practices, thereby reducing the prevalence of water borne diseases. The ground water in the project areas has high amount of fluoride. Incidence of fluorosis was high. This has reduced because of available of safe drinking water from rainfall for almost six months a year.

Salya and her Khadin



Salya is 60 years old and comes from Muslim Community, She has Six Children.

Salya belongs to a farmer family. Her husband Shri Hameer is a farmer. The family has three sons who are all married. The two elder sons live separately. The youngest son lives with his parents, as is the norm in rural Rajasthan. The daughters are also all married and live at their in laws' place. The family has 3.7 hectares of land. They have one cow, one buffalo, and eight goats. The livelihood is mainly dependent on farming and animal husbandry.

Salya lives in the village Jaani ki Basti that has scattered settlement in Chohtan tehsil of District Barmer. Earlier, their field did not hold water. This meant that the agriculture production was low. This was a source of worry for the household. Salya contacted the VDC and applied for construction of a *khadin* in her land. She gave details of the household situation. The VDC assessed the ground situation and criteria adopted for sanction of *khadin*. The family qualified on both of these. Subsequently a *khadin* was sanctioned for Salya under the EOPC project sponsored by GRAVIS.

A *khadin* was constructed in the year 2023 in the farm of Salya. The family has hopes of good production for the kharif crop (rainy season) in the year 2024. If it rains in the winter season, the family will sow black gram and taramira also. Salya shared that earlier the water would flow through her farm taking along fertile top soil and manure. The production would be less. In 2023, she attended a training on advanced farming systems using better quality seeds and new techniques. This has been very helpful. The family has gained economically. The animals will have fodder for round the year. The money spent in buying fodder will be saved. The family thanks GRAVIS and hopes that it will continue to support small and marginal farmers like her.



Education : The project interventions will have a significant impact on educational status of children in the village in a number of ways. Household incomes have a direct impact on schooling of children. Higher household income as a result of project intervention will lead to higher retention in schools and increase in years of schooling. Children, freed from the responsibility of water collection, can now attend school regularly, thus improving their access to education and future prospects.

Improvement in situation of older people : The project seeks to ensure a lead role for the older people in the climate change interventions. It has formed Older People Associations (OPAs) in all six project villages comprising of 66 older people. The OPA functions as the Village Development Committee managing the project and taking all project related decisions. Project has undertaken capacity building of OPAs through regular trainings. It has conducted trainings on Natural Resource Management, Leadership, and Health & Nutrition.

The focus on older people has led to reduction in their social isolation. Normally the older people tend to get excluded from household decision making as their contribution to household income is reduced. The project interventions like AHUs create gainful economic activities for older people as these involve tasks that old people can perform easily. Older people also experience abusive behaviour like not being given adequate food and water, being overloaded with work, and neglect of their health needs. This abuse has come down as old people have become sought after as the project allocates assets to households with old people. It has also undertaken trainings sensitizing people to needs of the older people.

Reduction in gender inequity : Project has a great impact on reducing gender inequity. It has ensured participation of women in all project activities. This starts with the decision making. There are 32 female members out of a total of 66 members in the OPAs. Thus, women comprise almost 50 percent of the OPAs. The proportion of women allottees in the three household assets created under the project – *taanka*, *khadin*, and AHUs – was 82, 47, and 93 respectively as shown in the table below

Table 2: Proportion of Women Allottees

<i>Household asset</i>	<i>Number of allottees</i>	<i>Proportion of female allottees</i>
<i>Taanka</i>	61	82
<i>Khadin</i>	62	47
<i>AHU</i>	61	93

Source: Project Annual Report

Women also participated in significant numbers in the capacity -building trainings carried out under the project as shown in the table below

Table 3: Female participation in Capacity Building Trainings

<i>Theme of the training</i>	<i>Number of participants</i>	<i>Proportion of female participants</i>
<i>Self-care</i>	436	56
<i>Natural Resource Management</i>	251	56
<i>OPA leadership</i>	245	44
<i>Health and nutrition</i>	236	44

Source: Project Annual Report



Reduction in migration : It is expected that migration of the younger members of the family has reduced amongst the project beneficiaries. Now, they earn sufficient income from agriculture with the help of *khadins*, enabling them to meet their basic needs.

Persons with Disability : The project has also ensured inclusion of Persons with Disability. Out of 66 members of OPAs in six villages, seven are Persons with Disability.

Environmental challenges

Environmental changes, including changing rainfall patterns and vegetation, have affected Rajasthan's desert ecology, impacting local flora and fauna. One of the key phenomena that is accompanying climate change is occurrence of extreme weather events. Rajasthan, the desert state of India, was in the news last year for the unusually heavy rains that lasted days in the months of July and August, flooding towns and cities and marooning villages.

Rajasthan State Action Plan on Climate Change has explored in depth the impact of climate change on agriculture. It used a set of 20 variables to determine Agriculture Vulnerability Index (AVI). This can be defined as the degree to which an agricultural system is susceptible to harm or unable to cope with the adverse impacts of climate change. It found out that the districts with the highest agriculture vulnerability are clustered in the west. The Plan also constructed a climate Hazard Index using a set of five variables such as annual rainfall, monsoon rainfall, deviation from normal rainfall, deviation from monsoon rainfall and drought occurrence. The districts in the dry Western regions turned out to have the highest Hazard Index.

<https://environment.rajasthan.gov.in/content/dam/environment/Env/Pdf Files/Draft%20of%20State%20Action%20Plan%20on%20Climate%20Change%202022.pdf>

The project has propagated mixed farming as a key adaptation mechanism to mitigate impact of climate change. The traditional dryland agriculture practice in the project region in some of the driest parts of the desert has been to undertake mixed cropping. A mix of five crops – *baajra, mung/moth, guar, til, and matira* – are sown together. The logic is that if the rainfall pattern is not suitable to one or more crops, at least some other crops will survive. The logic has been borne out by the results in recent years that have seen many extreme weather events like unusually heavy rainfall and long breaks between the rains during the monsoon season.

Integrated Approaches and Key Features

Community engagement for empowerment : The GRAVIS model is based on people led action. The project interventions are carried out in the villages through a representative body called Village Development Committee (VDC) that is socially inclusive, gender sensitive, and includes PwDs. The VDC undertakes all project related decisions. One critical decision related to allocation of household level structures – *taanka, khadin, and AHUs*. The number of structures is limited because of budgetary



constraints. In such a scenario, the allocation of these structures requires framing just guidelines that are accepted by the community. Involvement of people's representatives facilitates this sensitive task. The village community is well aware of the situation of individual households. A just collective decision is taken.

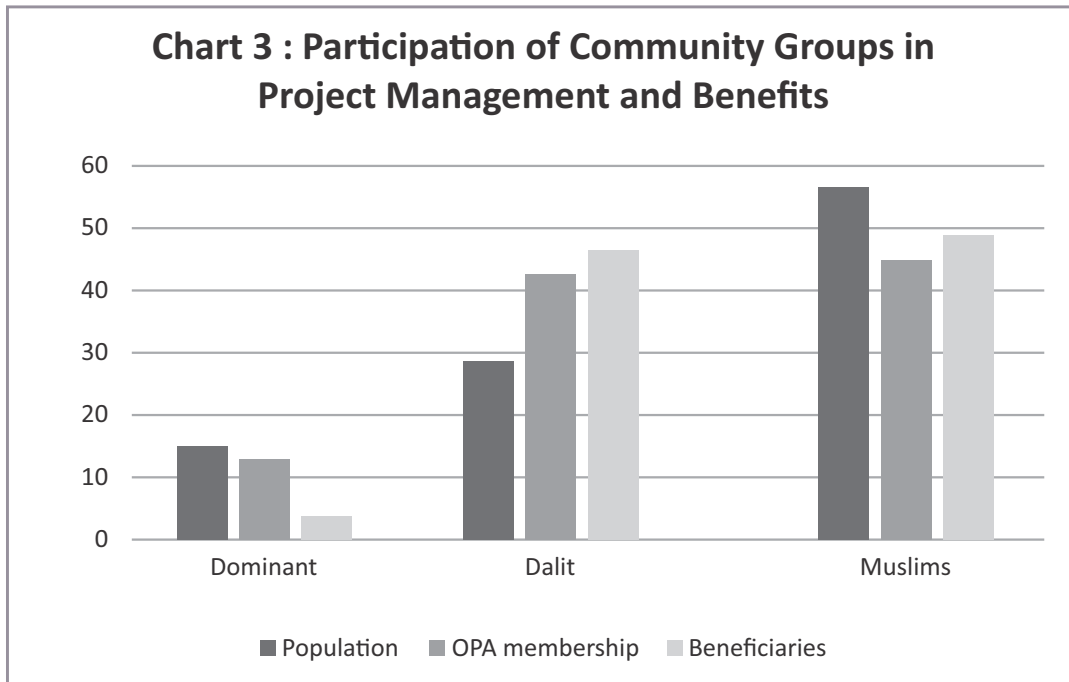
Enhancing older people's leadership through OPAs : This is the key project feature that distinguishes the project from other similar projects. The project has institutionalized the leadership of old people through formation of OPAs. The OPAs are given the task of managing the project interventions. This involves selection of beneficiaries for household structures like *taanka*, *khadin*, and AHUs and monitoring the construction of the structures. The lead role by old people ensures that the traditional knowledge base is utilized and passed on to the next generation. This is universally accepted that traditional practices promoted rain-fed farming that is crucial for rain-fed farming systems.

Towards a Just Transition – ensuring social inclusion in Climate Change Adaptation projects: Ensuring that climate change adaptation interventions do not have an adverse impact on marginalized communities is crucial. This is even more important for a country like India that has a highly hierarchical social structure. The project has ensured that the structures created under the project are distributed in an even manner across all communities in the village. The aspect of social inclusion is kept in mind from the very beginning. One of the first activities after starting work in a village is to map the communities in the village through a participatory rapid appraisal.

The social inclusion in benefits distribution can be seen in the diagram below. For ease of analysis and understanding, the community/caste groups within a village have been divided into three groups – dominant, dalit, and Muslims. These are described below

- **Dominant:** The dominant category includes general and landed / peasant castes like Rajput, Jat, Bishnoi, and Rabari.
- **Dalit:** This includes castes classified as Scheduled Caste and Scheduled Tribe. In the project area, the two major dalit castes are Meghwal and Bhil.
- **Muslims:** Muslims have been classified as a separate group. Moslem community is also affected by caste system, albeit to a lesser degree. While some Muslim communities are classified under Other Backward Castes, some may hold significant land holdings.

As can be seen, the share of the most marginalised group – Dalits – is more than their proportion in population in both the OPA membership and in project benefits. Share of dominant groups in project benefits is almost half of their proportion in population. Share of Muslim is almost same as their proportion in population.



Source : Project Impact Assessment Survey

Strong partnership with government agencies enabling climate mainstreaming and sustainability of outcomes : Bridging the gap between Government programmes and communities through the leadership of Older People is one of the project objectives. The project organized two Dialogues with key Government functionaries at Ambedkar Nagar and Sumarki Basti village. The dialogues were led by the old people from the community. The Government side was represented by the Block Development Officer and Tehsildar. The Dialogues facilitating an exchange of ideas and expert is between older individuals and government representatives.

These dialogue should profound significance as they provide platforms where older community members can advocate for their specific needs and concerns.

A notable outcome of these dialogues is the inclusion of older people's voices in development plans, ensuring that their perspectives and experiences are not overlooked but rather integrated into strategies aimed at fostering inclusive growth. This inclusive approach not only promotes representation, but also leads to the formulation of culturally sensitive interventions that resonate with the community's unique context and values. Project interventions like *taanka* have been adopted by the rural employment generation scheme called MGNREGA. Taankas are being constructed under this scheme.

Lessons learned

Science-based intervention and continuous improvisation : Though rooted in local milieu, GRAVIS interventions also incorporate science-based inputs for resource and benefits optimisation. To illustrate the design of *khadins* is proposed by the technical team of GRAVIS that comprises of trained engineers. The

circular *taanka* design optimises resource use. GRAVIS has not sat upon its model and replicated the same without any further changes. It has come up with improvisations to improve the model. It has undertaken simple innovations to augment the effectiveness of its interventions. To illustrate the silt trap constructed at the inflow of the water into *taankas*, introduction of water filters constructed with local material, the lining of the channels carrying water to the *naadis*, masonry overflow for *khadins* are some of the innovations that GRAVIS has introduced over the years.



Masonry spillway of khadin

Adaptive management to ensure the sustainability of Interventions: Opportunities for project sustainability can vary from site to site. Thus, adaptive management is key to ensure sustainability of interventions, and should be built into project design. Early-stage design of the project needs to be adjusted to ecological conditions, extreme weather, socio-economic situations, political changes, and delays. COVID was one such event. Extreme climate events are on the rise in the desert region. To illustrate in the year 2024, till the time of writing of the report the 10 districts of Western Rajasthan had received large excess rainfall to the tune of 75 percent. The project district Barmer has received excess rainfall of 47 percent.

https://mausam.imd.gov.in/imd_latest/contents/rainfall_statistics_3.php

Documentation and dissemination of lessons learned: It is important that the key achievements of the project are documented and disseminated through appropriate channels including public and social media. This will induce other communities also to adopt the practices promoted by the project to strengthen rain-fed farming.

People centred approaches leading to inclusive local engagement and climate action: The methodological alliance between Older People Association and project enabled the enhancement of technical skills, community empowerment and women's leadership for resilience and climate change adaptation. OPAs are socially inclusive because of their focus on small landholders and marginal communities, who are often among those more vulnerable, and their methods contribute to improving

livelihoods and reducing rural poverty.

The dynamic and community driven platforms have proven to be successful approaches to encourage behavioural change and agile responses to threats. In earlier projects, the OPAs/ VDCs were active and engaged on COVID-19 awareness through their engagement with the community and their connection on WhatsApp for information sharing. The project demonstrates how people in villages can become real agents of change through participatory approaches.



Water filter in use

Need to Include Livestock Development in the Model : Animal husbandry is a key component of the livelihood systems of the desert areas. The low and erratic rainfall means that only one out of three years a good crop is assured. Rest of the years may be drought years or years when there is some production of food grain but not much. Almost two third of the years are like this. However, even when there is a crop failure and not much production of food grains, there is fodder production that sustains livestock. The project interventions lead to an increased availability of fodder and water that is likely to lead to an increase in livestock of the resident communities. The GRAVIS model could also include some focused interventions around animal husbandry.

Role of Health Camps in changing health care seeking behaviour : Outreach Medical Camps (OMC) are a key project activity. The camps have led to changes in health care seeking behaviour. Village people avoid going to a health facility for normal testing because of the distance. In case of OMCs, the facility came at their door step. The basic parameters like sugar and blood pressure were tested. Village people and especially old people have become aware of diseases like diabetes and hypertension that can be life taking if not treated.

Agro-farm forestry unit : Project experimented with a new feature in the long-established GRAVIS model. It has set up agro-farm forestry units at two farms. These units promote cultivation of trees that will provide food, fodder, fire wood, and timber. The trees also help in increasing biological diversity. The AFFU promote



cultivation of local trees that have started disappearing with coming in of intrusive species like *Prosopis juliflora*

Challenges faced

The project has faced some challenges.

Uncertainty in rainfall : The monsoon rainfall is highly uncertain and more so in arid areas. The staple crop of the region is pearl millet. It is also the main food crop. However, this needs to be sown within a certain time. Late arrival of monsoon means that the farmers can not sow the pearl millet crop. They have to then shift to crops like gowar, that is a cash crop and sorghum that is used more for fodder. The *khadins* do allow the farmers to take a winter crop if rainfall is late.

Excess rainfall : As shared in the report, the arid western zone has been experiencing increasing rainfall. The rainfall was more than 75 percent in the project district of Barmer. This can also create problems. Sometimes the standing crop can be destroyed because of excess rainfall.

Demand is more than supply for the assets to be created under the project: There is high demand for the assets to be created under the project and not enough funds to meet this demand. This can create problems. The issue is resolved through the VDC where the VDC members are aware of the ground situation.

Sustainability

The concept of sustainability in climate change adaptation projects is different than in other projects. The reason for this is that adaptation projects seek to raise adaptive capacity to long-term climate change. Raised adaptive capacity implies, fundamentally, sustainability. That is, the project's very *raison d'être* is sustainability and this is central to its strategy and approach. In addition, the project has the following elements to increase sustainability:

Ecological Sustainability

Given that an overall aim of the project is to improve sustainable resource use in order to help manage desert ecosystems all elements of the project approach should contribute to ecological sustainability. By maintaining ecological balance and supporting integrated management, the project directly contributes to ecological sustainability. The project has done this by propagating mixed cropping under the rain-fed farming system. Two elements of the model can be cited that promote ecological sustainability during a period of climate change.

- **Mixed cropping pattern:** Diversification of crops can shield farmers against the vagaries of nature by giving them a wider choice. Mixed cropping is already the norm in the project area. Unfortunately, this has been getting replaced with mono cropping under irrigated agriculture. The EOPC project has sought to revive and continue the practice of mixed cropping. It started seed banks in the project villages to



support traditional seeds and promoted rain-fed farming. The surety of crop survival has induced farmers to increase number of crops sown. To illustrate while the four farmers on whose land *khadins* were constructed sowed only eight crops during the year 2022 when the *khadin* was not there, they sowed 12 crops after *khadin* construction.

- Khadin: The farm dykes, locally known as *khadins*, play a critical role in extreme weather events like scarce rainfall, early rainfall, late rainfall. Khadins preserve top soil. Degradation of top soil is a major environmental hazard in desert areas.

Institutional Sustainability

It is important that the institutional structure that is promoted to undertake the project interventions is sustainable. It continues to be in existence after the project is withdrawn. The GRAVIS model normally sets up a Village Development Council (VDC) to manage the project in the village. However, under EOPC project, older people have been brought in the forefront. Older People's Associations (OPA) have been formed in the project villages to take over the functions performed by the VDCs. These are set up to ensure inclusion of older people in the development process and making use of their traditional knowledge. The OPA is in charge of the physical and financial aspects of the project. It takes decisions on allocation of the assets to be created under the project to individual beneficiaries. It comprises of the major caste groups in the village so that it is socially inclusive. It also has adequate representation of women.

At local levels, the main measures in the project design to achieve sustainability are

- training for local people in various aspects of project management
- creating village-based organizations for implementing the project interventions
- supporting existing agencies and experts;
- empowering communities and decision-makers;
- developing capacity to undertake income revenue activities
- strengthening existing consultation and decision-making structures.

The project has developed linkages with the local Government – the village level panchayats and the block level Panchayat Samitis. At the national and state levels, although the stakeholders and issues are different, the approach to assure institutional sustainability is the same. Finally, the project aims to leave behind a strong cadre of experts able to plan, design, build, and monitor rainwater harvesting structures. This cadre will be able to sustain project impacts after the project has been completed.

Financial/Economic Sustainability

The intervention measures should have costs that are affordable. Further any structure or asset created will have an ongoing maintenance cost. This too should be affordable. The per unit capital and ongoing maintenance costs of the household level intervention measures are given below. As can be seen the annual



maintenance cost of structures created is low and easily manageable by even resource poor households. In case of *taanka*, it is three percent of the annual benefits and for *khadins* it is 12.5 percent of the annual benefits.

Table 4: Capital and Maintenance Costs of assets created

<i>Asset</i>	<i>Capital cost (INR.)</i>	<i>Annual maintenance cost</i>
<i>Taanka</i>	<i>37,000</i>	<i>960</i>
<i>Khadin</i>	<i>38,000</i>	<i>2550</i>
<i>Arid Horticulture Unit</i>	<i>19,000</i>	<i>1500</i>

Source: Project reports and Project impact assessment survey

Given the poor resource base of the desert economy, it may not be possible for resource poor households to raise the capital cost. However once constructed the maintenance costs are affordable for all segments of the population.

Project also keeps cost low by building capacity to undertake all steps in constructing these measures locally. This further lowers the cost of these measures – all capacity will be available locally. Further, the project has built local organisational capacity to demonstrate that communities can maintain the physical constructions. It is important to note that the 'demonstration' aspect of the project has implications for sustainability. In part, the project aims to demonstrate innovation, and to capture lessons learnt. Both of these are processes which require financing. Once something has been 'demonstrated', it does not require demonstrating again, so the costs associated with demonstration can be one-off (and do not need to be recovered).

Replicability

Climate change adaptation remains at early stages of development in the region. This project can therefore identify new and innovative mechanism for adaptation to climate change in desert areas. These mechanisms may be of interest to other similar agro-climate regions facing similar challenges – in the country or outside. Accordingly, this project is explicitly designed to facilitate the replication of successes and lessons learnt. The strategy for this replication is two-fold:

First, the project will demonstrate adaptation in a range of situations. This will lead to the generation of a sizeable body of lessons and experience. It is to be noted that physical conditions in Thar are not same in all regions. All the districts have their own characteristics. The GRAVIS model has now been tested in different regions of Thar successfully including districts of Jodhpur, Bikaner, Jaisalmer, and Barmer.

Second, the project will document and actively and strategically disseminate the lessons learnt from its implementation. A number of activities have been designed in the project with this aim. These include

- Organization of a dissemination event
- Two project publications for learning and advocacy



- Organization of ToTs for NGOs and Government agencies focused on OPA model
- IDOP events: Project celebrated the International Day for Older People by organizing an event.

Replication is envisaged to cover other households in the project villages who have not been allotted household assets like *taanka*, *khadin*, and AHUs. The village level assets like *naadi* renovation may also be replicated. The project impact assessment survey shows that *taankas* have been constructed in the project area in large number – both by the Government and by people themselves. The project impact assessment survey documented 710 *taankas* constructed by the Government and 688 *taankas* constructed by the community itself in project villages. The *taankas* constructed by the community are smaller in size and referred to as *taanklis* in local language.

David P. Racine laid out four dimensions of replicability of any social intervention in his article 'Replicating Programs in Social Markets' <https://search.issuelab.org/resources/12059/12059.pdf> . The four dimensions are program product, program process, environment support, environment constraints. The GRAVIS model as implemented in the ECOP project is analysed these four dimensions.

Program Product : How Good a Performer is the Program? The first and most obvious set of dimensions speaks to key qualities of the outputs of a model program. Effectiveness is obviously crucial in assessing whether a program is replicable.

The effectiveness of the interventions is well proven. The Impact Assessment Survey shows that the interventions are highly effective. The *khadins* create an average benefit of more than INR. 20,000 per household. The impact of *taankas* is even more at INR. 32,000 per household. While the impact of AHUs is not calculated as the plants have not yet come into full production, it is likely to be significant as well.

Program Process : How Easy is the Program to Implement? Often a program's performance is the only standard by which the wider world judges it. But to gauge a program's replicability, other dimensions related to the ease of implementation may be equally important. There is also the obvious constraint of direct costs — whether a particular operational design is affordable, relative to the benefits it produces or by other standards.

The interventions are easy to implement. These require simple technology, skill sets, and material that is easily available at village level. As shown by figures in Table 4, the capital cost of both *khadin* and *taanka* can be recouped in two years. The maintenance cost is very low.

Environment/ Market Supports : How Encouraging is the Environment for What the Program Tries to Achieve? A program's broader market or environment will be more or less favourable to the kind and level of social change it claims to engender. Much of the appeal of a social program turns on how a wide variety of actors — potential adopters and funders, opinion leaders, social scientists, and others — perceive its significance.



Climate change adaptation is a major global issue. There is likely to high amount of funding available for this type of work. The wider environment is highly supportive of the interventions promoted under the model.

Environment /Market Constraints : What Limitations Does the Environment Impose on the Operation of the Program? Adaptability is a key feature of replicability. Under ideal circumstances, a program would simply be able to operate as it was designed. In reality, however, its manageability will depend on how complex it is to operate given its context.

While the current implementation was confined to one cluster in one arid district of Rajasthan, the interventions have been carried out in all the desert districts of Rajasthan. In fact, the interventions have also been implemented successfully in other countries like Kenya and Malawi.

The replicability of the model is proven by the large number of locations and families where the interventions have been carried out. GRAVIS has implemented the model in three states of the country with 250,000 families in more than 2000 villages impacting 1.8 million needy people.



A taanka constructed in one of the project villages



Acronyms

AFFU - Agro-Farm Forestry Unit

AHU - Arid Horticulture Unit

EOPC - Expanding Older People led Climate action

GRAVIS - Gramin Vikas Vigyan Samiti

NRM - Natural Resource Management

OPA - Older People's Association

VDC - Village Development Committee

Glossary

Khadin - Farm embankment to store rainwater on the farm

Taanka - Underground masonry tanks for harvesting rainwater

Oran - Village forest

Gaucher - Pasture

Khejeri - A desert tree



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GRAVIS is a leading Non-Governmental Organization working in rural India in the States of Rajasthan, Uttarakhand, and the Bundelkhand region of Uttar Pradesh. Since its inception in 1983. GRAVIS has worked in over 2,000 villages reaching a population of over 2.5 million and has established over 4,000 Community Based Organizations (CBOs). GRAVIS believes in participatory community development that blends traditional knowledge and modern sciences and promotes equality.

GRAVIS is registered under Rajasthan Societies Registration Act and under section 80 (G) and 12A of IT Act, 1961 of Government of India with tax exemption status.